COMMONWEALTH of VIRGINIA
Board of Education Agenda

Date of Meeting: September 23, 2010 **Time:** 9 a.m.
Location: Jefferson Conference Room, 22nd Floor, James Monroe Building
101 North 14th Street, Richmond, Virginia

9:00 a.m. FULL BOARD CONVENES `

Moment of Silence

Pledge of Allegiance

Approval of Minutes of the July 22, 2010, Meeting of the Board

Public Comment

Consent Agenda

A. First Review of a Proposed Amendment to the *Licensure Regulations for School Personnel* (8 VAC 20-22-10 et seq.) to Conform to Senate Bill 715 Passed by the 2010 General Assembly

B. First Review of a Proposed Amendment to the *Regulations Governing the Review and Approval of Education Programs in Virginia* (8 VAC 20-542-10 et seq.) to Conform to Senate Bill 715 Passed by the 2010 General Assembly

C. First Review of the Notice of Intended Regulatory Action (NOIRA) to Promulgate *Regulations Governing Competitive Food in the Public Schools*

D. Final Review of Proposed Board of Education Meeting Dates for the 2011 Calendar Year

Action/Discussion: Board of Education Regulations

E. First Review of Final Amendments to the *Regulations Governing Local School Boards and School Divisions* (8 VAC 20-720) and Repeal of the *Rules Governing Fees and Charges* (8 VAC 20-370)

Action/Discussion: Board of Education Regulations (continued)

F. Final Review of Amendments to the *Regulations Governing Local School Boards and School Divisions* (8 VAC 20-720) and Repeal of the *Regulations Governing Instructional Materials-Selection and Utilization by Local School Boards* (8 VAC 20-1790), *Regulations Governing Textbook Adoption State Level* (8 VAC 20-220), *Regulations Governing Textbook Adoption Local Level* (8 VAC 20-230), and *Regulations Governing Textbook Fund Management and Handling on Local Level* (8 VAC 20-270)

G. Final Review of Revisions to the *Regulations Governing Pupil Transportation* (8 VAC 20-70-10 et seq.)

Action/Discussion Items

H. First Review of Proposed Revised Curriculum Framework for 2010 *English Standards of Learning*

I. First Review of Proposed Revised Curriculum Framework for 2010 *Science Standards of Learning*

J. First Review of the Annual Measurable Objectives in Reading and Mathematics from 2010-2011 through 2013-2014 for Virginia's Consolidated State Application Accountability Plan under the *No Child Left Behind Act of 2001*

K. First Review of Multidivision Online Providers Approval Process: List of Accreditation Agencies

L. First Review of Nominations to Fill Vacancies on Board of Education Advisory Committees: Advisory Committee on Adult Education and Literacy, State Special Education Advisory Committee, Virginia Advisory Committee for Career and Technical Education, Virginia Advisory Committee for the Education of the Gifted, and the Advisory Board on Teacher Education and Licensure

M. First Review of the Board of Education's *Comprehensive Plan: 2011-2016*

Reports

N. Report on the Memorandum of Understanding for Petersburg City Public Schools to Include Compliance with the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA) (8 VAC 20-131-315)

O. Report on the Memorandum of Understanding for Sussex County Public Schools in Accordance with *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA) (8 VAC 20-131-315)

P. Report on Preliminary Analysis of Virginia's *2009 Mathematics Standards of Learning* Compared to the Common Core State Standards in Mathematics

DISCUSSION OF CURRENT ISSUES - by Board of Education Members and Superintendent of Public Instruction

EXECUTIVE SESSION

ADJOURNMENT

PUBLIC NOTICE

The Board of Education members will meet for dinner at 6:30 p.m. at the Crowne Plaza Hotel on Wednesday, September 22, 2010. Items for the Board agenda may be discussed informally at that dinner. No votes will be taken, and it is open to the public. The Board president reserves the right to change the times listed on this agenda depending upon the time constraints during the meeting.

GUIDELINES FOR PUBLIC COMMENT

1. The Board of Education is pleased to receive public comment at each of its regular monthly meetings. In order to allow the Board sufficient time for its other business, the total time allotted to public comment will generally be limited to thirty (30) minutes. Individuals seeking to speak to the Board will be allotted three (3) minutes each.

2. Those wishing to speak to the Board should contact Dr. Margaret Roberts, Executive Assistant for Board Relations at (804) 225-2924. Normally, speakers will be scheduled in the order that their requests are received until the entire allotted time slot has been used. Where issues involving a variety of views are presented before the Board, the Board reserves the right to allocate the time available so as to ensure that the Board hears from different points of view on any particular issue.

3. Speakers are urged to contact Dr. Roberts in advance of the meeting. Because of time limitations, those persons who have not previously registered to speak prior to the day of the Board meeting cannot be assured that they will have an opportunity to appear before the Board.

4. In order to make the limited time available most effective, speakers are urged to provide multiple written copies of their comments or other material amplifying their views.

Board of Education Agenda Item

Item: A. **Date:** September 23, 2010

Topic: First Review of a Proposed Amendment to the *Licensure Regulations for School Personnel* (8 VAC 20-22-10 et seq.) to Conform to Senate Bill 715 Passed by the 2010 General Assembly

Presenter: Mrs. Patty S. Pitts, Assistant Superintendent for Teacher Education and Licensure

Telephone Numbers: (804) 371-2522 **E-Mail Address:** Patty.Pitts@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by

- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting ____ Action requested at future meeting: _____

Previous Review/Action:

_X_ No previous board review/action

____ Previous review/action

date _____

action _____

Background Information: The Board of Education *Licensure Regulations for School Personnel* became effective September 21, 2007. The 2010 General Assembly passed Senate Bill 715 requiring civics education training specific to Virginia for educators. The legislation passed by the 2010 General Assembly states:

> *§ 1. That the Board of Education shall amend its regulations to require that all teacher education preparation programs in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences include local government and civics instruction specific to Virginia.*
>
> *§ 2. That the Board of Education shall amend its regulations to require any individual seeking renewal of a license with an endorsement in early/primary preK-3, elementary education preK-6, middle education 6-8, history and social sciences, history, or political science to complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia. The study may be satisfactorily completed using any applicable option described in the Virginia Licensure Renewal Manual. This requirement shall be met one time for the individual's next renewal after July 1, 2012.*

The Administrative Process Act provides for an exemption from executive branch review for regulations necessary to conform to changes in statutory law where no discretion is involved. The provision permits the regulation to become effective at the conclusion of the 30-day public comment period following publication in the *Virginia Register* unless a legislative or gubernatorial objection is filed or the Board suspends the regulatory process. Section 2.2-4006 of the *Code of Virginia* says, in part:

> § 2.2-4006. Exemptions from requirements of this article.
>
> A. The following agency actions otherwise subject to this chapter and § 2.2-4103 of the Virginia Register Act shall be exempted from the operation of this article:
>
> …
>
> 4. Regulations that are:
>
> a. Necessary to conform to changes in Virginia statutory law or the appropriation act where no agency discretion is involved; …
>
> B. Whenever regulations are adopted under this section, the agency shall state as part thereof that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision. The effective date of regulations adopted under this subsection shall be in accordance with the provisions of § 2.2-4015, except in the case of emergency regulations, which shall become effective as provided in subsection B of § 2.2-4012.
>
> C. A regulation for which an exemption is claimed under this section or § 2.2-4002, or 2.2-4011 and that is placed before a board or commission for consideration shall be provided at least two days in advance of the board or commission meeting to members of the public that request a copy of that regulation. A copy of that regulation shall be made available to the public attending such meeting.

Summary of Major Elements:

The *Licensure Regulations for School Personnel* will be amended to require that individuals seeking renewal of licenses with endorsements in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences after July 1, 2012, must complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia. Attachment A outlines the language to be inserted in Section 8VAC20-22-110 (Requirements for renewing a license) of the *Licensure Regulations for School Personnel*.

The *Regulations Governing the Review and Approval of Education Programs in Virginia* (8 VAC 20-542-10 et seq.) also will be amended to require institutions of higher education with approved education (endorsement) programs in early/primary preK-3, elementary education preK-6, middle education 6-8,

and history and social sciences to incorporate study in local government and civics instruction specific to Virginia.

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education receive for first review the proposed amendment to the *Licensure Regulations for School Personnel*, and authorize staff of the Department of Education to proceed with the remaining steps required by the Administrative Process Act.

Impact on Resources: The impact on resources for these regulations will include the cost of the development and delivery of the training and the resources to document and verify the completion of the requirement.

Timetable for Further Review/Action: The Department of Education will notify school divisions of the changes in the regulations when the regulations become final, pursuant to the requirements of the Administrative Process Act.

Attachment A

Proposed Amendments to the
Licensure Regulations for School Personnel
(8 VAC 20-22-10 et seq.)

8VAC20-22-110. Requirements for renewing a license.

A. The Division Superintendent, Postgraduate Professional, Collegiate Professional, Technical Professional, Pupil Personnel Services, and School Manager Licenses may be renewed upon the completion of 180 professional development points within a five-year validity period based on an individualized professional development plan that includes ongoing, sustained, and high-quality professional development.

B. Virginia public school divisions and public education agencies must report annually to the Department of Education that instructional personnel have completed high quality professional development each year as set forth by the Virginia Department of Education.

C. Any individual seeking renewal of a license with an endorsement in early/primary preK-3, elementary education preK-6, middle education 6-8, history and social sciences, history, or political science to complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia. The study may be satisfactorily completed using any applicable option described in the Virginia Licensure Renewal Manual. This requirement shall be met one time for the individual's next renewal after July 1, 2012.

~~C~~ D. Professional development points may be accrued by the completion of professional development activities to improve and increase instructional personnel's knowledge of the academic subjects the teachers teach or the area assigned from one or more of the following eight options….

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Exempt Action Final Regulation
Agency Background Document

Agency name	Virginia Department of Education
Virginia Administrative Code (VAC) citation	8 VAC 20-22-10 et seq.
Regulation title	*Licensure Regulations for School Personnel*
Action title	Local Government and Civics Instruction Requirement for License Renewal
Final agency action date	The Virginia Board of Education will receive the amendment to the regulations on October 28, 2010, for final review.
Document preparation date	September 8, 2010

When a regulatory action is exempt from executive branch review pursuant to § 2.2-4002 or § 2.2-4006 of the Virginia Administrative Process Act (APA), the agency is encouraged to provide information to the public on the Regulatory Town Hall using this form.

Note: While posting this form on the Town Hall is optional, the agency must comply with requirements of the Virginia Register Act, the *Virginia Register Form, Style, and Procedure Manual*, and Executive Orders 36 (06) and 58 (99).

Summary

Please provide a brief summary of all regulatory changes, including the rationale behind such changes. Alert the reader to all substantive matters or changes. If applicable, generally describe the existing regulation.

The *Licensure Regulations for School Personnel* will require any individual seeking renewal of a license with an endorsement in early/primary preK-3, elementary education preK-6, middle education 6-8, history and social sciences, history, or political science to complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia. The study may be satisfactorily completed using any applicable option described in the *Virginia Licensure Renewal Manual*. This requirement shall be met one time for the individual's next renewal after July 1, 2012.

Statement of final agency action

Please provide a statement of the final action taken by the agency including (1) the date the action was taken, (2) the name of the agency taking the action, and (3) the title of the regulation.

The Virginia Board of Education is expected to take final action to amend the *Licensure Regulations for School Personnel* on October 28, 2010, pursuant to SB 715 passed by the 2010 General Assembly and signed by the Governor.

Family impact

Assess the impact of this regulatory action on the institution of the family and family stability.

Not applicable

Board of Education Agenda Item

Item: B. **Date:** September 23, 2010

Topic: First Review of a Proposed Amendment to the *Regulations Governing the Review and Approval of Education Programs in Virginia* (8 VAC 20-542-10 et seq.) to Conform to Senate Bill 715 Passed by the 2010 General Assembly

Presenter: Mrs. Patty S. Pitts, Assistant Superintendent for Teacher Education and Licensure

Telephone Numbers: (804) 371-2522 **E-Mail Address:** Patty.Pitts@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by

- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting ____ Action requested at future meeting: _____

Previous Review/Action:

_X_ No previous board review/action

____ Previous review/action

date _____

action _____

Background Information: The Board of Education *Regulations Governing the Review and Approval of Education Programs in Virginia* (8 VAC 20-542-10 et seq.) became effective September 21, 2007. The 2010 General Assembly passed Senate Bill 715 requiring civics education training specific to Virginia for educators. The legislation passed by the 2010 General Assembly states:

> *§ 1. That the Board of Education shall amend its regulations to require that all teacher education preparation programs in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences include local government and civics instruction specific to Virginia.*
>
> *§ 2. That the Board of Education shall amend its regulations to require any individual seeking renewal of a license with an endorsement in early/primary preK-3, elementary education preK-6, middle education 6-8, history and social sciences, history, or political science to complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia. The study may be satisfactorily completed using any applicable option described in the Virginia Licensure Renewal Manual. This requirement shall be met one time for the individual's next renewal after July 1, 2012.*

The Administrative Process Act provides for an exemption from executive branch review for regulations necessary to conform to changes in statutory law where no discretion is involved. The provision permits the regulation to become effective at the conclusion of the 30-day public comment period following publication in the *Virginia Register* unless a legislative or gubernatorial objection is filed or the Board suspends the regulatory process. Section 2.2-4006 of the *Code of Virginia* says, in part:

> § 2.2-4006. Exemptions from requirements of this article.
>
> A. The following agency actions otherwise subject to this chapter and § 2.2-4103 of the Virginia Register Act shall be exempted from the operation of this article:
>
> …4. Regulations that are:
>
> a. Necessary to conform to changes in Virginia statutory law or the appropriation act where no agency discretion is involved;…
>
> B. Whenever regulations are adopted under this section, the agency shall state as part thereof that it will receive, consider and respond to petitions by any interested person at any time with respect to reconsideration or revision. The effective date of regulations adopted under this subsection shall be in accordance with the provisions of § 2.2-4015, except in the case of emergency regulations, which shall become effective as provided in subsection B of § 2.2-4012.
>
> C. A regulation for which an exemption is claimed under this section or § 2.2-4002, or 2.2-4011 and that is placed before a board or commission for consideration shall be provided at least two days in advance of the board or commission meeting to members of the public that request a copy of that regulation. A copy of that regulation shall be made available to the public attending such meeting.

Summary of Major Elements:

The *Regulations Governing the Review and Approval of Education Programs in Virginia* (8 VAC 20-542-10 et seq.) will be amended to require institutions of higher education with approved education (endorsement) programs in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences to incorporate study in local government and civics instruction specific to Virginia. Attachment A outlines the language to be inserted in Section of the *Regulations Governing the Review and Approval of Education Programs in Virginia.*

The *Licensure Regulations for School Personnel* also will be amended to require that individuals seeking renewal of licenses with endorsements in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences after July 1, 2012, must complete study of the structures, function, and powers of state and local government of Virginia and the importance of citizen participation in the political process in state and local government of Virginia.

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education receive for first review the proposed amendment to the *Regulations Governing the Review and Approval of Education Programs in Virginia*, and authorize staff of the Department of Education to proceed with the remaining steps required by the Administrative Process Act.

Impact on Resources: The impact on resources for these regulations will include the cost of the development and delivery of the training and the resources to document and verify the completion of the requirement.

Timetable for Further Review/Action: The Department of Education will notify school divisions of the changes in the regulations when the regulations become final, pursuant to the requirements of the Administrative Process Act.

Attachment A

Proposed Amendments to the
Regulations Governing the Review and Approval of Education Programs in Virginia
(8 VAC 20-542-10 et seq.)

8 VAC 20-542-70. Competencies for endorsement areas.

A. The professional education program develops, maintains, and continuously evaluates high quality professional education programs that are collaboratively designed and based on identified needs of the preK-12 community. Candidates in education programs for teachers demonstrate competence in the core academic content areas that they plan to teach. The indicator of the achievement of this standard shall include the following: Candidates demonstrate an understanding of competencies including the core concepts and facts of the disciplines and the *Virginia Standards of Learning* for the content areas they plan to teach.

B. All teacher education programs in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences must include local government and civics instruction specific to Virginia.…

8VAC20-542-100. Early/primary education preK-3.

…2.c.(1)(c) Civics.

(i) The privileges and responsibilities of good citizenship and the importance of the Rule of Law for the protection of individual rights;

(ii) The process of making laws in the United States and the fundamental ideals and principles of a republican form of government; ~~and~~

(iii) The understanding that Americans are a people of diverse ethnic origins, customs, and traditions, who are united by basic principles of a republican form of government and a common identity as Americans~~.~~;and

(iv) Local government and civics instruction specific to Virginia.…

8VAC20-542-110. Elementary education preK-6.

…2.c.(1)(c) Civics.

(i) The privileges and responsibilities of good citizenship and the importance of the Rule of Law for the protection of individual rights;

(ii) The process of making laws in the United States and the fundamental ideals and principles of a republican form of government; ~~and~~

(iii) The understanding that Americans are a people of diverse ethnic origins, customs, and traditions, who are united by basic principles of a republican form of government and a common identity as Americans~~.~~;and

(iv) Local government and civics instruction specific to Virginia.…

8VAC20-542-120. Middle education 6-8.

…3.a.(3) Civics and economics.

(a) Essential characteristics of limited and unlimited governments;

(b) Importance of the Rule of Law for the protection of individual rights and the common good;

(c) Rights and responsibilities of American citizenship;

(d) Nature and purposes of constitutions and alternative ways of organizing constitutional governments;

(e) American political culture;

(f) Values and principles of the American constitutional republic;

(g) Structures, functions, and powers of local and state government;

(h) Importance of citizen participation in the political process in local and state government;

(i) Local government and civics instruction specific to Virginia;

(~~i~~j) Structures, functions, and powers of the national government; and

(~~j~~k) The structure and function of the United States market economy as compared with other economies….

8VAC20-542-330. History and social sciences.

…1.c. Civics/government and economics.

(1) The essential characteristics of limited and unlimited governments;

(2) The importance of the Rule of Law for the protection of individual rights and the common good;

(3) The rights and responsibilities of American citizenship;

(4) The nature and purposes of constitutions and alternative ways of organizing constitutional governments;

(5) American political culture;

(6) Values and principles of the American constitutional republic;

(7) The structures, functions, and powers of local and state government;

(8) Importance of citizen participation in the political process in local and state government;

(9) Local government and civics instruction specific to Virginia;

(~~9~~10) The structures, functions, and powers of the national government;

(~~10~~11) The role of the United States in foreign policy and national security;

(~~11~~12) The structure of the federal judiciary;

(~~12~~13) The structure and function of the United States market economy as compared with other economies;

(~~13~~14) Knowledge of the impact of the government role in the economy and individual economic and political freedoms;

(~~14~~15) Knowledge of economic systems in the areas of productivity and key economic indicators; and

(~~15~~16) The analysis of global economic trends….

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Exempt Action Final Regulation
Agency Background Document

Agency name	Virginia Department of Education
Virginia Administrative Code (VAC) citation	8 VAC 20-542-10 et seq.
Regulation title	*Regulations Governing the Review and Approval of Education Programs in Virginia*
Action title	Local Government and Civics Instruction Specific to Virginia
Final agency action date	The Virginia Board of Education will receive the amendment to the regulations on October 28, 2010, for final review.
Document preparation date	September 8, 2010

When a regulatory action is exempt from executive branch review pursuant to § 2.2-4002 or § 2.2-4006 of the Virginia Administrative Process Act (APA), the agency is encouraged to provide information to the public on the Regulatory Town Hall using this form.

Note: While posting this form on the Town Hall is optional, the agency must comply with requirements of the Virginia Register Act, the *Virginia Register Form, Style, and Procedure Manual*, and Executive Orders 36 (06) and 58 (99).

Summary

Please provide a brief summary of all regulatory changes, including the rationale behind such changes. Alert the reader to all substantive matters or changes. If applicable, generally describe the existing regulation.

The *Regulations Governing the Review and Approval of Education Programs in Virginia* will require that all teacher education preparation programs in early/primary preK-3, elementary education preK-6, middle education 6-8, and history and social sciences include local government and civics instruction specific to Virginia.

Statement of final agency action

Please provide a statement of the final action taken by the agency including (1) the date the action was taken, (2) the name of the agency taking the action, and (3) the title of the regulation.

The Virginia Board of Education is expected to take final action to amend the *Regulations Governing the Review and Approval of Education Programs in Virginia* on October 28, 2010, pursuant to SB 715 passed by the 2010 General Assembly and signed by the Governor.

Family impact

Assess the impact of this regulatory action on the institution of the family and family stability.

Not applicable

Board of Education Agenda Item

Item: C. **Date:** September 23, 2010

Topic: First Review of a Notice of Intended Regulatory Action (NOIRA) for Proposed Regulations Governing Nutritional Guidelines for Competitive Foods Sold in the Public Schools

Presenter: Mr. Kent C. Dickey, Deputy Superintendent for Finance and Operations

Telephone Number: (804) 225-2025 **E-Mail Address:** kent.dickey@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

X Board review required by
- X State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

X Action requested at this meeting ____ Action requested at future meeting: _____ (date)

Previous Review/Action:

X No previous board review/action

____ Previous review/action
date _____
action _____

Background Information:

Senate Bill 414 (2010 Acts of Assembly) amended the *Code of Virgina* by adding section 22.1-207.4: Nutritional Guidelines for Competitive Foods. A copy of the legislation is attached. The legislation requires the Board of Education, in cooperation with the Department of Health, to promulgate and periodically update regulations setting nutritional guidelines for all competitive foods sold to students during regular school hours that are not part of the federal National School Lunch Program (NSLP) or School Breakfast Program (SBP).

The rising rate of obesity in children has become a major health concern, both because of its impact on childhood health and its potential effect on the development of chronic disease in adulthood. In response to this growing concern, attention has focused on the need to establish nutrition standards for foods in schools. Federal regulations governing the national school lunch and breakfast programs establish nutrition standards for school meals. In addition, federal regulations require every school division to have wellness policies that address nutrition and physical activity. The content and implementation of these policies have been at the discretion of the local school divisions.

Summary of Major Elements:

As specified in enactment clause three of SB 414, the board shall work with the Department of Health, the School Nutrition Association of Virginia, the American Heart Association, the American Cancer Society, the Virginia chapter of the American Academy of Pediatrics, the Virginia Wholesalers and Distributors Association, the Virginia Automatic Merchandising Association, and other stakeholders in conducting the research necessary for the development of the regulations and in the dissemination of the nutritional guidelines to school divisions.

Further, SB 414 requires in the development and implementation of the regulations that:

1. nutritional guidelines are established for all competitive foods sold to students on school grounds during regular school hours. "Competitive food" means any food, excluding beverages, sold to students on school grounds during regular school hours that is not part of the school breakfast or school lunch programs. SB 414 did not include "beverages" under the definition of "competitive food."
2. the guidelines be based on the Institutes of Medicine's (IOM) nutrition standards for competitive foods in schools or the competitive food guidelines established by the Alliance for a Healthier Generation as the initial statewide standard for competitive foods;
3. the guidelines be periodically reviewed by the Board of Education with assistance from the Department of Health to ensure they remain current, science-based, and consistent with any changes to the federal laws or regulations on competitive foods; and
4. the guidelines are incorporated by local school boards as part of their existing local wellness policy.

The Notice of Intended Regulatory Action Agency Background Document that initiates the regulatory process under the Virginia Administrative Process Act (APA) is attached.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education waive first review and approve the attached NOIRA and authorize Department of Education staff to proceed with the requirements of the Administrative Process Act.

Impact on Resources:

It is anticipated that the adopted regulation will impact all school divisions 1) administratively, as they will be required to adopt the new state nutritional guidelines as part of their required local wellness policies; and 2) possibly financially, as they change the food offerings on the school site during the school day to meet the adopted nutritional guidelines. The impact on the Department of Education to develop and implement these regulations is not expected to be significant and can be absorbed with existing staff. It is expected that the department will have to provide on-going staff support and technical assistance to divisions in the implementation of these regulations.

Timetable for Further Review/Action:

The timetable for further action in regards to the development of the regulations will be governed by the requirements of the Administrative Process Act. Pursuant to enactment clause four of SB 414, the board must report to the General Assembly on the status of the final regulations by December 1, 2011. Also, Section 22.1-207.4 B. requires periodic review of the nutritional guidelines by the board with assistance

from the Department of Health to ensure they remain current.

VIRGINIA ACTS OF ASSEMBLY -- 2010 SESSION

CHAPTER 718

An Act to amend the Code of Virginia by adding a section numbered 22.1-207.4, relating to nutritional guidelines for competitive foods in public schools.

[S 414]

Approved April 13, 2010

Be it enacted by the General Assembly of Virginia:

1. That the Code of Virginia is amended by adding a section numbered 22.1-207.4 as follows:

§ 22.1-207.4. Nutritional guidelines for competitive foods.

A. The Board, in cooperation with the Department of Health, shall promulgate regulations setting nutritional guidelines for all competitive foods sold to students during regular school hours.

B. The Board, with assistance from the Department of Health, shall periodically review the nutritional guidelines for competitive foods to ensure that they remain current and science-based and shall also review the nutritional guidelines upon changes to federal law or regulations for competitive foods.

C. The regulations promulgated pursuant to this section shall include but not be limited to: calorie, fat, sugar, and sodium content.

For purposes of this section, "competitive food" means any food, excluding beverages, sold to students on school grounds during regular school hours that is not part of the school breakfast or school lunch program.

2. That in promulgating its regulations pursuant to this act, the Board of Education shall adopt either the Alliance for a Healthier Generation's Competitive Foods Guidelines or the Institute of Medicine's Recommended Standards for Competitive Foods in Schools as the initial statewide standard for competitive foods.

3. That the Board of Education shall work with the Department of Health, the School Nutrition Association of Virginia, the American Heart Association, the American Cancer Society, the American Academy of Pediatrics, Virginia Chapter, the Virginia Wholesalers and Distributors Association, the Virginia Automatic Merchandising Association, and other stakeholders to conduct any research necessary for the development of the regulations and dissemination of the guidelines to each local school division.

4. That the Board of Education shall report to the General Assembly on the status of the final regulations by December 1, 2011. The report shall be submitted as provided in the procedures of the Division of Legislative Automated Systems for the processing of legislative documents and reports.

5. That each local school board shall adopt the state guidelines as part of their existing local wellness policy to ensure compliance with the provisions of subsection A of § 22.1-207.4 of the Code of Virginia.

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Notice of Intended Regulatory Action (NOIRA)
Agency Background Document

Agency name	DEPARTMENT OF EDUCATION
Virginia Administrative Code (VAC) citation	____ VAC___-____
Regulation title	NUTRITIONAL GUIDELINES FOR COMPETITIVE FOODS SOLD IN THE PUBLIC SCHOOLS
Action title	To establish nutritional guidelines for all foods sold to students in the public schools during the regular school day that are not part of the national school lunch or school breakfast programs.
Date this document prepared	September 14, 2010

This information is required for executive branch review and the Virginia Registrar of Regulations, pursuant to the Virginia Administrative Process Act (APA), Executive Orders 14 (2010) and 58 (1999), and the *Virginia Register Form, Style, and Procedure Manual.*

Purpose

Please describe the subject matter and intent of the planned regulatory action. Also include a brief explanation of the need for and the goals of the new or amended regulation.

This regulation, required to be developed by Section 22.1-207.4, *Code of Virginia*, and pursuant to requirements in SB 414 (2010) will:

1. establish nutritional guidelines for all “competitive foods” sold to public school students on school grounds during regular school hours.
2. be based on the Institutes of Medicine's (IOM) Recommended Standards for Competitive Foods in Schools or the Alliance for a Healthier Generation’s Competitive Food Guidelines.
3. require periodic review by the Board of Education with assistance from the Department of Health to ensure the nutritional guidelines developed as part of the regulations remain current, science-based, and consistent with any changes to federal law or regulations on competitive foods.
4. require all local school boards to adopt the state nutritional guidelines as part of their existing wellness policies.

These required regulations are intended to implement nutritional standards for competitive foods sold in the public schools in response to concerns about increasing childhood obesity and its effects and the general goal of increasing the nutritional quality of foods offered in the school setting.

Legal basis

Please identify the state and/or federal legal authority to promulgate this proposed regulation, including (1) the most relevant law and/or regulation, including Code of Virginia citation and General Assembly chapter number(s), if applicable, and (2) promulgating entity, i.e., agency, board, or person. Describe the legal authority and the extent to which the authority is mandatory or discretionary.

Legal authority: SB 414 (2010) enacted on April 13, 2010, as Chapter 718 and codified as Section 22.1-207.4, *Code of Virginia*.

Promulgating entity: Board of Education in cooperation with the Department of Health.

Need

Please detail the specific reasons why the agency has determined that the proposed regulatory action is essential to protect the health, safety, or welfare of citizens. In addition, delineate any potential issues that may need to be addressed as the regulation is developed.

The regulations are required by statute (Section 22.1-207.4) to be developed. In addition, the rising rate of obesity in children has become a major health concern, both because of its impact on childhood health and its potential effect on the development of chronic disease in adulthood. In response to this growing concern, attention has focused on the need to establish nutrition standards for foods in schools. Federal regulations governing the national school lunch and breakfast programs establish nutrition standards for school meals. In addition, federal regulations require every school division to have wellness policies that address nutrition and physical activity; the content and implementation of these policies have been at the discretion of the local school divisions.

Statewide nutritional guidelines for competitive foods sold to students during the school day would strengthen the local wellness policies and help address some of the factors that impact childhood obesity, as well as increase the nutritional quality of foods offered in the school setting.

Substance

Please detail any changes that will be proposed. For new regulations, include a summary of the proposed regulatory action. Where provisions of an existing regulation are being amended, explain how the existing regulation will be changed.

This regulation will include specific nutritional guidelines for foods sold to students throughout the school day on school grounds that are not part of the national school lunch or breakfast programs. The nutrient/ingredient areas to be addressed in these standards will include, but not be limited to, calories, fat, sugar, and sodium content. Evidence-based guidelines established by the Institutes of Medicine (IOM) or the Alliance for a Healthier Generation shall be used in establishing these statewide standards.

Alternatives

Please describe all viable alternatives to the proposed regulatory action that have been or will be considered to meet the essential purpose of the action. Also, please describe the process by which the agency has considered or will consider other alternatives for achieving the need in the most cost-effective manner.

None. The regulations are required by statute to be developed.

Public participation

Please indicate whether the agency is seeking comments on the intended regulatory action, including ideas to assist the agency in the development of the proposal and the costs and benefits of the alternatives stated in this notice or other alternatives. Also, indicate whether a public hearing is to be held to receive comments on this notice.

The agency is seeking comments on the intended regulatory action including, but not limited to, 1) ideas to assist in the development of a proposal, 2) the costs and benefits of the alternatives stated in this background document or other alternatives, and 3) potential impacts of the regulation. The agency is also seeking information on impacts on small businesses as defined in § 2.2-4007.1 of the *Code of Virginia*. Information may include 1) projected reporting, recordkeeping and other administrative costs, 2) probable effect of the regulation on affected small businesses, and 3) description of less intrusive or costly alternative methods of achieving the purpose of the regulation.

Anyone wishing to submit written comments may do so by mail, e-mail, or fax to Catherine Digilio-Grimes, Director of School Nutrition Programs, Virginia Department of Education, P.O. Box 2120, Richmond, VA 23218-2120, (804) 225-2074, fax (804) 786-

3117, e-mail **Catherine.Digilio-Grimes@doe.virginia.gov**. Written comments must include the name and address of the commenter; please also submit an e-mail address for use by the agency for subsequent communications. In order to be considered, comments must be received by the last day of the public comment period. A public hearing on the NOIRA will not be held.

Participatory approach

Please indicate, to the extent known, if advisers (e.g., ad hoc advisory committees, regulatory advisory panels) will be involved in the development of the proposed regulation. Indicate that 1) the agency is not using the participatory approach in the development of the proposal because the agency has authorized proceeding without using the participatory approach; 2) the agency is using the participatory approach in the development of the proposal; or 3) the agency is inviting comment on whether to use the participatory approach to assist the agency in the development of a proposal.

The Board of Education is required by SB 414 to work with the Department of Health, the School Nutrition Association of Virginia, the American Heart Association, the American Cancer Society, the American Academy of Pediatrics, Virginia chapter, the Virginia Wholesalers and Distributors Association, the Virginia Automatic Merchandising Association, and other stakeholders to conduct research necessary for the development of the regulations. Consequently, the agency is using the participatory approach in the development of the proposed regulations.

Family impact

Assess the potential impact of the proposed regulatory action on the institution of the family and family stability including to what extent the regulatory action will: 1) strengthen or erode the authority and rights of parents in the education, nurturing, and supervision of their children; 2) encourage or discourage economic self-sufficiency, self-pride, and the assumption of responsibility for oneself, one's spouse, and one's children and/or elderly parents; 3) strengthen or erode the marital commitment; and 4) increase or decrease disposable family income.

In regards to category one above, the regulations will increase the nutritional quality of competitive foods offered to students in the public schools with the goal of increased student health.

Board of Education Agenda Item

Item: D. **Date:** September 23, 2010

Topic: Final Review of Proposed Board of Education Meeting Dates for the 2011 Calendar Year

Presenter: Dr. Margaret N. Roberts, Executive Assistant to the Board of Education

Telephone: 804/225-2924 **E-mail:** Margaret.Roberts@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- ____ State or federal law or regulation
- ____ Board of Education regulation
- _X_ Other: Board of Education Bylaws

_X__ Action requested at this meeting

___ Action requested at future meeting:

Previous Review/Action:

___ No previous board review/action

_X__ Previous review/action: First Review of Proposed Meeting Dates
date: July 22, 2010
action: Received proposed dates for first review

Background Information: Section 2 of Article Three of the Bylaws of the Board of Education states the following:

> Section 2. Regular Meetings. Prior to and no later than the annual meeting (February), the Board shall adopt a tentative schedule for regular meetings for the applicable calendar year. Such schedule shall be subject to the change, alteration or adjustment by the President as he or she deems appropriate, to accommodate the operation of the Board as is necessary.

Summary of Major Elements: In recent years, the Board of Education has met monthly except for the months of August and December. Meetings are typically held on the fourth Thursday of the month, although this is not a requirement. Exceptions are the January meeting, which is held early in the month to coincide with the opening of the General Assembly session, and the November meeting, which is scheduled to avoid meeting during Thanksgiving week. The April meeting is typically a two-day planning session.

The proposed dates for meetings in 2011 (shown below) are set to avoid scheduling conflicts with major professional commitments for Board of Education members and the Superintendent of Public Instruction. The proposed dates are also set to avoid conflict with national holidays and other important calendar events.

In addition to the monthly business meetings, the President may call special meetings of the full Board of Education and its committees, as deemed necessary. Unless otherwise announced by the President, all Board of Education meetings will be held in the Jefferson Conference Room on the 22nd floor of the James Monroe Building, 101 North 14th Street, Richmond, Virginia 23219.

The proposed meeting dates for 2011 are as follows:

Thursday, January 13, 2011
Thursday, February 17, 2011
Thursday, March 24, 2011
Wednesday-Thursday, April 27-28, 2011
Thursday, May 19, 2011
Thursday, June 23, 2011
Thursday, July 28, 2011
Thursday, September 22, 2011
Thursday, October 27, 2011
Thursday, November 17, 2011

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education adopt the schedule of meeting dates for the 2011 calendar year.

Impact on Resources: Funding to support the expenses related to the meetings of the Board of Education is provided from the Department of Education's general operating budget, which is appropriated by the General Assembly.

Timetable for Further Review/Action: Following adoption, the dates will be widely disseminated to local school officials, statewide organizations, and to the public. The meeting dates will also be posted on the Board of Education's Web site.

ATTACHMENT:

PROPOSED

MEETING DATES
2011 CALENDAR YEAR

Thursday, January 13, 2011

Thursday, February 17, 2011

Thursday, March 24, 2011

Wednesday-Thursday, April 27-28, 2011

Thursday, May 19, 2011

Thursday, June 23, 2011

Thursday, July 28, 2011

Thursday, September 22, 2011

Thursday, October 27, 2011

Thursday, November 17, 2011

Board of Education Agenda Item

Item: E. **Date:** September 23, 2010

Topic: First Review of Final Amendments to the *Regulations Governing Local School Boards and School Divisions* (8 VAC 20-720) and Repeal of the *Rules Governing Fees and Charges* (8 VAC 20-370)

Presenter: Ms. Anne D. Wescott, Assistant Superintendent for Policy and Communications

Telephone Number: (804) 225-2403 **E-Mail Address:** Anne.Wescott@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting _____ Action requested at future meeting: _____

Previous Review/Action:

___ No previous board review/action

_X_ Previous review/action

date July 23, 2009

action Acceptance of proposed regulation for first review

Background Information: The Board of Education's *Rules Governing Fees and Charges*, 8 VAC 20-370-10, were adopted on or before September 1, 1980, and have not been amended since that time. The purpose of this proposal is to update the regulations by repealing the current regulations governing fees charged by school divisions and creating a new regulation that will be added as a section to the proposed *Regulations Governing Local School Boards and School Divisions*, 8 VAC 20-720-10 et seq.

Summary of Major Elements: The proposed regulation will include specific provisions regarding permissible and impermissible fees, policies for families that cannot afford the fees and permissible and impermissible actions for the failure to pay the fees. The current regulation will be repealed simultaneously with the promulgation of the new regulation.

The following changes were included in the July 23, 2009, proposed regulations:

- Local school boards that charge fees would be required to have a policy and a fee schedule that would be provided to parents annually and posted on the school division's Web site.

- The policy would include a provision to waive or reduce fees for economically disadvantaged students and students whose families are undergoing economic hardships. Notice of the option to request a waiver and how to do so would have to be provided each time a fee is charged.

- The policy and fee schedule would be required to be consistent across the school division.

- No fees could be charged that had not been approved by the local school board.

- Fees may not be charged as a condition of school enrollment unless the student is not of school age or does not live within the jurisdiction (§§ 22.1-1, 22.1-3, and 22.1-5, *Code of Virginia*).

- Fees may not be charged for textbooks or textbook deposits; however, § 22.1-143, *Code of Virginia*, permits school divisions to assess a reasonable fee for lost or damaged textbooks.

- Fees may not be charged for pupil transportation to and from school (Attorney General's Opinion dated August 29, 2007), but may be charged for the student's pro rata cost of providing for voluntary extracurricular activities (§ 22.1-176, *Code of Virginia*).

- Fees may be charged for summer school unless the summer school program is a remediation program required by the Standards of Quality (§ 22.1-253.13:1, *Code of Virginia*).

- Fees may be charged for class dues; however, class dues shall not be mandatory, and the school board must specify the kinds of programs and activities covered by class dues.

- Fees may be charged for nonmandatory services such as parking fees and locker fees (Attorney General's Opinions dated November 8, 1991 and 1964-65 Att'y Gen. Ann. Rep. 294).

- Fees may be charged for consumable materials, such as workbooks, but the local school board must have a policy to ensure that these are furnished at a reduced price or free of charge to students who are unable to afford them (§ 22.1-243, *Code of Virginia*).

- Fees may be charged for the behind the wheel portion of the driver's education program (§ 22.1-205, *Code of Virginia*).

- Fees may be charged for the preparation and distribution of official paper copies of the student's transcript, provided that the school board first provides a reasonable number of copies for free. Official electronic copies of transcripts shall be provided at no cost.

- A student may not be suspended or expelled for nonpayment of fees and charges.

The public comment period for the proposed regulations was held from May 24, 2010 through July 26, 2010. During this time, four public comments were held. They were held in Marion on June 3, 2010, and in Alexandria, Chesapeake, and Richmond on June 10, 2010. The Board received comments from 42 individuals and organizations. Most of the commenters had more than one recommendation. The comments primarily addressed the following:

- 21 recommend permitting local school boards to charge fees for consumable materials including fine arts materials and supplies.

- 18 recommend permitting local school boards to charge fees for musical instruments.

- Seven recommend requiring school divisions to provide clear, conspicuous written notice that low income families can apply for a fee waiver, including directions as to how to do so each time a fee is charged.

- Seven recommend that fee waivers should be made available for all activities, whether mandatory, elective, or optional.

- Seven recommend that the regulations should explicitly prohibit school divisions from withholding class schedules, or excluding students from basic educational functions such as graduation ceremonies or field trips for nonpayment of fees.

A summary of the public comments may be found in Appendix A.

The following substantive changes are recommended in response to public comment:

- School divisions shall provide notice that a fee waiver may be requested, including directions as to how to apply for the waiver, each time a fee is charged.

- Local school boards may charge fees for musical instruments, so long as the instruction in the use of musical instruments is not part of the required curriculum (Attorney General's Opinion dated May 6, 1977).

- Local school boards may charge fees for fine arts materials and supplies.

- Local school boards shall not withhold a student's class schedule for nonpayment of fees.

Amendments are also recommended in response to action by the 2010 General Assembly.

- HB 491, passed by the 2010 General Assembly, says: "Nothing in this section shall be construed to authorize a school board to charge fees to students for instructional materials, textbooks, or other materials used by a school board employee that are not directly used by a public school student." Language is recommended to be added to comport with this legislative change.

- HB 1289 was considered by the 2010 General Assembly, but was left in the House Committee on Education with the understanding that the Board of Education would take it into consideration as these regulations are amended. The language in the bill says: "Nothing in this section shall be construed to prohibit the school board from (i) making supplies, services, or materials available to pupils at cost or (ii) imposing a fee or charge for a field trip or any educational program that is not a required activity; although a school board may waive such fees or charges in total or in part for those pupils it determines are unable to afford them." The proposed regulations address the provisions of the bill. They would permit school boards to charge fees for consumable materials and for field trips and other educational programs that are not required activities. They also provide for waivers of fees and charges for those students who are unable to afford them.

Finally, a number of editorial and technical changes are proposed for clarity and accuracy. Detailed information about these changes may be found in Appendix B.

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education adopt the attached final amendments to the *Regulations Governing Local School Boards and School Divisions* and authorize the Department of Education staff to proceed with the requirements of the Administrative Process Act.

Impact on Resources: The administrative impact for the review of these regulations and passage of the section governing textbooks is expected to have a minimal fiscal or administrative impact on the Department of Education and school divisions.

Timetable for Further Review/Action: The timetable for further action will be governed by the requirements of the Administrative Process Act.

CHAPTER 720

REGULATIONS GOVERNING
LOCAL SCHOOL BOARDS AND SCHOOL DIVISIONS

8VAC 20-720-80. Student fees and charges.

A. No fees or charges may be levied on any pupil by any school board unless authorized by [regulation of] the Board of Education or [~~prescribed~~] by the [~~*Code of Virginia*~~ General Assembly.]

B. Each local school board shall develop a policy in accordance with the requirements of the Standards of Quality, § 22.1-253.13:7 of the *Code of Virginia*, addressing any fees that are charged. The policy shall include the schedule of fees charged by the school division, provisions for reducing or waiving fees, and [~~sanctions~~ consequences] for nonpayment of fees. The policy and the fee schedule shall be provided to parents annually and posted on the school division's Web site.

C. The policy shall provide for the reduction or waiver of fees for economically disadvantaged students and students whose families are undergoing economic hardships [and are financially unable to pay them]. This shall include, but not be limited to, families receiving unemployment benefits [~~and~~ or] public assistance, including Temporary Assistance for Needy Families (TANF), [~~food stamps~~ Supplemental Nutrition Assistance Program (SNAP), Supplemental Security Income (SSI) ~~and~~ or] Medicaid; foster families caring for children in foster care; [~~and~~ or] families that are homeless.

D. [School divisions shall provide notice that a fee waiver may be requested, including directions as to how to apply for the waiver, each time a fee is charged.]

E. School divisions shall not charge any fees that have not been approved by the local school board.

F. The fee policy and the fee schedule shall be consistent throughout the school division, although there may be different fee schedules [~~for~~ assessed at the] elementary, middle, and high [~~schools~~ school levels.]

G. Local school boards shall not charge fees:

1. As a condition of school enrollment, except for students who are not of school age and who do not reside within the jurisdiction, in accordance with §§ 22.1-1 and 22.1-3 of the *Code of Virginia* and as provided for in § 22.1-5 of the *Code*.

2. For instructional programs and activities, or materials required for instruction, except as specified in subsection [~~G~~ H] of this section;

3. For textbooks or textbook deposits; however, § 22.1-243 of the *Code of Virginia* permits a local school board to assess a reasonable fee or charge for lost or damaged textbooks;

4. For pupil transportation to and from school; or

5. For summer school programs or other forms of remediation required by the Standards of Quality, § 22.1-253.13:1 of the *Code of Virginia*.

H. Local school boards may charge fees for the following:

1. [~~Nonmandatory~~ Optional] services, such as parking fees or locker rental fees;

2. [~~Nonmandatory~~ Student-selected] extracurricular activities;

3. Class dues; however, class dues shall not be mandatory, and the school board shall specify the kinds of programs and activities covered by class dues;

4. Field trips or educationally-related programs that are not required instructional activities;

5. [~~Deposits for musical instruments, not required for instructional activities;~~ Fees for musical instruments, so long as the instruction in the use of musical instruments is not part of the required curriculum;]

6. Distance learning classes for enrichment and not necessary to meet the requirements for a diploma;

7. Summer school, unless the classes are required for remediation as prescribed by the Standards of Quality, § 22.1-253.13:1 of the *Code of Virginia*;

8. Overdue or lost or damaged library books;

9. Lost or damaged textbooks, in accordance with § 22.1-243 of the *Code of Virginia*; however, textbooks shall be provided free of charge;

10. Consumable materials such as workbooks, writing books[, ~~and~~] drawing books [and fine arts materials and supplies]; however, in accordance with § 22.1-243 of the *Code of Virginia*, the local school board shall develop a policy ensuring that workbooks, writing books, and drawing books are furnished to students who are unable to afford them at a reduced price or free of charge[. In addition, local school boards are not authorized to charge fees to students for instructional materials, textbooks, or other materials that are not directly used by a public school student;]

11. The behind the wheel portion of the driver's education program, in accordance with § 22.1-205 of the *Code of Virginia*;

12. A [fee not to exceed a] student's pro rata share of the cost of providing transportation for voluntary extracurricular activities, in accordance with § 22.1-176 of the *Code of Virginia*; and

13. The preparation and distribution of official paper copies of student transcripts; however, each school board shall provide a reasonable number of copies for free before a charge is levied for additional official copies. Official electronic copies of student transcripts shall be provided for free.

I. Local school boards shall not:

1. Withhold any student's scholastic report card or diploma because of nonpayment of fees and charges, in accordance with § 22.1-6 of the *Code of Virginia*; ~~or~~

2. [Withhold any student's class schedule, or]

3. Suspend or expel a student for nonpayment of fees and charges.

J. Nothing in this chapter shall be construed to prohibit the school board of any county, city, or town from making supplies, services, or materials available to pupils at cost.

K. These regulations do not address the operation of school stores or fund raising activities where transactions are strictly voluntary.

CHAPTER 370

RULES GOVERNING FEES AND CHARGES

~~8VAC 20-370-10. Fees and charges.~~

~~No fees or charges as noted below may be levied on any pupil by any school board unless authorized by the Board of Education; further, no pupils' scholastic report card or diploma shall be withheld because of nonpayment of any such fee or charge.~~

~~Fees may be charged for:~~

1. ~~Class dues;~~

2. ~~Voluntary student activities;~~

3. ~~Night school classes;~~

4. ~~Postgraduate classes;~~

5. ~~Summer school;~~

6. ~~Rental textbooks;~~

7. ~~Musical instruments used in regularly scheduled instructional classes; and~~

8. ~~Library fees.~~

~~Nothing in this chapter shall be construed to prohibit the school board of any county, city, or town from making supplies, services, or materials available to pupils at cost. Nor is it a violation to make a charge for a field trip or an educational related program that is not a required activity.~~

~~Deposits may be required when return of the item used results in a return of the fees deposited.~~

~~This chapter is not intended to cover operations of school stores or other fund raising activities. These activities are covered by opinions of the Attorney General and certain practices which may be approved by auditors.~~

Appendix A: Public Comments

The public comment period was held from May 24, 2010 through July 26, 2010. During this time, four public comments were held. They were held in Marion on June 3, 2010, and in Alexandria, Chesapeake, and Richmond on June 10, 2010. The Board received comments from 42 individuals and organizations.

Commenter	Comment
Citizen	• Regulations should require local school divisions to provide clear, conspicuous written notice that low income families can apply for a fee waiver, including directions as to how to do so each time a fee is charged. • Fee waivers should be made available for all activities, whether mandatory, elective, or optional. • The regulations should explicitly prohibit school divisions from withholding class schedules, or excluding students from basic educational functions such as graduation ceremonies or field trips for nonpayment of fees.
Legal Aid Society of Roanoke Valley	• Families should receive clear written notice about the availability of fee waivers whenever a fee is charged. • Families should have access to waivers for every school-related activity, whether optional or required. • Schools should be prohibited from withholding academic schedules, or excluding students from participating in activities such as graduation or field trips if fees are not paid.
High School English Teacher	• Do not drop fees for art supplies, musical instruments, uniforms and music because programs will be cut back or cut altogether for lack of funds, students will lose opportunities, and teachers will lose jobs.
Art Teacher	• Do not eliminate art fees because students would not be able to purchase all of the items they need individually.
Music Educator	• Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Social Studies Department Chair	• Students should not be required to pay for a gym uniform because it is a required course. • Eliminate the disparity in fees. It is unfair that some students must pick a course schedule based on the classes they can afford to take. • Allowing a fee waiver is helpful, but there are many families who would not qualify for the waiver, but would still be burdened by the fees.
Elementary School Principal	• School fees should not be required to be consistent cross the school division. They should be based on school needs. • Add language that school management teams that include parent input will determine the fees within those allowed by the school board. • Add a process that allows individual schools to request waivers to add fees that are supported by staff and parents for school activities. • Charter schools should be required to follow the same guidelines as other schools in a division as it relates to fees. • Opposes providing reduced fees for economically disadvantaged students unless the state provides funding for this purpose. Funding should be clearly spelled out in policy how a division will support students who cannot pay. • Require all students to pay at least a portion. Economically disadvantaged

	students should be required to pay at least 50% of the fees. • Do not prohibit fees for art and music programs.
Music Teacher	• Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Music Specialist	• Do not damage performing arts programs by eliminating fees.
Choral Director	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Chorus Teacher	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Teacher	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Citizen	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Art Teacher	• Support the charging of fees for fine arts students. Students take better care of materials if they have a stake in them and it would allow budgets to extend further.
Virginia Art Education Association	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Citizen	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Citizen	• Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Citizen	• Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.

Parent	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Retired Art Educator and VAEA Board Chair	• Without fees as funding from the school board, it will be difficult to provide many consumable materials for fine arts classes, thus diluting the quality of offerings for students and have a negative impact on advanced study opportunities.
Band Director	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Citizen	• It is the right decision to regularize the schools so as not to exclude low income group students for extra activities in the school.
Music Department Chair	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
High School Choir Alumni	• Support the charging of fees by school boards and school divisions. • Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials.
Division Superintendent	• Regulations would impose new administrative requirements on LEAs while reducing local flexibility over potential sources of revenue. • Instructional programs that are particularly resource and/or equipment intensive could be disproportionately affected. • Consider dropping the requirement to include unemployment benefits from the waiver section. • Section F appears unnecessary. • Fee prohibitions in item number 2 are written too broadly and could eliminate fee authority in many circumstances where a fee is appropriate. • Prohibition language conflicts with the *Code*, i.e., costs for AP or IB exams. It is unclear whether LEAs would be allowed to pass those charges and charges for industry certification exams to students given they are directly related to instructional programs and activities. • Draft language only allows for deposits for musical instruments, not charges, and only for non-instructional instruments. This could have an impact on the ability of LEAs to provide this instruction. • Draft regulations are likely to have a fiscal impact on LEAs, in terms of revenue losses and additional administrative burden. Suggests the BOE consider delayed enactment of the changes until the fiscal situation in Virginia improves.
JustChildren	• Add Supplemental Security Income as one of the forms of public assistance qualifying a family for a waiver. • Families should receive clear written notice of how to request a waiver each time a fee is charged.

	• Waivers should be available for all activities, whether mandatory or optional. • Schools should be prohibited from withholding class schedules, or excluding students from basic educational activities such as graduation or field trips for non-payment of fees.
Citizen	• All children need a fair chance of an education, no matter their income level, background, or anything else.
Citizen	• The regulations are really helpful for those people who want to go to school but do not have enough money to pay tuition or other expenses.
Citizen	• Children need to be educated and the government must make a move to help those children who cannot afford school expenses.
Citizen	• The regulation page is a good page with nice topics and good comments.
Citizen	• The topics are interesting and important.
Citizen	• More actions like this should be taken.
Citizen	• With the recession, we all should strive to economize and not have necessary fees.
Citizen	• Looking forward to learning more about this.
Virginia Leadership Coalition for Fine Arts in Education	• Permit local school boards to charge fees for musical instruments and equipment required for instructional activities. • Permit local school boards to charge fees for consumable materials such as workbooks, writing books, drawing books, and fine arts materials. Keep in mind the long term impact of the proposed regulations. It is impractical to think school divisions can fully fund the equipment, maintenance and consumable supply needs of the school.
Legal Aid	• Families should receive clear notice about the availability of fee waivers whenever a fee is charged. • Families should have access to waivers for every school-related activity, whether those activities are optional or required. • Schools should be prohibited from withholding academic schedules, or excluding students from participating in activities like graduation or field trips because of unpaid fees.
Families and Allies of Virginia's Youth	• Families should receive clear written notice of how to request a waiver each time a fee is charged. • Waivers should be available for all activities, whether mandatory or optional. • Schools should be prohibited from withholding class schedules, or excluding students from basic educational activities like graduation or field trips because of non-payment of fees.
Band Director	• Removing some of the fees will present an undue burden on school divisions' ability to support the successful programs that the children and community have enjoyed. • The term "consumable" should be revised to include those terms critical to a fine arts education, such as visiting artists, entry fees to state performance assessments, and sheet music. • Allow local school divisions to use state textbook monies to purchase sheet music. In music classes, sheet music is the textbook.
Just Children	• Families should receive clear written notice of how to request a waiver each time a fee is charged. • Waivers should be available for all activities, whether mandatory or optional. • Schools should be prohibited from withholding class schedules, or excluding students from basic educational activities like graduation or field trips because of non-payment of fees.

Virginia Music Educators, Inc.	• Allow school divisions to charge fees for musical instruments and equipment required for instructional activities and for consumable materials used in Fine Arts.
Virginia Music Educators Association and Virginia Leadership Coalition for Fine Arts in Education	• Allow school divisions to charge fees for musical instruments and equipment required for instructional activities and for consumable materials used in Fine Arts.
Advocating for Children and Justice for All	• No child should be prevented from taking a course or participating in an activity because of inability to pay a fee. • Families should receive clear written notice as to how to request a waiver each time a fee is charged. • Waivers should be available for all activities, whether mandatory or optional. • Schools should be prohibited from withholding class schedules, or excluding students from basic educational activities like graduation or field trips for non-payment of fees.

Appendix B: Revisions to the Proposed Regulations

Section number	Requirement at proposed stage	What has changed	Rationale for change
80 A.	No fees or charges may be levied unless authorized by the Board of Education or by the *Code of Virginia*.	Language is revised to say that no fees or charges may be levied unless authorized by regulation of the Board or by the General Assembly	Revised for clarity.
80 B.	Required local school board policies to include the sanctions for nonpayment of fees.	The term "sanctions" has been changed to "consequences."	Revised for clarity.
80 C.	Requires that local school board policies provide for the reduction or waiver of fees for economically disadvantaged students and students whose families cannot afford them. Specific examples of such students are included.	The phrase "and are financially unable to pay them" is added. Families receiving Supplemental Security Income are added to the examples. The term "food stamps" is replaced with the term "Supplemental Nutrition Assistance Program."	Revised for clarity. Revised in response to public comment. Supplemental Security Income is a form of public assistance recognized by the Virginia Supreme Court. The food stamp program is now known as the Supplemental Nutrition Assistance Program.
80 D.		Language is added to require school divisions to provide notice that a fee waiver may be requested, including directions as to how to apply for the waiver, each time a fee is charged.	Revised in response to public comment.
80 F.	The fee policy and the fee schedule shall be consistent throughout the school division, although there may be different fee schedules for elementary, middle, and high school levels.	Language revised to say that the fee policy and the fee schedule shall be consistent throughout the school division, although there may be different fee schedules assessed at elementary, middle, and high schools.	Revised for clarity.
80 H 1 and 2	Fees may be charged for nonmandatory services… and nonmandatory extracurricular activities.	The term "nonmandatory" is changed to "optional" (services) and "student-selected" (extracurricular activities).	Revised for clarity.

80 H.5	Deposits may be charged for musical instruments not required for instructional activities.	Language is broadened to permit fees for musical instruments so long as the instruction in the use of musical instruments is not part of the required curriculum.	Revised in response to public comment and to comport with the Attorney General's Opinion dated May 6, 1977.
80.H. 10	Fees may be charged for consumable materials such as workbooks, writing books, and drawing books.	Language is added to clarify that fees may be charged for consumable materials such as workbooks, writing books, drawing books and fine arts materials and supplies. Language is added to say that Local school boards are not authorized to charge fees to students for instructional materials, textbooks, or other materials that are not directly used by a public school student.	Fine arts materials and supplies are added in response to public comment. Language is added to comport with HB 491, passed by the 2010 General Assembly.
80.H.12	A student's pro rata share of the cost of providing transportation for voluntary extracurricular activities	Language is added to say that a fee not to exceed a student's pro rata share.	Revised for clarity
80.I	Local school boards shall not withhold any student's, scholastic report card or diploma because of nonpayment of fees and charges, in accordance with § 22.1-6 of the *Code of Virginia* or to suspend or expel a student for nonpayment of fees.	Language is added to say that local school boards shall not withhold any student's class schedule for nonpayment of fees.	Revised in response to public comment

Board of Education Agenda Item

Item: F. **Date:** September 23, 2010

Topic: Final Review of Amendments to the *Regulations Governing Local School Boards and School Divisions* (8 VAC 20-720) and Repeal of the *Regulations Governing Instructional Materials – Selection and Utilization by Local School Boards* (8 VAC 20-170), *Regulations Governing Textbook Adoption State Level* (8 VAC 20-220), *Regulations Governing Textbook Adoption Local Level* (8 VAC 20-230), and *Regulations Governing Textbook Fund Management and Handling on Local Level* (8 VAC 20-270)

Presenter: Ms. Anne D. Wescott, Assistant Superintendent for Policy and Communications

Telephone Number: (804) 225-2403 **E-Mail Address:** Anne.Wescott@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting _____ Action requested at future meeting: _____

Previous Review/Action:

___ No previous board review/action

_X_ Previous review/action

date July 23, 2009

action Acceptance of the proposed regulation for first review

Background Information: The Board of Education currently has three sets of regulations governing textbooks and one set of regulations governing instructional materials. The regulations governing textbooks are: *Regulations Governing Textbook Adoption State Level* (8 VAC 20-220), *Regulations Governing Textbook Adoption Local Level*, (8 VAC 20-230), and *Regulations Governing Textbook Fund Management and Handling on Local Level*, (8 VAC 20-270). The regulations governing instructional materials are: *Regulations Governing Instructional Materials – Selection and Utilization by Local School Boards* (8 VAC 20-170). All of these regulations were adopted on or before September 1, 1980, have not been amended since that time, and are out-of-date.

During the 2008 General Assembly, three bills were passed that impact the purchasing and provision of textbooks for Virginia's public school students. These bills were HB 137, patroned by Delegate Chris Peace, HB 354, patroned by Delegate Mark Cole and SB 356, patroned by Senator John Watkins. HB 137 and SB 356 are identical and were proposed by the Department of Education. HB 354 is identical, with the addition of a provision making it possible for any private school within a school division to purchase textbooks from the local school board's contract. These bills took effect on July 1, 2008.

The purpose of this proposal is to repeal the four current regulations and amend the *Regulations Governing Local School Boards and School Divisions* by creating a section governing textbooks. The three current regulations will be repealed simultaneously with the adoption of the amendment. The amendment will also capture the requirements of the bills passed by the 2008 General Assembly.

The Board of Education accepted the proposed regulations and authorized the Department of Education to proceed with the requirements of the Administrative Process Act at its July 23, 2009, meeting. The proposed regulations were published in the May 24, 2010, Virginia Register of Regulations. A public comment period was held from May 24, 2010 until July 26, 2010. During that time, public hearings were held on June 3 in Marion, and on June 10 in Alexandria, Chesapeake and Richmond. No public comments were received.

Summary of Major Elements: The proposed final regulations will capture the requirements of HB 137, HB 354 and HB 356, all passed by the 2008 General Assembly, relating to textbook purchasing. These provisions relate to the approval of textbooks, basal textbooks, contacts with textbook publishers, the distribution of textbooks and consumable materials, and the selection of instructional materials by local school divisions. In addition, a number of provisions that are unnecessary, outdated, or are no longer required by the *Code of Virginia* would be deleted.

In 8 VAC 20-720-10, the definitions section:

- The term "textbook" is defined, consistent with the definition of textbook in § 22.1-238 of the *Code of Virginia*.

- The term "instructional materials" is also defined.

In VAC 20-70-160, the instructional materials section:

- Language is added to provide parents with the right to inspect instructional materials used as a part of the educational curriculum, and the procedure for granting a request to parents for such access. This language is consistent with the federal *Protection of Pupil Rights Amendment*, 20 U. S. C. § 1232H and its implementing regulation 34 CFR 98.

In 8 VAC 20-720-170, the textbooks section:

- The textbook selection process is streamlined, consistent with the 2008 legislation. School divisions purchasing textbooks approved by the Board of Education may either

enter into a contract with the publisher or purchase on an as-needed basis. In accordance with § 22.1-241 of the *Code of Virginia*, the written contracts or purchase orders for textbooks approved by the Board are exempt from the *Virginia Public Procurement Act*, and the textbook price shall not exceed the lowest wholesale price at which the book or books involved in the contract are currently bid under contract anywhere in the United States.

- Local school boards may continue to use textbooks not approved by the Board of Education, provided that they adopt procedures governing the selection process. The selection process must include the appointment of evaluation committees, notice to parents and opportunities for consideration of public comment, and the use of selection criteria approved by the local school board. Local school boards may purchase textbooks not approved by the Board of Education. These transactions are not exempt from the *Virginia Public Procurement Act*.

- Local school divisions would be required to certify annually that the textbooks are selected and purchased in accordance with the *Code of Virginia* and these regulations.

- Language about the textbook fund that is no longer required by the *Code*, and other outdated and unnecessary provisions of the current regulations, would be repealed.

Two substantive changes are proposed in the final regulations.

- The 2010 General Assembly passed HB 709, which says: "Contracts and purchase orders with publishers of textbooks approved by the Board for use in grades 6-12 shall allow for the purchase of printed textbooks, printed textbooks with electronic files, or electronic textbooks separate and apart from printed versions of the same textbook. Each school board shall have the authority to purchase an assortment of textbooks in any of the three forms listed above." This language would be added to the regulations.

- The *Code of Virginia* says, in § 22.1-242: "The Board shall adopt regulations governing (i) the purchase of textbooks approved by it for use in the public schools directly from the publishers by school boards and (ii) the distribution of such textbooks for the use by children attending public schools in Virginia. The current regulations do not address the distribution of textbooks. At one time, the distribution of textbooks was more centrally administered, and authorized a central depository for textbooks. Currently, § 22.1-243 of the *Code* addresses the distribution of textbooks and says: "Each school board shall provide, free of charge, such textbooks required for courses of instruction for each child attending public schools." This language would also be added to the regulations.

In addition, a number of editorial changes are proposed in the final regulations to improve the draftsmanship of these regulations. Most of the changes are intended to clarify the language in the proposed regulations, and to track the language in the *Code of Virginia* more closely. Detailed information about these changes may be found in Appendix A.

Upon passage of the new sections governing textbooks and instructional materials, the current individual regulations would be simultaneously repealed.

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education adopt the attached final amendments to the *Regulations Governing Local School Boards and School Divisions* and authorize the Department of Education staff to proceed with the remaining steps required by the Administrative Process Act.

Impact on Resources: The administrative impact for the review of these regulations and passage of the section governing textbooks and instructional materials is expected to have a minimal fiscal or administrative impact on the Department of Education and local school divisions.

Timetable for Further Review/Action: The timetable for further action will be governed by the requirements of the Administrative Process Act.

CHAPTER 720

REGULATIONS GOVERNING
LOCAL SCHOOL BOARDS AND SCHOOL DIVISIONS

8VAC 20-720-10. Definitions

"Instructional materials" means all materials, other than textbooks, used to support instruction in the classroom, including, but not limited to, books, workbooks, and electronic media.

"Textbooks" means print or electronic media for student use that serve as the primary curriculum basis for a grade-level subject or course.

8 VAC 20-720-160. Instructional materials.

A Local school boards shall be responsible for the selection[~~, approval,~~] and utilization of instructional materials.

B Local school boards shall adopt policies and criteria for the selection of instructional materials that shall include, at a minimum:

1. [~~Instituting a policy regarding the~~ The] rights of parents to inspect, upon request, any instructional materials used as part of the educational curriculum for students, and the procedure for granting a request by a parent for such access, in accordance with the *Protection of Pupil Rights Amendment*, 20 U. S. C. § [~~123h~~ 1232H], and its implementing regulation, 34 CFR 98[~~;~~.]

2. [~~Establishing procedures for the reconsideration of challenged materials;~~

~~3. Placing special emphasis on the thorough evaluation of materials related to controversial or sensitive topics such as sex education, moral education, and religion; and~~

The basis upon which a person may seek reconsideration of the local school board's selection of instructional materials, including but not limited to materials that might be considered sensitive or controversial, and the procedures for doing so.]

~~4.~~3.[~~Including in the curriculum and scheduling options for students whose parents choose to withdraw them from class for the duration of the treatment of a sensitive or controversial topic. Parents should be required to justify their requests.~~ Pursuant to § 22.1-253.13:7 of the *Code of Virginia*, the policies shall include clear procedures for handling challenged controversial materials.]

8VAC20-720-170. Textbooks

A. Textbook approval

1. The Board of Education shall have the authority to approve textbooks for use in the public schools of Virginia.

2. In approving basal textbooks for reading in kindergarten and first grade, the Board shall report to local school boards those textbooks with a minimum decodability standard based on words that students can correctly read by properly attaching speech sounds to each letter to formulate the word at 70 percent or above for such textbooks, in accordance with § 22.1-239 of the *Code of Virginia*.

3. Any local school board may use textbooks not approved by the Board provided the school board selects such books in accordance with this chapter.

4. [Contracts and purchase orders with publishers of textbooks approved by the Board for use in grades 6-12 shall allow for the purchase of printed textbooks, printed textbooks with electronic files, or electronic textbooks separate and apart from printed versions of the same textbook. Each school board shall have the authority to purchase an assortment of textbooks in any of the three forms listed above.]

B. Selection of textbooks by local school boards

Local school boards shall adopt procedures for the selection of textbooks. These procedures shall include, at a minimum, the following:

1. Appointment of [~~an~~] evaluation [~~committee~~ committees] by the local school board to review and evaluate textbooks in [~~one or more~~ each] of the subject areas.

2. Notice to parents that textbooks under consideration for approval will be listed on the school division's Web site and made available at designated locations for review by any interested citizens.

   [~~Provisions~~ Opportunities ~~shall be made~~] for those reviewing such textbooks to present their comments and observations, if any, to the school board through locally approved procedures.

   [~~Actions which are necessary~~ Procedures] to [~~assure~~ ensure] appropriate consideration of citizen comments and observations. [~~shall be taken and adequate time for such consideration shall be allowed.~~]

3. [~~Use of selection~~ Selection] criteria [~~that has been approved by the local school board~~].

C. Purchasing Board of Education approved textbooks

1. Local school divisions shall purchase textbooks approved by the Board of Education directly from the publishers of the textbooks by either entering into written term contracts

or issuing purchase orders on an as-needed basis in accordance with § 22.1-241 of the *Code of Virginia*.

2. Such written contracts or purchase orders shall be exempt from the *Virginia Public Procurement Act* (§§ 2.2-4300 et seq. of the *Code of Virginia*). [~~and from any locally adopted regulations or procedures~~.]

D. Purchasing non-Board of Education approved textbooks

[~~Local school divisions shall purchase non-Board of Education approved textbooks by either entering into written contracts or issuing purchase orders on an as-needed basis in accordance with locally adopted procurement procedures or regulations that contain requirements for competitive purchasing or the *Virginia Public Procurement Act*.~~]

[The purchase of textbooks other than those approved by the State Board is not exempt from the *Virginia Public Procurement Act*.]

E. [Distribution of textbooks

Each school board shall provide, free of charge, such textbooks required for courses of instruction for each child attending public schools.]

F. Certifications

The division superintendent and chairperson of the local school board shall annually certify to the Virginia Department of Education that:

1. All textbooks were selected and purchased in accordance with this chapter; and

2. The price paid for each textbook [~~was not in excess of that charged elsewhere in the United States~~ did not exceed the lowest wholesale price at which the textbook involved in the contract was currently bid under contract in the United States], in accordance with § 22.1-241 of the *Code of Virginia*.

The certification shall include a list of all textbooks adopted by the local school board.

CHAPTER 170

REGULATIONS GOVERNING INSTRUCTIONAL MATERIALS – SELECTION AND UTILIZATION BY LOCAL SCHOOL BOARDS

~~8VAC20-170-10. Responsibility - local school boards.~~

~~The Board of Education places with local school boards the responsibility for the selection, approval, and utilization of instructional materials.~~

~~In the selection of instructional materials, the local school board is responsible for the following:~~

1. ~~Developing local criteria for selection (the Board of Education will assist by publishing guidelines for the development of criteria);~~

2. ~~Approving materials which are consistent with instructional goals and objectives;~~

3. ~~Appointing a division evaluation committee which should include, when appropriate, parents, students, teachers, supervisors, and nonparent patrons;~~

4. ~~Providing for the examination of materials by appropriate committees and individuals (local boards may choose to exempt certain types of materials from the formal evaluation process - maps, charts, games, etc.);~~

5. ~~Providing notice to parents that books and materials under consideration for approval will be available at designated locations for review by any interested citizens. Provisions should be made for those reviewing such materials to present their comments and observations, if any, to the school board through locally approved procedures. Those actions should be taken which are necessary to assure appropriate consideration of such citizen observations and adequate time for such consideration should be allowed. Such actions might include (i) opportunity to meet with the board, or (ii) opportunity to meet with board-appointed professional committees assigned responsibility for making recommendations to the board;~~

6. ~~Requesting special assistance in the evaluation of proposed materials, if desired, from the Department of Education;~~

7. ~~Establishing procedures for the reconsideration of challenged materials;~~

8. ~~Placing special emphasis on the thorough evaluation of materials related to controversial or sensitive topics such as sex education, moral education, and religion;~~

9. ~~Including in the curriculum and schedule options for students whose parents choose to withdraw them from class for the duration of the treatment of a sensitive or controversial topic. Parents should be required to justify their requests.~~

CHAPTER 220

REGULATIONS GOVERNING TEXTBOOK ADOPTION
STATE LEVEL

~~8VAC20-220-10. Adoption period established.~~

~~Textbooks shall be adopted for a six-year period, according to a schedule to be determined by the Department of Education and approved by the Board of Education in the following areas:~~

~~1. Elementary:~~

~~a. Language and grammar;~~
~~b. Social studies;~~
~~c. Mathematics;~~
~~d. Health;~~
~~e. Dictionaries;~~
~~f. Science;~~
~~g. Reading;~~
~~h. Spelling; and~~
~~i. Handwriting.~~

~~2. Secondary:~~

~~a. Literature;~~
~~b. Speech;~~
~~c. Drama;~~
~~d. Journalism;~~
~~e. English, grammar, and composition;~~
~~f. Physical science;~~
~~g. Earth-space science;~~
~~h. Biology;~~
~~i. Chemistry;~~
~~j. Physics;~~
~~k. World history;~~
~~l. United States history;~~
~~m. United States government;~~
~~n. Economics;~~
~~o. Mathematics;~~
~~p. Health;~~
~~q. Dictionaries;~~
~~r. Sociology;~~
~~s. Geography; and~~
~~t. Foreign Languages.~~

~~8VAC20-220-20. Deletion from approved lists within adoption period; extension of contracts for adopted books.~~

~~An adopted book may be deleted from the approved list within the six-year period in accordance with statutory provisions; and contracts for certain books currently adopted as well as those which may be adopted from such areas as writing, spelling, and literature (anthologies) may be extended up to four years in accordance with statutory provisions.~~

~~8VAC20-220-30. Types of materials adopted.~~

~~Only those materials which are designed to provide basic support for the instructional program of a particular content area at an appropriate level will be adopted.~~

~~8VAC20-220-40. Wholesale prices.~~

~~Contracts with the publishers shall be made for all textbooks at the wholesale prices free on board publishers' nearest shipping point.~~

~~8VAC20-220-50. Allowance for delivery costs.~~

~~A percentage determined by the Board of Education will be added to the wholesale prices of textbooks, free on board publishers' nearest shipping point, to cover the cost of delivering the books to division school boards in Virginia.~~

~~8VAC20-220-60. Maximum retail prices.~~

~~A percentage, in addition to that mentioned above, shall be added to establish the maximum retail prices of textbooks.~~

~~8VAC20-220-70. Price adjustment requests.~~

~~At the time of adoption (December of even years), the Board of Education also will consider requests from publishers for adjustments in contract prices for materials already under contract but not involved in the current adoption.~~

CHAPTER 230

REGULATIONS GOVERNING TEXTBOOK ADOPTION
LOCAL LEVEL

~~8VAC20-230-10. Authority.~~

~~The Constitution of Virginia gives the Board of Education authority to adopt textbooks for use in the public schools of Virginia. To fulfill its duty, the Board adopts a multiple list of textbooks in each grade and subject in which basal adoptions are made. In turn, local school boards select materials to meet local needs from this multiple listing. In addition, the Code of Virginia provides that any local school board may use textbooks not approved by the board, provided the school board selects such books in accordance with regulations promulgated by the Board of Education.~~

~~8VAC20-230-20. Local adoptions of state-adopted texts.~~

~~Following the announcement of adoptions, the Board of Education authorizes a period of five to seven months in which localities may examine and select materials from the list chosen by the board. Such local adoptions are reported to the Department of Education on forms provided by the department.~~

~~8VAC20-230-30. Local adoptions of nonstate adopted material.~~

~~The Board of Education has set forth the following regulations for the selection of textbooks not on the state-adopted list:~~

1. ~~An evaluation committee shall be appointed by the school board to review and evaluate textbooks in one or more of the subject areas for which adoptions are effective beginning July 1 of odd-numbered years.~~

2. ~~The evaluation committee shall be representative of the supervisory staff of the central office, elementary or secondary school administrators or both, and classroom teachers of the subject fields in which adoptions are to be made, and shall be nondiscriminatory with respect to sex and race.~~

3. ~~Before recommending a textbook not on the state-adopted list, the committee shall first have examined and evaluated the appropriate textbooks on the state-adopted list.~~

4. ~~The evaluation committee shall submit in writing its recommendations and supporting data via the division superintendent to the school board for action in sufficient time for the adoptions by the local school boards to be effective July 1 of odd- numbered years.~~

5. ~~Criteria to be used by the evaluation committee in the review and assessment of textbooks must have the official approval of the local school board. The criteria, as approved, shall be on file in the office of the local school board.~~

6. ~~The division superintendent shall certify to the Superintendent of Public Instruction or his representative, on forms prescribed by the Department of Education, a list of all books adopted by the local school board and state that such books have been adopted in full compliance with this chapter and that information as to prices paid for such books is available upon request.~~

7. ~~Evidence shall be on file in the office of the local school board that the price charged for any textbook adopted under this chapter is not in excess of that charged elsewhere in the United States.~~

~~8VAC20-230-40. Local adoptions for materials for subject areas not included in basal adoptions.~~

~~For use in vocational classes and for other subject areas in which no material is adopted, localities may select textbooks from lists of recommended texts furnished by the Department of Education.~~

CHAPTER 270

REGULATIONS GOVERNING TEXTBOOK FUND MANAGEMENT AND HANDLING ON LOCAL LEVEL

~~8VAC20-270-10. General.~~

~~Although most school systems distribute textbooks to students on a free or rental basis, some systems still use retail sales to students. In the following sections, references to "retail sales" or "unsold textbooks on hand" refer to this type of distribution. Books are secured from publishers on a consignment basis and payment is made quarterly as the books are sold. Books not sold may be held until the end of an adoption period and returned to the publisher for credit.~~

~~Only those textbooks selected by school divisions from the list of state-adopted texts are subject to the prices and regulations set forth in contracts between the publishers having books on the adopted list and the Virginia Board of Education.~~

~~8VAC20-270-20. Establishment and designation of special fund; establishment of special bank account.~~

~~A separate fund shall be established by the school board and the chief fiscal officer of the county, city, or town (of which the school board is a part), to which shall be credited all proceeds received from the sale of textbooks in the local school system. This special fund shall be designated:~~

~~County, City, or Town of.....~~
~~School Textbook Fund~~
~~The chief fiscal officer is requested to establish a special bank account titled as follows:~~
~~County, City, or Town of.....~~
~~School Textbook Fund~~
~~By.....~~
~~(Treasurer/Director of Finance or such title as he may have.)~~

~~8VAC20-270-30. Textbook sales, receipts, and disbursements; bonds for clerk and other personnel handling funds.~~

~~The school board shall designate the clerk of the school board, who shall be bonded as provided by law, to handle the sale of textbooks. Additional personnel employed to assist the clerk in handling textbook funds shall be covered by a fidelity and faithful performance bond, a copy of which shall be filed in the school board office.~~

~~The local school board shall require the clerk to deposit intact, with the treasurer or the director of finance or in any bank designated by the chief fiscal officer, all moneys received from the sale of textbooks; and the treasurer or the director of finance, in turn, will deposit these sums to the credit of the special bank account aforementioned. When ordering payments to publishers, or the payment of any expense from the proceeds of the sale of textbooks, the county, city, or town~~

~~school board shall issue its warrant made payable to the publisher, agency, or individual to whom the payment is being made; this warrant shall be signed by the chairman of the school board and countersigned by the clerk of that board.~~

~~In each instance, each warrant shall indicate that it is payable from the school textbook fund as set forth above. All expenditures shall be approved and a warrant in payment thereof authorized by the school board in accordance with the procedure for the expenditure of regular school funds. The procedure to be followed for the disbursement of funds credited to the school textbook fund in cities shall conform to the procedure in effect for the disbursements of school funds; the only distinction being that the school board and the chief fiscal officer shall maintain a separate fund and separate bank account for the receipts and disbursements incident to the handling of textbooks.~~

~~8VAC20-270-40. Accounting and records; verification of book shipments received.~~

~~The school board shall require the clerk of the board to maintain a record of receipts and disbursements of the textbook fund and to reconcile the balance in this fund each month with the chief fiscal officer of the county, city or town. It shall also require the maintenance of a ledger account with each publisher to which will be credited the value of books received for sale and to which will be charged all payments made to the publisher on account and all transactions for exchanged and returned books. This account shall be reconciled with the reports of unsold books on hand. The invoices received from the publishers for books shipped to the school board shall be filed in separate folders by the names of publishers. Each shipment of books received shall be verified by actual count and the date and quantity of books received should be written on the invoice opposite each title and signed by the person making the count.~~

~~8VAC20-270-50. School systems having free or rental textbook systems and also selling textbooks.~~

~~In counties, cities, and towns where free or rental textbook systems are in operation in some schools and textbooks are sold to pupils in other school systems, all textbooks purchased from the publishers should be handled through the textbook fund. Books which are used for that portion of the school system from which rental or free textbooks are furnished should be purchased from the textbook fund and be paid for with a warrant drawn on the regular school operating fund or the school textbook rental fund.~~

~~8VAC20-270-60. Transfers between school operating fund and textbook fund.~~

~~If the school board makes an appropriation for the operation of the school textbook fund, a warrant should be drawn on the regular school operating fund and deposited to the credit of the school textbook fund. If the school board authorizes the use of surplus school textbook funds for general school operation, a warrant should be drawn on the textbook fund and credited to the regular school operating fund.~~

~~8VAC20-270-70. Reports and payments to publishers; unsold textbooks on hand as of June 30.~~

~~Copies of reports to publishers listing all new unsold textbooks on hand and showing balances due for all books sold as of October 15, January 15, March 31, and June 30 shall be kept by the school board. The school board shall forward the original of each periodic report, together with its remittance, directly to the publishers on the dates designated. Each report to the publisher certifying unsold textbooks on hand as of the date of the report shall be certified by the persons responsible for the handling of the textbooks and the superintendent, or some person designated by the superintendent, who shall verify the accuracy of the report by an actual count of the books on hand. Unsold textbooks on hand as of June 30 of each year shall be listed on the Virginia textbook requisition (elementary and high) for the current year.~~

~~8VAC20-270-80. Books for resale to be segregated from those owned by the school board.~~

~~Books received from the publishers for resale shall be segregated and maintained under a separate inventory control from books which are owned outright by the school board and used in a rental or a free- textbook system.~~

~~8VAC20-270-90. Responsibility for books placed in specific schools.~~

~~Where the school board finds it necessary to place books in a school for resale to pupils, the principal of the school (or other person approved by the school board) shall be required to sign a receipt listing the titles and retail sale prices of all books placed in his or her custody; the individual shall be responsible for the total value of books received and be required to account to the school board not less than quarterly in money and value of books returned equal to the total value of books receipted for by him.~~

~~8VAC20-270-100. Audits; preservation of records.~~

~~The school textbook fund shall be audited annually on order of the school board or by the governing board as a part of the overall county, city, or town audit. A copy of the audit report shall be furnished to the Board of Education. The records required by this chapter shall be preserved in the same manner as other public records.~~

~~8VAC20-270-110. Fire insurance on textbooks in stock.~~

~~The entire stock of textbooks shall be adequately covered by fire insurance and any loss shall be payable to the school board. A copy of the policy shall be filed with the school board and satisfactory proof of coverage submitted to the Board of Education.~~

~~8VAC20-270-120. Retail sales of textbooks to be for cash.~~

~~Textbooks shall be sold at retail for cash only.~~

~~8VAC20-270-130. Issuance of warrants between board meetings.~~

~~The school board may provide, by resolution, for the issuance of warrants drawn on the textbook fund in payment of amounts due publishers and for freight, or drayage falling due between meeting of the board. All such warrants shall be signed by the chairman and countersigned by the clerk of the school board and presented to the school board for approval at the next meeting following the issuance of such warrants.~~

Appendix A: Revisions to the Proposed Regulations

Section number	Requirement at proposed stage	What has changed	Rationale for change
160.A	Local school boards shall be responsible for the selection, approval, and utilization of instructional materials	Language is revised to delete the word "approval."	Revised to comport with § 22.1-238 of the *Code of Virginia*, which authorizes the Board of Education to approve textbooks, and local school boards to select textbooks.
160.B	Local school boards shall adopt policies and criteria:		
	1. Instituting a policy regarding the rights of parents to inspect any instructional materials used as part of the educational curriculum…	The words "instituting a policy regarding" are deleted.	Revised for clarity
	20 U.S.C. § 123h…	The citation § 1232h is changed to read § 1232H.	Revised to correct the citation
	2. Establishing procedures for the reconsideration of challenged materials 3. Placing special emphasis on materials related to sensitive or controversial topics	Items 2 and 3 are combined and revised to say that the basis upon which a person may seek reconsideration of the local school board's selection of instructional materials, including but not limited to materials that might be considered sensitive or controversial, and the procedures for doing so.	Revised for clarity
	4. Including in the curriculum and scheduling options for students whose parents choose to withdraw the student from class…	The language is revised to reference language in the *Code of Virginia* specifying that the policies include procedures for handling challenged controversial materials.	Revised to comport with § 22.1-253.13:7 of the *Code of Virginia*

170 A		Language is added to clarify that textbooks approved by the Board of Education for use in grades 6-12 may be print textbooks, electronic textbooks, or print textbooks with electronic files. Local school boards are authorized to purchase these textbooks in any of these three forms.	Addresses the provisions of HB 709, passed by the 2010 General Assembly (§ 22.1-243 of the *Code of Virginia.*
170 B.	The procedures include: Appointment of an evaluation committee to review textbooks in one or more subject areas.	Language is revised to provide for evaluation committees for each subject area.	Revised for clarity.
	Notice to parents that textbooks under consideration will be listed on the school division's Web site and made available for review.	The item is divided into short paragraphs and reorganized.	Revised for clarity.
	Provisions shall be made for those reviewing textbooks to present their comments to the school board through locally approved procedures.	The term "opportunities" is used instead of provisions.	Revised for clarity.
	Actions necessary to assure appropriate consideration of citizen comments and observations. shall be taken and adequate time for such consideration shall be allowed.	The language is revised to say that procedures are required to ensure appropriate consideration of citizen comments and observations.	Revised for clarity.
	Use of selection criteria that has been approved by the local school board.	The language is revised simply to require selection criteria.	Revised for clarity and elimination of redundancy.

170 C.	Provides that written contracts or purchase orders are exempt from the *Virginia Public Procurement Act* and from any locally adopted regulations or procedures.	The provision regarding locally adopted regulations or procedures is deleted.	Revised to clarify that textbooks approved by the Board of Education are exempt from the state procurement act, but not from locally adopted regulations or procedures.
170 D.	Requires local school divisions to purchase non-Board of Education approved textbooks by either entering into written contracts or issuing purchase orders in accordance with locally adopted procurement procedures or regulations or the *Virginia Public Procurement Act.*	Specifies that the purchase of non-Board of Education approved textbooks is not exempt from the *Virginia Public Procurement Act*.	The requirement that the purchase of non-Board of Education approved textbooks must be by written contract or purchase orders in accordance with local procedures or the *Procurement Act* was unnecessary.
170 E		Adds language addressing distribution of textbooks. This requires local school boards to provide, free of charge, textbooks required for courses of instruction for each child attending public schools.	§ 22.1-242 of the *Code* requires regulations governing the distribution of textbooks. The current regulations do not address this topic. The proposed language is consistent with language in § 22.1-243 of the *Code*, which addresses distribution of textbooks.
170 F.	Requires local school boards to certify that the price paid for each textbook was not in excess of that charged elsewhere in the United States in accordance with § 22.1-241 of the *Code of Virginia*.	Language is revised to state that the price did not exceed the lowest wholesale price at which the textbook involved in the contract was currently bid under contract in the United States, in accordance with § 22.1-241.	Revised to comport more closely with the language in the *Code of Virginia.*

Board of Education Agenda Item

Item: G. **Date:** September 23, 2010

Topic: Final Review of the Proposed Revisions to the *Regulations Governing Pupil Transportation (8VAC20-70)*

Presenter: Mr. Kent C. Dickey, Assistant Superintendent for Finance and Operations

Telephone Number: (804) 225-2025 **E-Mail Address:** Kent.Dickey@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting ____ Action requested at future meeting: _____ (date)

Previous Review/Action:

____ No previous board review/action

_X_ Previous review/action
- dates October 18, 2007; November 20, 2008; and May 27, 2010
- action October 18, 2007: Approval of the Notice of Intended Regulatory Action (NOIRA)
- action November 20, 2008: First Review of the Proposed Revisions to the *Regulations*
- action May 27, 2010: Second Review of the Proposed Revisions to the *Regulations*

Background Information:

The *Regulations Governing Pupil Transportation* (8VAC20-70) were last revised in 2004. Since that time, statutory provisions related to the content of these regulations have been enacted or amended resulting in inconsistent or conflicting requirements. In addition, areas of the current regulations needing clarification or flexibility have been identified, as well as content from the 2005 National School Transportation Specifications and Procedures and federal requirements for incorporation into the regulations.

At its October 2007 meeting, the Board of Education approved the department to begin the regulatory revision process. In accordance with the Virginia Administrative Process Act (APA), a Notice of Intended Regulatory Action (NOIRA) was published in the Virginia Register of Regulations in January 2008 indicating the Board's intent to conduct a comprehensive review of the current regulations. The NOIRA was posted for 30 days for public comment.

At its November 2008 meeting, the Board accepted for first review proposed revisions to the regulations and approved the department to continue with the regulatory revision process. Key changes proposed in the first review version of the regulations included additional requirements for activity buses similar to those for yellow school buses, restrictions on daily driving hours and students standing on buses, changes to the daily pre-trip safety inspection, changes to the bus preventive maintenance schedule, changes and clarifications to training requirements, and changes to crash reporting requirements.

Initial executive branch review of the proposed regulations occurred during winter-spring 2009. The proposed regulations were published in the Virginia Register in August 2009 and posted on the Town Hall and department Web sites for a 60-day comment period from August 17 through October 16, 2009. Three public hearings were held across the state (Roanoke, Chesapeake, and Fairfax) in September 2009 to receive public comment. Comments were received from two regional transportation directors' groups, 12 school divisions, and one private company, local education association, private citizen, and school bus dealer. Most of the comments focused on the proposed changes to driving restrictions, standing on buses, student instruction on vehicle operation around buses, maintenance inspection schedules, crash reporting, route review, and pre-trip inspection requirements.

The public comments were compiled and a local review committee was convened to review the comments and provide recommendations for further revisions to the regulations. The review committee consisted of 18 local pupil transportation personnel representing school divisions from all eight superintendents' regions, one representative from the State Police, and three department pupil transportation staff. The committee reviewed and discussed the public comments and made recommendations on further revisions to the regulations.

At its May 2010 meeting, the Board accepted for second review proposed revisions to the regulations. The second review version of the regulations maintained most of the changes proposed in the first review version and reduced or streamlined the pre-trip inspection, preventive maintenance, crash reporting, and bus route review requirements. Due to further proposed changes to the regulations, the Board approved another 30-day public comment period on the proposed changes. The comment period was from June 7, 2010, to July 7, 2010. Comments were received from four school divisions, primarily focusing on proposed changes to the maintenance inspection requirements in the regulations.

Summary of Major Elements

Attachment A shows the most recent public comments received on particular sections of the regulations, with the currently proposed section of the regulation shown for reference. The changes recommended by the department in response to the comments are shown in the last column.

The major change proposed compared to the second review version is to 8VAC20-70-130 (Maintenance Inspection). The current Maintenance Inspection section requires school divisions to conduct bus maintenance inspections every 30 operating days or every 2,500 miles. After reviewing the comments received, and researching this requirement, the proposed change is to require maintenance inspections every 45 school days (with school days based on the school division's approved yearly calendar) or every 5,000 miles. Based on additional staff research, this change will not reduce the safety of the school buses being used to transport students. The proposed change is consistent with manufacturer recommended maintenance schedules, the current diagnostic technology present on school buses, and the maintenance schedules mandated in other states. In addition, the current daily pre-trip safety inspection provides additional safeguards on safe bus operation. Further, school divisions may realize cost savings due to the proposed change in the maintenance schedule.
Attachment B contains the final proposed revisions to the regulations.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education adopt the attached *Regulations Governing Pupil Transportation* as the final version and authorize Department of Education staff to proceed with the remaining steps of the Administrative Process Act prior to the regulations becoming effective.

Impact on Resources:

The final proposed regulations are not expected to have a significant fiscal or administrative impact on local school divisions.

Timetable for Further Review/Action:

The timetable for further action will be governed by the requirements of the Administrative Process Act. The adopted version of the regulations will continue with the remaining steps of the APA before becoming effective.

Attachment A

Comments Received During Second Public Comment Period (June 7 – July 7, 2010)
May 2010 Proposed Changes to *Regulations Governing Pupil Transportation*

Proposed Change to Regulations (2nd Review Version – May 2010)	Public Comments Received	Committee/Staff Proposed Language Changes
8VAC20-70-10. Definitions. The following words and terms when used in this chapter shall have the following meanings unless the context clearly indicates otherwise: "Color-black" means federal standard No. 595, black. "Color-yellow" means national school bus yellow SBMTC color standard 008. "Nonconforming bus" means any vehicle designed to carry more than 10 passengers that is used to transport children to or from school or school-related activities that does not meet the federal standards, 49 CFR part 571, specific to school buses or multifunction school activity buses. These vehicles are not approved for transporting students to and from school or school-related activities. "Vehicle" means any vehicle owned or operated by, or owned or operated by any person under contract with, a county, city, town or school board in which any school pupils or personnel are transported at public expense to or from any public	**Roanoke County –** The word "identification" should be removed from the definition of Multifunction School Activity Bus in 8VAC20-70-10 because it contradicts what is in Specifications Item 80, page 42. The definition of activity buses, page 4, of the current specifications contradicts what is currently in regulation providing an exception of "Identification" and what is in the body of the document, page 42, item 80b.	**Agree with comment**. The word "identification" will be removed from 8VAC20-70-10 to be consistent with the Specifications. **Language in Regulations will become:** "Multifunction School Activity Bus (MFSAB)~~"/(school activity bus)~~ means a school bus whose purposes do not include transporting students to and from home or school bus stops, as defined in 49 CFR 571.3. This subcategory of school bus meets all Federal Motor Vehicle Safety Standards (FMVSS) for school buses, except the traffic control devices, ~~identification,~~ color, use of cruise control, and seating requirements. **Clarify the wording of "Vehicle" as follows:** "Vehicle" means any vehicle owned or operated by, or owned or operated by any person under contract with, a county, city, town or school board in which any school pupils or personnel are transported at public expense to or from any public

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school. "School bus" means any motor vehicle ~~described in this chapter as "Type A1 and A2," "Type B1 and B2," "Type C," or "Type D," which is designed and used for the transportation of pupils,~~ other than a station wagon, automobile, truck, or commercial bus, which is: (i) designed and used primarily for the transportation of pupils to and from public, private or religious schools, or used for the transportation of the mentally or physically handicapped to and from a sheltered workshop; (ii) painted yellow and bears the words "School Bus" in black letters of a specified size on the front and rear, and (iii) ~~which~~ is equipped with ~~the required~~ warning devices ~~as stated~~ prescribed in §46.2-~~100~~ 1090. A yellow school bus may have a white roof provided such vehicle is painted in accordance with regulations promulgated by the Department of Education. ~~Note: This definition includes school buses owned and operated by school boards, private contractors, local governments, and~~		school or public school activity.

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~~transit systems that are used for the transportation of public school pupils.~~ "Specially equipped bus" means a school bus designed, equipped, or modified to accommodate students with special needs. "Multifunction School Activity Bus (MFSAB)"/(school activity bus) means a school bus whose purposes do not include transporting students to and from home or school bus stops, as defined in 49 CFR 571.3. This subcategory of school bus meets all Federal Motor Vehicle Safety Standards (FMVSS) for school buses and meets all regulations for school buses, except the traffic control devices, identification, color, use of cruise control, and seating requirements. "Type A school bus" ~~means~~ is a ~~van~~ conversion ~~or~~ bus constructed utilizing a cutaway front-section vehicle with a left side driver's door. ~~The entrance door is behind the front wheels.~~ This definition includes two classifications. Type A1, with a Gross Vehicle Weight Rating (GVWR) ~~less than or equal to 10,000~~ of		

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14,500 pounds or less; and Type A2, with a GVWR greater than 14,500 pounds but less than or equal to ~~greater than 10,000~~ 21,500 pounds. "Type B school bus" ~~means a bus with a body~~ is constructed utilizing a stripped chassis. The entrance door is behind the front wheels. This definition includes two classifications: Type B1, with a GVWR ~~less than or equal to~~ of 10,000 pounds or less; and Type B2, with a GVWR greater than 10,000 pounds. "Type C (Conventional) school bus" ~~means a bus with~~ is a body ~~constructed utilizing an~~ installed upon a flat-back cowl chassis with a hood and ~~front fender assembly~~ fenders. ~~The entrance door is behind the front wheels~~. This definition shall include two classifications: Type C1, with a GVWR range of 17,500 pounds with a design seating capacity range from 16 to 30 persons; and Type C2 with a GVWR of more than 21,500 pounds, designed for carrying more than 30 persons. The engine is in front of the windshield and the entrance door is behind the front wheels. Both Type C1 and Type C2 must be		

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equipped with dual rear tires. "Type D school bus" means a bus with a body constructed utilizing a stripped chassis. The entrance door is ahead of the front wheels. This bus is also known as a rear engine or front engine transit style school bus. "Classroom instruction" means training provided by a qualified driver instructor through lectures, demonstrations, audio-visual presentations, computer-based instruction, driving simulation devices, or similar means. Instruction occurring outside a classroom is included if it does not involve actual operation of a school bus and its components by the student.		
8VAC20-70-40. Seating The number of pupils who may ride a school bus shall be determined by the total number who can be seated on the seat cushion facing forward, safely seated within the seating compartment and shall not exceed the manufacturer's capacity. ~~During the first 30 instructional days of the school year standees may be permitted for~~	**Fairfax County Administration –** This a longstanding regulation that has allowed standees on buses during the first few weeks of school when planning meets reality on the bus will soon be abolished. The 30 Day Role, as it has been called for decades, has allowed a grace period for local school divisions to balance unforeseen overloads and make routing	**Leave as proposed. Consistent with Review Committee input and standards in other states.**

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~~short distances in the aisle back of the driver's seat.~~ Pupils may not be permitted to stand ~~after the first 30 instructional days~~ except under unforeseen temporary emergency conditions and short distances as identified in policy by the local school board.	adjustments while minimizing disruption, service, and risk. If approved, it appears that under the new rule, each locality will need to adopt a new policy to allow any standees for any period but only for unforeseen temporary emergency conditions and for short distances. While I am sure this may save some calls to VDOE, this appears to create a new and unnecessary hardship for local school divisions.	
8VAC20-70-130. Maintenance Inspection. All school buses and school activity ~~vehicles~~ buses used to transport public school pupils to and from school and school activity events shall be inspected and maintained by competent mechanics ~~immediately before being used in the fall and~~ at least once every 30 ~~operating~~ school days, as denoted by the school division's approved yearly calendar, or every ~~2,500~~ ***3,000*** miles. In no case shall the preventive maintenance scheduled for the ~~2500~~ ***3,000*** miles exceed 90 regular calendar days. Any bus that is removed from service or deadlined so as to disrupt	**Frederick County** - Recommend "90 regular calendar days" be changed to "90 regular operating days." This would still require that buses are inspected at least twice per year, and it doesn't penalize school divisions for the months buses are parked during the summer. **Fairfax County Maintenance**– Fairfax County and Fairfax County Public Schools continue to support a definitive and authoritative regulation for school bus maintenance. The thorough and careful review of maintenance standards remains essential to the safe, reliable and cost – effective operation of these critically	**After additional comment and research, propose that this section ~~to~~ read:** **8VAC20-70-130. Maintenance Inspection.** All school buses and school activity ~~vehicles~~ buses used to transport public school pupils to and from school and school activity events shall be inspected and maintained by competent mechanics ~~immediately before being used in the fall and~~ at least once every ~~30 operating~~ 45 school days, with "school days" as ~~denoted~~ determined by the school division's approved yearly calendar or modifications in the calendar as approved by the division

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the scheduled maintenance shall be inspected prior to being returned to service. The inspections and maintenance shall be conducted in accordance with provisions of the "Preventive Maintenance Manual for Virginia School Buses" and recorded on the prescribed inspection forms or in a format approved by the Department of Education. If the inspection and maintenance are not made in a shop operated by the school board or the local governing body, the school board shall designated one or more inspection centers to make the inspections and require a copy of the results of the inspections to be furnished to the division superintendent. School division compliance with the foregoing maintenance inspection requirement shall be subject to verification by the Department of Education. Subject to funds being available, the Department of Education shall conduct random operational assessments during the school year of school divisions' pupil transportation operations to ensure statutes, regulations, and specifications are being met. The Department of Education shall establish procedures for conducting the	important vehicles. Revised PM inspection intervals proposed by the Department relax the mileage interval to 3,000 miles but continue to impose an operating day interval (30 days) that is unnecessarily restrictive. Furthermore, the proposed definition of the time interval as "school days" requires some amplification. • The "school days" definition does not directly address calendar modifications due to snow or other emergencies, nor does it directly address summer school. • The definition can be clarified by adding a notation that modifications to the calendar approved by the division superintendent are considered part of the approved calendar. In that way maintenance schedules can be adjusted to account, for example, for days lost to snow or added to make up for snow days. • Summer school days should count as "school days" only for vehicles actually used for summer school. • The attachment outlines PM	superintendent or their designee, or every ~~2,500~~ ~~3,000~~ 5,000 miles. Any bus that is removed from service or deadlined so as to disrupt the scheduled maintenance shall be inspected prior to being returned to service. At no point shall any bus go without an inspection during a school semester and such inspections shall be no more than 90 days apart excluding summer sessions. The inspections and maintenance shall be conducted in accordance with provisions of the "Preventive Maintenance Manual for Virginia School Buses," and recorded on the prescribed inspection forms or in a format approved by the Department of Education. Additional Original Equipment Manufacturer (OEM) inspection and maintenance recommendations should be maintained during the service life of each bus to ensure safety and warranty requirements are met. Maintenance consideration should be given to buses operated during the summer session. If the inspection and maintenance are not made in a shop operated by the school board or the local governing body, the school board shall designate one or more inspection centers to make the inspections, and require a copy of

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random operational assessments. Maintenance and service personnel shall be encouraged to attend approved workshops or training institutes and shall receive all necessary service and maintenance publications for equipment serviced.	inspection recommendations of the three U.S. school bus manufacturers and the manufacturers of major components of those buses. Based on those recommended intervals, most school buses (those manufactured by Blue Bird Corporation or IC Bus Corporation, but not those from Thomas Built Buses) could be safely placed on a PM schedule of 3 months or 5,000 miles. Many (but not all) divisions in Virginia have found that a time interval based on operating days (or "school days") is far easier to manage than one based on calendar days. We therefore recommend the time interval be defined as **"45 school days" and the mileage interval be increased to 5,000 miles.** Such a time interval equates to 9, 5-school-day weeks, or 63 calendar days. That number leaves a margin of 17 days without exceeding the 3-month OEM standard. Those 17 days can absorb up to 13 scheduled or unscheduled non-school weekdays	the results of the inspections to be furnished to the division superintendent. School division compliance with the foregoing maintenance inspection requirements shall be subject to verification by the Department of Education. **Change the wording in the second paragraph and remove the word "school":** Subject to funds being available, the Department of Education shall conduct ~~random~~ on an on-going basis operational assessments ~~during the school year~~ of school divisions' pupil transportation operations to ensure applicable statutes, regulations, and specifications are being met. The Department of Education shall establish procedures for conducting the ~~random~~ operational assessments and shall conduct the assessments in school divisions on a periodic cycle as resources permit. As part of the operational assessments, the Department of Education shall provide technical assistance to school divisions in a manner that will assist them with achieving and maintaining

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	plus the intervening weekend days within a 3-month period. Divisions that prefer a calendar day interval can set that interval at 63 days or fewer and remain within the 45-school-day standard. • According to e-mail correspondence with company representatives, Thomas Built Buses reviewed their recommended maintenance practices, including recommended PM intervals, in the second quarter of 2009. Their decision was to retain the 30-calendar-day/3,000 mile PM interval. In view of the unique position of that company, Fairfax County and FCPS believe Thomas Built Buses can fairly be singled out for exception to a 45-school-day/5,000 mile prescribed PM interval. We furthermore believe that long experience throughout the commonwealth provides strong confidence that Thomas Built Buses can be safely and reliably maintained on a 30-operating-day PM schedule even though that	compliance with applicable statutes, regulations, and specifications.

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	interval excels the manufacturer's recommended interval by at least 50 percent. Thomas Built's recommended mileage interval is 3,000 miles. We recommend, therefore, that **vehicles carrying an OEM-recommended PM interval more restrictive than the (proposed) state standard of 45 school days or 5,000 miles be inspected on a schedule of 30 school days or 3,000 miles.** In summary, Fairfax County and FCPS recommend the following amendments to the wording proposed by the Department. **1. In the definition of "school days," add provision for calendar modification by the division superintendent and notation that summer school days are considered "school days" only for vehicles actually used for summer school.** **2. Increase the time-based PM inspection interval from "30 school days" to "45 school days."** **3. Increase the mileage-based PM inspection interval from 3,000 to 5,000 miles.**	

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	4. Except vehicles with a more restrictive OEM-recommended PM interval from the 45-school-day/5,000 mile intervals and impose a 30-school-day/3,000 mile interval on them. Fairfax County and Fairfax County Public Schools recommend these provisions be reflected as the following amendment to this excerpt from the Virginia Administrative code (deletions struck through; additions underscored): 8VAC20-70-130. Maintenance inspection. All school buses and school activity vehicles used to transport public school pupils to and from school and school activity events shall be inspected and maintained by competent mechanics ~~immediately before being used in the fall and at least once every 30 operating~~ 45 school days or every ~~2,500~~ 5,000 miles traveled, with the exception of school buses and school activity vehicles carrying a more restrictive manufacturer's recommended interval. Those school buses and school activity vehicles shall be inspected and maintained at least once every 30 school days or 3,000 miles. "School days" are those denoted by the	

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	division's approved yearly calendar and as modified during the year by authority of the division superintendent. Summer school "school days" apply only to school buses and school activity vehicles actually used for summer school. The inspections and maintenance shall be conducted in accordance with provisions of the "Preventive Maintenance Manual for Virginia School Buses, ~~March 2003~~" and recorded on the prescribed inspection forms or in a format approved by the Department of Education. The recommended amendment would increase the currently prescribed PM interval for Virginia school buses and school activity vehicles (except Thomas Built Buses) by 50 percent for buses on the time interval and up to 100 percent for buses on the mileage interval without degrading the level of safety now experienced. The cost saving for each fleet of school buses could be substantial. The current economic situation and the resulting pressures on our budgets add a dimension of urgency to this issue. In view of the fiscal challenges all our school districts must be facing, we request a high	

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	priority be placed on your consideration of this recommendation. *Attachment* Below are some examples of manufacturer-prescribed service intervals for the buses that represent the large majority of our fleet: • The predominant model in the Fairfax County school bus fleet is the IC Bus RESB. IC Bus prescribes a minimum body/chassis service interval of 10,000 miles/6 months. • The IC Bus FESB and CESB, also prominent in our fleet, have the same service interval requirements. • The engines we have installed in these buses – International models VT365, T444E, DT466, DT570, HT570, and MaxxForce DT – all require oil and filter changes at 12,000 miles/6 months, with fuel strainer service requirement varying from 10,000 miles/6 months (T444E) to 30,000 miles/12 months (MaxxForce DT). • The Caterpillar 3116 engine, installed in most of our Thomas	

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	built MVP-ER buses, requires service at 10,000 miles/6 months. • The Caterpillar 3126 engine, installed in most of our front engine Thomas Built buses, also requires service at 10,000 miles/6 months. • The Cummins 5.9L engine in virtually all our other buses, requires service at 6,000 miles/6 months. • The Cummins ISB, predominant engine in Blue Bird buses, requires service at 15,000 miles/6 months (except under severe duty with smallest oil pan capacity: 9,000 miles/6 months). • ArvinMeritor, manufacturer of most of our brake systems, recommends a service interval for automatic slack adjusters of 4-6 months or 50,000 – 100,000 miles depending on model and use. • Bendix, another manufacturer of our brake systems, recommends a service interval on automatic slack adjusters of 3 months or 25,000 miles. • Our next most populous bus	

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	models, the Thomas built MVP-ER, MVP-EF, and Saf-T-Liner, require body/chassis service at 3,000 miles/30 days. We have operated most of these buses over 10 years on the state-mandated interval of 30 operating days, or about 42 calendar days, with only the rarest occurrences of events that might have been prevented by more frequent inspections. **We recommend that the PM interval for these buses remain at the current "30 operating days" interval. The mileage interval, however, can be extended to 3,000 miles.** • The only other U.S. manufacturer of Type C and Type D school buses is Blue Bird Corporation. Blue bird has a range of intervals for PM inspections by vehicle system. Most components require inspection at intervals no less than 3 months or 5,000 miles. The few that require more frequent inspection could (and appear to be intended to) be inspected by a	

Proposed Change to Regulations (2nd Review Version – May 2010)	Public Comments Received	Committee/Staff Proposed Language Changes
	driver or other person not trained as a technician, and referred to a technician for correction if found to be discrepant. **Fairfax County Administration –** 1. The revised language proposed for 8VAC20-70-130 regarding Maintenance Inspections still appears to create a new problem. As I read it, the addition of "as denoted by the school division's approved yearly calendar" has the potential to create confusion on whether the local board approved yearly calendar is used to just to indicate the total number of days when schools are intended to operate or whether it is intended to account for changes in the actual days when schools were later closed by the administration and any subsequent make-up days were added as subsequently approved by a local school board. The primary concern is the possible deadline of massive numbers of buses that would have been considered safe to operate prior to the addition of this new phrase. The use of "operational days" or "school days" represents no impact, but adding the reference to days approved on a yearly calendar before school even begins	

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	has no foundation or merit. If the intent is to simply identify or count actual days that schools operated during the year, then I would recommend deleting the words identified above or substituting with "every 30 school days including any make-up days and excluding any student holidays or days when schools were closed by order of the school administration due to weather or other emergency conditions." If schools are closed a bus is not operated. Neither does it incur any use, significant wear, or any miles. According the mileage criteria, a bus can go up to 90 calendar days as long as it does not exceed the mileage limit before concern from wear due to sitting is raised. Why then should not a bus scheduled for service based upon school days operated be allowed to go up to 90 calendar days so long as it does not exceed the maximum of 30 actual days of operation? For example: The school calendar calls for 30 operation days over the next month and a half, but a blizzard hits the area and 10 days of days scheduled by the approved school calendar do not occur. If your buses can operate on the miles criteria, there is no affect on when the bus must be	

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	inspected. However, if the 30 day criteria is used and if the intent of the new wording is to count the local board approved calendar days without consideration of administrative changes to the calendar during the course of the year, then every bus due for an inspection during the 10 days when schools were closed could be considered overdue for inspection when school reopens. I know the intent is to clear up misinterpretations, but this new wording just creates different possibilities for misinterpretation. 2. Deletion of "school vehicles" used to transport public school pupils from maintenance inspection requirements is another example of the state failing to provide leadership and abdicating responsibility to local school divisions that choose to use other school vehicles in transporting pupils. Fairfax maintains the position that the established PM interval of 30 days should be increased for efficiency and to avoid unnecessary wear and tampering with components in order to inspect that is no longer needed at current intervals for modern components. At a minimum,	

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	VDOE staff should be directed to conduct a formal review of the maintenance program, equipment, technology improvements, and requirements in order to make recommendations to the board for the future. **DOE –** Use of "random" in this context may be confusing or unclear. Propose striking "random" and adding other language clarifying the intent of the DOE operational assessments.	
8VAC20-70-110. Pupil ~~rider~~ <u>transportation</u> safety instruction. Pupil transportation instruction shall be included in the school curriculum, including demonstration and practices of safety procedures. 1. At the Pre-K-1 grade levels, initial safety training shall occur during the first week of school with additional training on a periodic basis during the year. ~~Students in grades 9-12 shall receive additional~~	**Fairfax County Administration -** 1. This change/deletion appears to reduce emphasis on such training for students in grades 9 – 12 and removes specific guidance for the instruction of older students who will soon become motorists regarding the school bus stop law from the school curriculum. These are important items that must be retained in order to ensure emphasis is made by curriculum specialists who may not understand the significance of the issue. 2. This change appears to require that the bus	**Leave as proposed.** The instruction for grades 9-12 has been incorporated into the VDOE Driver Education Training Manual.

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~~training on the rules for motorists approaching a stopped school bus and on safe following distances when operating a personal vehicle.~~ 2. Emergency exit drills shall be practices by all pupil riders at least twice a year, the first occurring during the first 30 instructional days and the second in the second semester, and shall include the bus driver.	driver be present and participate in the drill at the same time with the students. The need for the driver and students to demonstrate knowledge and ability to exit the bus in an emergency is important but, it is not always appropriate, practical, or safe to have both students and the driver practice at the same time. Local school divisions need the flexibility to allow separate or group specific training and practice as appropriate.	
8VAC20-70-190. Policies Local school boards shall adopt policies, consistent with provisions of the Code of Virginia, before establishing a practice of collecting transportation fees from pupils or receiving contributions from other sources for activities sponsored by schools under their authority. No pupil whose parent or guardian is financially unable to pay the pro rata cost of the trip may be denied the opportunity to participate. See §22.1-176 of the Code of Virginia.		**Include the following language at the end of this section:** Each disabled child enrolled in and attending a special education program provided by the school division shall be entitled to transportation at no cost if such transportation is necessary to enable such child to obtain the benefit of educational programs and opportunities. See §22.1-221 A. of the Code of Virginia.
8VAC20-70-360 – In-Service Training. In-service training (at least two hours before ~~the beginning~~ opening of the	**Chesterfield County** - "…In-service training shall include, but not be limited to, the following topics:…"	**Change the wording to:** **….**In-service training ~~shall~~ should include,

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schools ~~year~~ and at least two hours during the second half of the school year) devoted to improving the skills, attitudes, and knowledge including orientation to maximize benefits of using safety programs and safety components shall be provided to all school or activity bus drives. In-service training shall include, but is not limited to, the following topics: Basic motor vehicle laws, related administrative codes, pre-trip inspection procedures, student discipline and conduct, drug and alcohol testing procedures and policies, fuel conservation, safety, emergency procedures and student information and confidentiality and local policies and procedures as required by the division's transportation department. A copy of the agenda for each in-service training event shall be on file.	The entire section is worded in such a way that requires the ten topics to be covered at every in-service training. If the intent is to require these topics to be covered at every in-service then the local school divisions will be severely restricted in offering staff development and training that meet the needs of that particular school division. If the intent is to require the discussion of these topics during one of the two required in-service meetings, perhaps re-wording of the section will improve the section's clarity.	but is not limited to, the following topics: basic motor vehicle laws, related administrative codes, pre-trip inspection procedures, student discipline and conduct, drug and alcohol testing procedures and policies, fuel conservation, safety, emergency procedures, ~~and~~ student information and confidentiality, and local policies and procedures as required by the division's transportation department. A copy of the agenda for each in-service training event shall be on file in the school division.
8VAC20-70-411. Driver Trainers. Behind-the-wheel driver trainers must meet the requirements of 8VAC20-70-280 and 8VAC20-70-350 and have at least 2 years experience operating a Class B vehicle.	**DOE –** Modify the language to "… must have maintained a Class B license for two years." The justification for the change is that it is difficult to document and verify actual driving operation time for individual personnel and also to operationally define "two years experience." Documenting and	**Change the wording as follows:** Behind-the-wheel driver trainers must meet the requirements of 8VAC20-70-280 and 8VAC20-70-350 and ~~have at least 2 years experience operating a Class B vehicle~~ must have maintained a Class B

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	verifying the time period during which a license has been held is less burdensome and is a reasonable proxy for driving experience.	license for two years prior to functioning as a behind-the-wheel driver trainer.
8VAC20-70-31 – Driving Time. **8VAC20-70-130 – Maintenance Inspection.** **8VAC20-70-140 – Crash/~~incident~~ Reporting.** **8VAC20-70-230 – Required Materials.**	**Chesterfield County -** In some cases refer to *school bus, school activity bus and activity vehicle*. In other references, it's *all vehicles used primarily*… This may be the preferred requirement. However, in 8VAC20-70-230 – Required Materials, **All vehicles used primarily to transport**… shall carry reflective triangles, first aid kit, body fluid clean-up kit and fire extinguisher. Yet, for crash report, inspections, or driving time, some vehicles used primarily to transport students will not be required to follow these requirements.	**Leave wording as is as each section pertains to different types of vehicles.**

Proposed Revisions for Final Review – September 2010

Regulations Governing Pupil Transportation

Virginia Administrative Code 8VAC20-70

8VAC20-70-10. Definitions.

The following words and terms when used in this chapter shall have the following meanings unless the context clearly indicates otherwise:

"Color-black" means federal standard No. 595, black.

"Color-yellow" means national school bus yellow School Bus Manufacturers Technical Council (SBMTC) color standard 008.

"Nonconforming bus" means any vehicle designed to carry more than 10 passengers that is used to transport children to or from school or school-related activities that does not meet the federal standards, 49 CFR Part 571, specific to school buses or multifunction school activity buses. These vehicles are not approved for transporting students to and from school or school-related activities.

"Vehicle" means any vehicle owned or operated by, or owned or operated by any person under contract by a county, city, town or school board in which any school pupils or personnel are transported at public expense from any public school or public school activity.

"School bus" means any motor vehicle ~~described in this chapter as "Type A1 and A2," "Type B1 and B2," "Type C," or "Type D," which is designed and used for the transportation of pupils,~~ other than a station wagon, automobile, truck, or commercial bus, which is: (i) designed and used primarily for the transportation of pupils to and from public, private or religious schools, or physically handicapped to and from a sheltered workshop; (ii) painted yellow with the words "School Bus" in black letters of a specified size on the front and rear, and (iii) ~~which~~ is equipped with ~~the required~~ warning devices ~~as stated~~ prescribed in §46.2-~~100~~ 1090 of the Code of Virginia. A yellow school bus may have a white roof provided such vehicle is painted in accordance with regulations and specifications of the Department of Education.

~~Note: This definition includes school buses owned and operated by school boards, private contractors, local governments, and transit systems that are used for the transportation of public school pupils.~~

"Specially equipped bus" means a school bus designed, equipped, or modified to accommodate students with special needs.

"Multifunction School Activity Bus (MFSAB)"/~~(school activity bus)~~ means a school bus whose purposes do not include transporting students to and from home or school bus

stops, as defined in 49 CFR 571.3. This subcategory of school bus meets all Federal Motor Vehicle Safety Standards (FMVSS) for school buses and meets all regulations for school buses, except the traffic control devices, ~~identification,~~ color, use of cruise control, and seating requirements.

"Type A school bus" ~~means~~ is a ~~van~~ conversion ~~or~~ bus constructed utilizing a cutaway front-section vehicle with a left side driver's door. ~~The entrance door is behind the front wheels.~~ This definition includes two classifications. Type A1, with a Gross Vehicle Weight Rating (GVWR) ~~less than or equal to 10,000~~ of 14,500 pounds or less; and Type A2, with a GVWR greater than 14,500 pounds but less than or equal to ~~greater than 10,000~~ 21,500 pounds.

"Type B school bus" ~~means a bus with a body~~ is constructed utilizing a stripped chassis. The entrance door is behind the front wheels. This definition includes two classifications: Type B1, with a GVWR ~~less than or equal to~~ of 10,000 pounds or less; and Type B2, with a GVWR greater than 10,000 pounds.

"Type C (Conventional) school bus" ~~means a bus with~~ is a body ~~constructed utilizing an~~ installed upon a flat-back cowl chassis with a hood and ~~front fender assembly~~ fenders. ~~The entrance door is behind the front wheels~~. This definition shall include two classifications: Type C1, with a GVWR range of 17,500 pounds with a design seating capacity range from 16 to 30 persons; and Type C2 with a GVWR of more than 21,500 pounds, designed for carrying more than 30 persons. The engine is in front of the windshield and the entrance door is behind the front wheels. Both Type C1 and Type C2 must be equipped with dual rear tires.

"Type D school bus" means a bus with a body constructed utilizing a stripped chassis. The entrance door is ahead of the front wheels. This bus is also known as a rear engine or front engine transit style school bus.

"Classroom instruction" means training provided by a qualified driver instructor through lectures, demonstrations, audio-visual presentations, computer-based instruction, driving simulation devices, or similar means. Instruction occurring outside a classroom is included if it does not involve actual operation of a school bus and its components by the student.

Part II

General Regulations

8VAC20-70-20. Transportation of children.

The greatest care shall be exercised at all times in the transportation of school children.

8VAC20-70-30. Safe speeds.

A school bus transporting school pupils shall be operated at a safe speed as stated in §46.2-871 of the Code of Virginia.

8VAC20-70-31. Driving Time.

Driving time for operators of any school bus, school activity bus, or school activity vehicle, shall be pursuant to Section 46.2-812, Code of Virginia.

8VAC20-70-40. Seating.

The number of pupils who may ride a school bus shall be determined by the total number who can be seated on the seat cushion facing forward, safely seated within the seating compartment, and shall not exceed the manufacturer's capacity. ~~During the first 30 instructional days of the school year standees may be permitted for short distances in the aisle back of the driver's seat.~~ Pupils may not be permitted to stand ~~after the first 30 instructional days~~, except under unforeseen temporary emergency conditions and for short distances as identified in policy by the local school board.

8VAC20-70-50. Written employment agreement.

A written employment agreement shall be made by the school board with all regular school bus drivers before they begin their duties. Substitute drivers shall meet the requirements prescribed for regular bus drivers and shall be approved and paid by the local school board.

8VAC20-70-60. Entrance door.

The school bus driver shall open and close the entrance door and keep it securely closed while the bus is in motion. This responsibility shall not be delegated to any other person.

8VAC20-70-70. Traffic warning devices.

Every school bus operated at public expense for the purpose of transporting school children shall be equipped with traffic warning devices as stated in §§46.2-1090 and 46.2-1090.1 of the Code of Virginia.

8VAC20-70-80. Loading or discharging pupils.

When loading or discharging pupils on the highway, stops shall be made in the right-hand lane and shall be made only at designated points where the bus can be clearly seen for a safe distance from both directions. Pupils shall be picked up and discharged only at designated school bus stops approved by the local school division except in the case of an emergency. While stopped, the driver shall keep the school bus warning devices in operation to warn approaching traffic to stop and allow pupils to cross the highway

safely. Pupils who must cross the road shall be required to cross in front of the bus. They shall be required to walk to a point 10 feet or more in front of the bus, stop before reaching a position in line with the left side of the bus, and wait for a hand signal from the bus driver before starting across the highway.

On dual highways divided by a physical barrier, unpaved area, or five lane highway with turning lane, buses shall be routed so that pupils will be picked up and discharged on the side of the road on which they live. (See §§46.2-893 and 46.2-918 of the Code of Virginia.)

8VAC20-70-90. Safety belts.

Persons operating a school bus shall wear the appropriate safety belt system while bus is in motion.

8VAC20-70-100. Passenger restraint belts.

Pupils riding in school buses required by federal law to be equipped with passenger restraint belts shall wear them as required by state or federal law while the bus is in motion. ~~See Federal Motor Vehicle Safety Standards No. 209 and 210.~~

8VAC20-70-110. Pupil ~~rider~~ transportation safety instruction.

Pupil ~~rider safety~~ transportation instruction shall be included in the school curriculum, including demonstration and practices of safety procedures.

1. At the Pre-K-1 grade levels, initial safety training shall occur during the first week of school with additional training on a periodic basis during the year. ~~Students in grades 9 – 12 shall receive additional training on the rules for motorists approaching a stopped school bus and on safe following distances when operating a personal vehicle.~~

2. Emergency exit drills shall be practiced by all pupil riders at least twice a year, the first occurring during the first 30 instructional days and the second in the second semester, and shall include the school bus driver. Summer session evacuation drills should be performed as needed.

3. A copy of bus rider safety rules shall be sent to parents at the beginning of the school year. The information shall include a request that parents or their designee accompany their young children to and from the bus stop.

8VAC20-70-120. Insurance.

Every vehicle used in transporting school pupils and personnel at public expense shall be covered by insurance that will provide financial assistance to pupils and personnel in case of injuries or deaths resulting from an accident as stated in §22.1-190 of the Code of Virginia.

8VAC20-70-130. Maintenance inspection.

All school buses and school activity ~~vehicles and school vehicles~~ buses used to transport public school pupils to and from school and school activity events shall ~~undergo a Level 2 maintenance inspection as prescribed in the Preventive Maintenance Manual for Virginia School Buses~~ be inspected and maintained by competent mechanics ~~immediately before being used for each new school year, and a Level 1 inspection~~ at least once every ~~30~~ 45 ~~operating days operating~~ school days, with "school days" as ~~denoted~~ determined by the school division's approved yearly calendar or modifications in the calendar as approved by the division superintendent or their designee, or every ~~2,500~~ ~~3,000~~ 5,000 miles. ~~traveled calendar days after the start of the new school year~~. Any bus that is removed from service or deadlined so as to disrupt the scheduled maintenance shall be inspected prior to being returned to service. At no point shall any bus go without an inspection during a school semester and such inspections shall be no more than 90 days apart excluding summer sessions. ~~In no case shall the 3,000 mile preventive maintenance exceed 90 regular calendar days. Any bus that is removed from service so as to disrupt the scheduled maintenance shall be inspected prior to being returned to service.~~ The inspections and maintenance shall be conducted in accordance with provisions of the "Preventive Maintenance Manual for Virginia School Buses, ~~March 2003~~" and recorded on the prescribed inspection forms or in a format approved by the Department of Education. Additional Original Equipment Manufacturer (OEM) inspection and maintenance recommendations should be maintained during the service life of each bus to ensure safety and warranty requirements are met. Maintenance consideration should be given to buses operated during the summer session. If the inspection and maintenance are not made in a shop operated by the school board or the local governing body, the school board shall designated one or more inspection centers to make the inspections and require a copy of the results of the inspections to be furnished to the division superintendent. School division compliance with the foregoing maintenance inspection requirements shall be subject to verification by the Department of Education.

Subject to funds being available, the Department of Education shall conduct ~~random~~ on an on-going basis operational assessments ~~during the school year~~ of school divisions' pupil transportation operations to ensure applicable statutes, regulations, and specifications are being met. The Department of Education shall establish procedures for conducting the ~~random~~ operational assessments and shall conduct the assessments in school divisions on a periodic cycle as resources permit. As part of the operational assessments, the Department of Education shall provide technical assistance to school divisions in a manner that will assist them with achieving and maintaining compliance with applicable statutes, regulations, and specifications.

Maintenance and service personnel shall be encouraged to attend approved workshops or training institutes and shall receive all necessary service and maintenance publications for equipment serviced.

8VAC20-70-140. Crash~~/incident~~ reporting.

A report, on forms or in a format furnished by the Department of Education, of any ~~vehicle~~ crashes ~~or incidents~~ involving school buses, pupils, and personnel who ride school or activity buses (including incidents of injury or death while crossing the road, waiting at bus stops, etc.) shall be sent to the Pupil Transportation Service, Department of Education by the division superintendent or designee at least once a month. The report shall give the apparent cause of the crash ~~or incident~~ and the extent of injuries to pupils or others. The division superintendent or designee shall notify the Pupil Transportation Service of any school bus crash ~~or incident~~ involving serious injuries, requiring professional medical treatment, or death within the next working day from the date of the crash ~~or incident~~.

A vehicle crash occurs when property damage is ~~$1,000~~ $1,500 or more or when persons are injured. ~~An incident occurs when property damage is $999 or less and there are no injured individuals.~~

The Department of Education shall publish on its Web site an annual report of the number of crashes involving school buses, pupils, and personnel who ride school or activity buses (including incidents of injury or death while crossing the road, waiting at bus stops, etc.) in each division.

8VAC20-70-150. Route schedule.

All school buses in operation shall be scheduled to maximize safety and efficiency. The schedule shall show the time the bus starts in the morning, the time it leaves each point at which pupils are picked up, ~~and~~ the time of arrival at school, and the time of drop off in the afternoon. One copy of such schedule shall be kept in the bus ~~and secured when the bus is unattended~~, and one copy shall be kept in the office of the division superintendent or designee and shall meet student records and information security requirements as stated in federal, state and local policy.

8VAC20-70-160. Review of routes.

School bus routes, school sites, and safety of pupils at designated school bus stops shall be reviewed at least ~~once~~ ~~twice each year, once each semester~~ once a year and as changes occur. ~~Bus~~ R~~r~~outes shall be reviewed for safety hazards, fuel conservation, and to assure ~~maximum~~ the most efficient use of buses. Local school administrators shall evaluate the safety of pupils at bus stops periodically and shall at the request of the local school board report the results annually to the school board. Hazardous or unusual situations, to include railway crossings, shall be marked on the route sheet and made available to drivers and substitutes.

A written vehicular and pedestrian traffic control plan for each existing school site shall be reviewed annually for safety hazards. All new school site plans shall include provisions that promote vehicular and pedestrian safety.

8VAC20-70-170. Railway crossings.

School buses shall stop, as required by law, at railway grade crossings. School buses equipped with a non-sequential lighting system must have these lighting systems deactivated when approaching a railroad grade crossing and ~~T~~ the 4-way hazard lights shall be activated when approaching the railway grade crossing and shall be deactivated before crossing the track. The bus driver shall turn off all noisy equipment, open the entrance door of the bus and determine when it is safe for the vehicle to cross the railroad tracks. The entrance door shall be closed when the bus is in motion. No stop need be made at any grade crossing where traffic is directed by a ~~police~~ law enforcement officer or a ~~green~~ traffic-control signal as stated in §46.2-886 of the Code of Virginia.

8VAC20-70-180. ~~Driver reports~~. Ridership and Miles Report.

School boards shall require that a report on the number of pupils transported and miles traveled be ~~made by all school bus drivers to principals or other designated school officials.~~ submitted to designated school officials.

8VAC20-70-190. Policies.

Local school boards shall adopt policies, consistent with provisions of the Code of Virginia, before establishing a practice of collecting transportation fees from pupils or receiving contributions from other sources for activities sponsored by schools under their authority. No pupil whose parent or guardian is financially unable to pay the pro rata cost of the trip may be denied the opportunity to participate. See §22.1-176 of the Code of Virginia. Each disabled child enrolled in and attending a special education program provided by the school division shall be entitled to transportation at no cost if such transportation is necessary to enable such child to obtain the benefit of educational programs and opportunities. Each disabled child enrolled in and attending a special education program provided by the school division shall be entitled to transportation at no cost if such transportation is necessary to enable such child to obtain the benefit of educational programs and opportunities. See §22.1-221 A. of the Code of Virginia.

8VAC20-70-200. Identification and lights covering.

The lettered identification and traffic warning lights on the front and rear of school buses shall be covered with opaque detachable material when ~~they~~ school buses are used for purposes other than to transport pupils on regular routes to and from school, ~~or~~ on special trips to participate in contests of various kinds, ~~and~~ or for supplementary education purposes as required by §22.1-183 of the Code of Virginia. This does not apply when the bus is being used to transport elderly or mentally or physically handicapped persons.

8VAC20-70-210. Advertising material.

The use of posters, stickers, or advertising material of any kind is prohibited in or on school buses unless permitted by law.

8VAC20-70-220. Passage restriction.

No object shall be placed on any bus carrying passengers that will restrict the access to any exit, or restrict the freedom of motion of the driver for proper operation of the vehicle.~~, or where displacement of such objects may result in personal injury to passengers.~~ Drivers shall be observant of items that may cause injury.

8VAC20-70-230. Required materials.

All vehicles used primarily to transport students to and from school or school-related activities shall carry reflective triangles, first aid kit, body fluid clean-up kit and fire extinguisher.

8VAC20-70-235. Funding for pupil transportation.

Funding for pupil transportation shall be pursuant to the provisions of the appropriation act.

8VAC20-70-240 to 8VAC20-70-270. [Repealed]

8 VAC 20-70-271. Records Retention

School division documents related to pupil transportation shall be retained in accordance with local policy and guidelines from the Virginia State Library.

Part III

Requirements For School Bus Drivers

8VAC20-70-280. Requirements for school bus drivers both for employment and continued employment.

Section 22.1-178~~, 46.2-339, and 46.2-340~~ of the Code of Virginia requires drivers of school and activity buses to:

1. Have a physical examination of a scope prescribed by the Board of Education with the advice of the Medical Society of Virginia and furnished on a form prescribed by the Board of Education showing the results of such examination.

a. No person shall drive a school bus unless that person is physically qualified to do so and has submitted a School Bus Driver's Application For Physician's Certificate signed by the applicant and the doctor or a licensed nurse practitioner for the applicable employment period.

b. The physical form describes the basic physical qualifications for school bus drivers; however, the examining physician or licensed nurse practitioner shall make the final

determination of the individual's physical capacity to operate a school bus based upon their assessment of the individual's overall physical condition.

2. Furnish a statement or copy of records from the Department of Motor Vehicles showing that the person, within the preceding five years, has not been convicted of a charge of driving under the influence of intoxicating liquors or drugs, convicted of a charge of refusing to take a blood or breath test, convicted of a felony, or assigned to any alcohol safety action program or driver alcohol rehabilitation program pursuant to §18.2-271.1 of the Code of Virginia or, within the preceding 12 months, has not been convicted of two or more moving traffic violations or has not been required to attend a driver improvement clinic by the Commissioner of the Department of Motor Vehicles pursuant to §46.2-~~497~~ 498 of the Code of Virginia.

3. Furnish a statement signed by two reputable persons who reside in the school division or in the applicant's community that the person is of good moral character.

4. Exhibit a license showing the person has successfully undertaken the examination prescribed by §46.2-339 of the Code of Virginia.

5. Be at least 18 years old.

6. Submit to testing for alcohol and controlled substances that is in compliance with the Omnibus Transportation Employee Testing Act of 1991 (Public Law 102-143, Title V) as amended and that is in compliance with 49 CFR Parts 40 and 382.

8VAC20-70-290. First aid course.

Any school board may require successful completion of the American Red Cross first aid course or its equivalent as a condition to employment to operate a school bus transporting pupils as required by §22.1-178 of the Code of Virginia.

8VAC20-70-300. Required documents.

The documents required pursuant to 8VAC20-70-280, parts 1 and 2, shall be furnished annually prior to the anniversary date of the employment to operate a school bus.

8VAC20-70-310. Filing. [Repeal]

~~The documents required pursuant to this section shall be filed with, and made a part of, the records of the school board employing such person as a school bus operator.~~

8VAC20-70-320. Forms for applicants.

The Department of Education shall furnish to the division superintendents the necessary forms for applicants to use to provide the information required by this section. Insofar as practicable, such forms shall be designed to limit paperwork, avoid the possibility of

mistakes, and furnish all parties involved with a complete and accurate record of the information required.

8VAC20-70-330. Health certificate.

As a condition to employment, every school and activity bus driver shall submit a certificate signed by a licensed physician or nurse practitioner stating that the employee appears free of communicable tuberculosis. The school board may require the submission of such certificates annually, or at such intervals as it deems appropriate, as a condition to continued employment.

8VAC20-70-340. Highway driving.

No person shall drive a school or activity bus upon a highway in the Commonwealth unless such person has had a reasonable amount of experience in driving motor vehicles, and shall have passed a special examination indicating the ability to operate a school bus without endangering the safety of pupil passengers and persons using the highway as stated in §46.2-339 of the Code of Virginia. To prepare for the examination required by this section, any person holding a valid operator's license and Commercial Driver's License (CDL) Instruction Permit issued under the provisions of §46.2-325 of the Code of Virginia, may operate, under the direct supervision of a person holding a valid school bus license endorsement, a school bus that contains no pupil passengers. The Department of Motor Vehicles is required to adopt such rules and regulations as may be necessary to provide for the examination of persons desiring to qualify to drive such buses in this Commonwealth and for the granting of permits to qualified applicants.

8VAC20-70-350. Training.

No person shall operate a school or activity bus transporting pupils unless the person has:

1. Received classroom, demonstration, and behind-the-wheel instruction in accordance with a program developed by the Department of Education pursuant to §22.1-181 of the Code of Virginia.

2. Completed a minimum of 24 classroom hours and 24 hours of behind-the-wheel training. A minimum of 10 of the 24 hours of behind-the-wheel time shall involve the operation of a bus with pupils on board while under the direct on-board supervision of a designated bus driver trainer. ~~Drivers of Type D buses must complete eight additional hours of training behind-the-wheel.~~ All drivers shall receive training in the operation of ~~a Type D~~ buses representative of the type used in the school division in which they will be employed and in the transportation of students with special needs. Classroom instruction means training provided by a qualified driver instructor through lectures, demonstrations, audio-visual presentations, computer-based instruction, driving simulation devices, or similar means. Instruction occurring outside a classroom qualifies as classroom instruction if it does not involve actual operation of a school bus and its components by the trainee. Behind–the-wheel training does not include the time spent riding in a school

bus or observing the operation of a school bus when the trainee is not in control of the vehicle.

The superintendent or his designee shall maintain a record showing that the applicant has completed the training and has been approved to operate a school or activity bus.

3. New transportation directors/supervisors employed by school divisions shall complete the "Train the Trainer" class conducted by the Department of Education within a year after being employed in this position.

~~8VAC20-70-359. Requirements for School Bus Driver Instructors/Trainers.~~

~~Instructors must meet the requirements of a school bus driver, the training, and have at least 2 years experience operating a Class B type vehicle.~~

8VAC20-70-360. In-service training.

In-service training (at least two hours before ~~the beginning~~ the opening of the school~~s~~ year and at least two hours during the second half of the school year) devoted to improving the skills, attitudes, and knowledge including orientation to maximize benefits of using safety programs and safety components shall be provided to all school or activity bus drivers. In-service training ~~shall~~ should include, but is not limited to, the following topics: basic motor vehicle laws, related administrative codes, pre-trip inspection procedures, student discipline and conduct, drug and alcohol testing procedures and policies, fuel conservation, safety, emergency procedures, ~~and~~ student information and confidentiality, and local policies and procedures as required by the division's transportation department. A copy of the agenda for each in-service training event shall be on file in the school division.

8VAC20-70-370. Supervision.

The drivers of school and activity buses shall be under the general direction and control of the division superintendent or designee, and shall also be accountable to the principal of the school to which pupil transportation is provided.

8VAC20-70-380. Pre-trip safety inspection.

Prior to the initial transporting of children each day, t~~T~~he drivers of school and activity buses shall perform a daily pre-trip safety inspection of the vehicle. ~~prior to transporting children.~~ The items checked and recorded shall be at least equal to the pre-trip inspection procedure ~~as prescribed by~~ in the Preventive Maintenance Manual for Virginia School Buses issued by the Department of Education.

8VAC20-70-390. [Repealed]

8VAC20-70-400. Evaluation.

Each school and activity bus driver shall be evaluated by the transportation director or designee at least once each year. The results of the evaluation shall be discussed with the driver and included in the driver's personnel file.

8VAC20-70-410. Emergency equipment.

The driver of activity or extracurricular trip buses shall advise the pupils and/or sponsors of the location of the required emergency equipment and exits prior to the beginning of any such trip.

8VAC20-70-411. Driver Trainers.

Behind-the-wheel driver trainers must meet the requirements of 8VAC20-70-280 and 8VAC20-70-350 and ~~have at least 2 years experience operating a Class B vehicle~~ must have maintained a Class B license for two years prior to functioning as a behind-the-wheel driver trainer.

8VAC20-70-420. Instructor course certificate.

Local school bus driver training instructors shall hold a certificate for completion of an instructor course conducted or approved by the Department of Education and shall attend a recertification course every five years. Certification expires at the end of the calendar year five.

8VAC20-70-430. Driver data.

The names and driver license numbers of persons operating school and activity buses and other vehicles used to transport pupils shall be submitted to the Department of Motor Vehicles annually as required by §46.2-340 of the Code of Virginia.

8VAC20-70-435. Filing.

The documents required pursuant to 8VAC20-70-280, 8VAC20-70-350, 8VAC20-70-360, 8VAC20-70-400 and 8VAC20-70-420 shall be filed with, and made a part of, the records of the school board employing such person as a school bus operator.

8VAC20-70-440. Responsibility for compliance.

The responsibility for compliance with the school bus and activity vehicle specifications issued by the Department of Education rests with dealers and manufacturers. If any dealer or manufacturer sells school buses or school activity vehicles that do not conform to any or all of the specifications issued by the Department of Education, a general notice will be sent to all school divisions advising that equipment supplied by such dealer or manufacturer will be disapproved for school transportation until further notice. A copy of the notice will be sent to the dealer or manufacturer and will remain in effect until full compliance by the dealer or manufacturer is assured.

Dealers and manufacturers shall be given at least 30 days' notice of any changes in the specifications.

Part IV

General Requirements for School Buses In Virginia

8VAC20-70-450. Minimum ~~standards~~ specifications.

Minimum ~~standards~~ specifications are applicable to all school buses and school activity ~~vehicles~~ buses, new or used, procured by purchase, lease or operational contract from another person or entity.

8VAC20-70-460. Specifications.

It is the intent of the Board of Education to accommodate new equipment and technology that will better facilitate the safe and efficient transportation of students. When a new technology, piece of equipment, or component is desired to be applied to ~~the~~ a school bus, it must have the approval of the ~~Virginia~~ Department of Education and must meet the following criteria:

1. The technology, equipment, or component shall not compromise the effectiveness or integrity of any major safety system.

2. The technology, equipment, or component shall not diminish the safety of the interior of the bus.

3. The technology, equipment, or component shall not create additional risk to students who are boarding or exiting the bus or are in or near the school bus loading zone.

4. The technology, equipment, or component shall not require undue additional activity or responsibility for the driver.

5. The technology, equipment, or component shall generally increase efficiency or safety, or both, of the bus, generally provide for a safer or more pleasant experience for the occupants and pedestrians in the vicinity of the bus, or shall generally assist the driver and make his many tasks easier to perform.

School b~~B~~uses and school activity ~~vehicles~~ buses must conform to the specifications relative to construction and design effective on the date of procurement. Any variation from the specifications, in the form of additional equipment or changes in style of equipment, without prior approval of the Department of Education, is prohibited. The Department of Education shall issue specifications and standards for public school buses to reflect desired technology or safety improvements for the then current model year.

8VAC20-70-470. Adjustments.

The Superintendent of Public Instruction is authorized to make such adjustments from time to time in technical specifications as are deemed necessary in the interest of safety and efficiency in school bus operation. This includes the issuance of chassis specifications by size, type and model year. Authority is also granted for conducting investigations and field tests of certain pertinent vehicle components.

8VAC20-70-480. Bus identification.

All publicly owned, part publicly owned, or contract school buses, transporting pupils to and from public school, shall be painted a uniform color, national school bus yellow, and shall be identified and equipped as outlined in the ~~standards and~~ specifications.

8VAC20-70-490. Purchase.

The responsibility for purchasing school buses and school activity ~~vehicles~~ buses which meet state and federal requirements rests with division superintendents and local school boards.

A schedule for the replacement of buses on a continuing basis shall be developed and implemented by each school division.

8VAC20-70-500. Sale of surplus school buses.

A. Before a surplus school bus is sold or released for nonschool transportation purposes, the bus shall have the traffic warning signal system and crossing control arm removed and all school bus lettering shall be covered by an opaque paint. A written notice shall be attached to the Certificate of Title stating that the vehicle does not meet the requirements of §§46.2-100 and 46.2-1089 and that its operation on the highway would be in violation of §46.2-917 of the Code of Virginia.

B. In the event that the bus is sold to a private school or a licensed dealer, the written notice shall contain a reminder that the bus shall be painted a different color, and shall have the bus signal systems and lettering removed before release for nonschool transportation purposes.

8VAC20-70-510. Vehicles powered by alternative fuels.

A. The Board of Education will continue to promote the use of alternative fuels for school buses. Any vehicle powered by alternative fuels will be subject to inspection and approval by the Virginia Department of Education.

B. Local school divisions, in consultation with the Department of Education, may purchase and use school buses using alternative fuels as covered in §22.1-177 of the Code of Virginia.

C. Installation of alternative fuel tanks and fuel systems shall comply with all applicable Federal Motor Vehicles Safety Standards (FMVSS) 301, 49 CFR Part 571, and all applicable fire codes.

~~D. A sign with black letters on clear or school bus yellow background, indicating the type of alternative fuel being used, may be placed on the side of the bus near the entrance door. No sign shall be more than 4-3/4 inches long or more than 3-1/4 inches high.~~

8VAC20-70-520. [Repealed]

Part V

School Activity ~~Vehicles~~ Buses

8VAC20-70-525. Regulations and standards.

School a~~A~~ctivity ~~vehicles~~ buses owned or operated under contract by or for the school board, which are used solely to transport pupils to and from school activity events, shall comply with all applicable regulations and standards prescribed for school buses except as noted in this part.

1. Exceptions, general regulations.

a. Pursuant to §46.2-871 ~~A~~an activity ~~vehicle~~ bus transporting school pupils shall be operated at a safe, legal speed ~~not in excess of 55 miles per hour~~.

b. No standees shall be permitted.

~~c. The eight-inch school bus lettered identification and traffic warning devices shall be removed by the local school division as required by §§46.2-100 and 46.2-1090 of the Code of Virginia. The name of the school division or individual school shall be placed on both sides of the vehicle.~~

d. Stops for the purpose of loading or discharging pupils on the travel portion of the highway shall not be permitted.

~~2. Exceptions, minimum standards for school buses in Virginia.~~

~~a. School activity vehicles shall not be painted national school bus yellow.~~

~~b. Other types of seats and increased spacing may be used provided all provisions of FMVSS 222, 49 CFR §571.222, are met.~~

8VAC20-70-530 to 8VAC20-70-1510. [Repealed].

DOCUMENTS INCORPORATED BY REFERENCE

Preventive Maintenance Manual for Virginia School Buses, ~~March 2003~~, Virginia Department of Education.

PROPOSED – NOVEMBER, 2008

FORM EB.001 **SCHOOL BUS DRIVER'S APPLICATION FOR PHYSICIAN'S CERTIFICATE**

This form is required under the provision of Section 22.1-178 of the Code of Virginia and Regulations of the Virginia Board of Education

APPLICANT NAME _____ **SCHOOL DIVISION** _____

APPLICANT SOCIAL SECURITY NO. _____ BIRTH DATE _____

ADDRESS _____

Medical History (to be completed by the Applicant) Please check if you have any history of the following:

_____ Diabetes
_____ Seizure Disorder
_____ Head Injury causing symptoms
_____ Brain Tumor
_____ Muscle Disease
_____ Heart Disease
_____ High Blood Pressure
_____ Paralysis of any Type
_____ Loss of Vision
_____ Loss of Hearing
_____ Tuberculosis
_____ Back Injury
_____ Shoulder Injury

Have you every received treatment for or been recommended by a physician for treatment of alcoholism or drug abuse? _____ Yes _____ No

Do you currently feel that you use alcohol to excess? _____ Yes _____ No

Do you currently use psychoactive drugs such as marijuana, cocaine, or other similar drugs? _____ Yes _____ No

Are you currently taking any prescribed medications? _____ Yes _____ No

If yes, identify the medication(s): _____

Do you have hay fever or other minor illnesses which require you to take over the counter (nonprescription) medications at times? _____ Yes _____ No

If so, identify the medication(s):_____

I certify I have answered the above questions truthfully and to the best of my ability. I hereby authorize the physician to release the information contained on this certificate to the school division.

Date _____ Signature of Applicant _____

Comments on History of Applicant by Examining Physician/Nurse Practitioner:_____

_____

PHYSICAL QUALIFICATIONS FOR SCHOOL BUS DRIVERS

1. No person shall drive a school bus unless that person is physically qualified to do so and has submitted a Certificate signed by the applicant and the doctor for the applicable employment period.
2. A person is physically qualified to drive a school bus if the individual:
   a. Has no loss of a foot, a leg, a hand, or an arm which interferes with the ability to control and safely drive a school bus without reasonable accommodations;
   b. Has no impairment of the use of a foot, a leg, a hand, finger, or an arm, and no other structural defect or limitation likely to interfere with the ability to control and safely drive a school bus without reasonable accommodations;
   c. Has no known medical history or clinical diagnosis of diabetes mellitus currently requiring insulin for control likely to interfere with the ability to control and safely drive a school bus without reasonable accommodations;
   d. Has no current clinical diagnosis of myocardial infarction, angina pectoris, coronary insufficiency, thrombosis, or any other cardiovascular disease of a variety known to be accompanied by syncope, dyspnea, collapse, or congestive cardiac failure;
   e. Has no known medical history or clinical diagnosis of a respiratory dysfunction likely to interfere with the ability to control and drive a school bus safely without reasonable accommodations;
   f. Has no known current clinical diagnosis of high blood pressure likely to interfere with the ability to operate a school bus safely without reasonable accommodations;
   g. Has no known medical history or clinical diagnosis of rheumatic, arthritic, orthopedic, muscular, neuromuscular, or vascular disease which would interfere with the ability to control and operate a school bus safely without reasonable accommodations;
   h. Has no known medical history or clinical diagnosis of epilepsy or any other condition which is likely to cause loss of consciousness or any loss of ability to control a school bus without reasonable accommodations;
   i. Has no known mental, nervous, organic, or functional disease or psychiatric disorder likely to interfere with the ability to drive a school bus safely without reasonable accommodations;
   j. Has both distant and near visual acuity of at least 20/40 (Snellen) in each eye with or without corrective lenses, and field of vision of at least 70 degrees in the horizontal meridian in each eye, and the ability to recognize the colors of traffic signals and devices showing standard red, green, and amber;
   k. First perceives a forced-whispered voice in the better ear at not less than 5 feet with or without the use of a hearing aid or, if tested by use of an audiometric device, does not have an average hearing loss in the better ear greater than 40 decibels at 500 Hz, 1,000 Hz, and 2,000 Hz with or without a hearing aid when the audiometric device is calibrated to American National Standard (formerly ASA Standard) Z24.5-1951; and
   l. Does not use an amphetamine, narcotic, or any habit-forming drug without appropriate physician supervision.

FORM EB.001
Revised 9-10

PHYSICIAN'S CERTIFICATE **APPLICANT'S NAME** _____

1. Visual Acuity Without Corrective Lenses Distant R20/ _____ L20/ _____
   Near R20/ _____ L20/ _____

2. Visual Acuity with Corrective Lenses Distant R20/ _____ L20/ _____
   Near R20/ _____ L20/ _____

3. Color Vision _____ Visual fields to 140 degree Horizontal sweep _____

4. Hearing R_____ L _____

5. Audiometry (May be completed by other qualified persons if authorized by examining physician)

   Decibel Loss with Hearing Aid at R500 Hz _____ 1000 Hz _____ 2000 Hz _____
   L500 Hz _____ 1000 Hz _____ 2000 Hz _____
   Decibel Loss without Hearing Aid at R500 Hz _____ 1000 Hz _____ 2000 Hz _____
   L500 Hz _____ 1000 Hz _____ 2000 Hz _____

6. Audiometric Test Performed by _____

7. Height _____ Weight _____ B.P. _____ Pulse _____

8. Check if Normal: Head _____ Lungs _____ Extremities _____
   Eyes (including Fundi) _____ Heart _____ Neurologic _____
   Ears _____ Abdomen _____ Urinalysis _____
   Throat _____ Genitalia _____

   1. X-ray, EKG, and TB Skin Test Data (if indicated):
      _____

I am a duly licensed physician/nurse practitioner in Virginia, License No. _____. I certify that I have reviewed the Medical History as written hereon, examined the patient as noted above and with the knowledge of his duties and the "Physical Qualifications for School Bus Drivers", I find that he/she is mentally and physically fit to operate a school bus: without restriction _____, with corrective lenses _____, with a hearing aid _____.

As best I can determine, this individual does not have any conditions which might impair level of consciousness, perception, judgement, motor/mechanical functions, or otherwise impair the ability to safely operate a school bus.

As best I can determine by reviewing the history and exam as above, I have no reason to suspect that the applicant uses illegal drugs or excessive amounts of alcohol.

Signed _____ Address _____

Name Printed _____ _____

Date _____ Phone _____

Notes: 1. The examining physician/nurse practitioner should be aware of the physical demands and mental and emotional responsibilities placed on a school bus driver. In the interest of public safety, the examining physician is required to certify that the driver does not have any physical, mental or organic defect of such a nature as to affect the driver's ability to operate safely a school bus.

2. ***The following duties may be required of a school bus driver: the ability to open a school bus hood; stoop and inspect under a vehicle; operate emergency doors, roof hatches and windows; assist students from emergency exits or vehicle by lifting children out of wheelchairs, out of emergency doors, roof hatches and/or emergency windows; installing tire chains as applicable; operate push pull handle for bus entrance doors; operate wheelchair lifts including stooping and/or bending to secure wheelchairs for transportation; lift preschool children in and out of the vehicles, operate a standard transmission if necessary.***

3. This report must be signed personally by the physician/nurse practitioner and returned to the school division requesting the certificate.

Board of Education Agenda Item

Item: H. **Date:** September 23, 2010

Topic: First Review of Proposed Revised Curriculum Framework for 2010 *English Standards of Learning*

Presenter: Ms. Tracy Fair Robertson, English Coordinator

Telephone Number: (804) 371-7585 **E-Mail Address:** tracy.robertson@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

____ Action requested at this meeting _X_ Action requested at future meeting: After public comment

Previous Review/Action:

____ No previous board review/action

_X_ Previous review/action
date January 14, 2010
action Board of Education adopted the 2010 *English Standards of Learning*

Background Information:
New academic content *English Standards of Learning* were developed in 1995 and revised in 2002. The Standards of Quality require the Board of Education to review the Standards of Learning on a regular schedule. The *English Standards of Learning* were scheduled for review in 2010. As a result, on January 15, 2009, the Board approved a plan to complete the review and revision of these standards and the companion Curriculum Framework during 2010. On January 14, 2010, the Board approved the 2010 *English Standards of Learning*.

In January 2007, the Board of Education authorized the Virginia Department of Education to conduct studies to determine factors contributing to success in postsecondary education. As part of that effort, the Department of Education requested ACT and the College Board conduct studies comparing their respective standards for postsecondary readiness to the Virginia Standards of Learning (SOL) in English/Reading and Mathematics. Virginia was also a participant in Achieve's American Diploma Project in 2007. Recommendations from Achieve, The College Board, and ACT were included in the proposed revised Curriculum Framework for the 2010 *English Standards of Learning*.

In June 2010, the National Governors Association and the Council of Chief State School Officers released the English/Language Arts Common Core State Standards, which the members of the

Curriculum Framework review committee also reviewed and considered in drafting the proposed revised Curriculum Framework for the 2010 *English Standards of Learning*. A preliminary analysis of the content included in Virginia's 2010 *English Standards of Learning* as compared with the English/Language Arts Common Core State Standards will be provided at the Board meeting in conjunction with the presentation on the Curriculum Framework for the 2010 *English Standards of Learning*.

The Department of Education took the following steps to produce a draft of the proposed revised Curriculum Framework for the 2010 *English Standards of Learning* for the Board's first review:

- Selected a review committee that consisted of educators solicited from school divisions to participate in the process;
- Met with the review committee during July 2010; and
- Developed a draft of the proposed revised Curriculum Framework for the 2010 *English Standards of Learning*.

Summary of Major Elements

The Virginia Department of Education has developed the attached draft of the proposed revised Curriculum Framework for the 2010 *English Standards of Learning* (Attachment A).

The major elements of the attached proposed revised Curriculum Framework for the 2010 *English Standards of Learning* include:

- Edits to enhance clarity, specificity, rigor, alignment of skills and content, and a reflection of the current academic research and practice;
- Emphasis on vertical alignment in grades 4-12;
- Addition of the media literacy content in the communication strand;
- Addition of the research strand beginning in grade four;
- Addition of the specific vocabulary standards in high school; and
- Addition of skills such as ethical behavior in gathering and using information, and the analysis and synthesis of information to solve problems.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education accept for first review the proposed revised Curriculum Framework for the 2010 *English Standards of Learning*.

Impact on Resources:

This responsibility can be absorbed by the agency's existing resources at this time.

Timetable for Further Review/Action:

Following the Board of Education's acceptance of the 2010 *English Standards of Learning* Curriculum Framework for first review, the Department of Education will receive public comment for at least 30 days before bringing the 2010 *English Standards of Learning* Curriculum Framework to the Board of Education for final review later in 2010.

The Department of Education staff will involve English/reading educators from local school divisions and continue to analyze the Common Core State Standards as compared to the Standards of Learning. A final report will be presented to the Board concurrent with final action on the English Curriculum Framework.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

K-12

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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Virginia Department of Education
P.O. Box 2120
Richmond, Virginia 23218-2120
http://www.doe.virginia.gov

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NOTICE
The Virginia Department of Education does not unlawfully discriminate on the basis of race, color, sex, national origin, religion, age, political affiliation, veteran status, or against otherwise qualified persons with disabilities in employment or in its programs and activities.

The 2010 *English Curriculum Framework* can be found in PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at http://www.doe.virginia.gov.

Virginia *English Standards of Learning* Curriculum Framework 2010
Introduction

The 2010 *English Standards of Learning* Curriculum Framework is a companion document to the 2010 *English Standards of Learning* and amplifies the *English Standards of Learning* by defining the content knowledge, skills, and understandings that are measured by the Standards of Learning assessments. The Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers in their lesson planning by identifying essential understandings, defining essential content knowledge, and describing the intellectual skills students need to use. This supplemental framework delineates in greater specificity the content that all teachers should teach and all students should learn.

Each topic in the *English Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge, and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into three columns: Understanding the Standard; Essential Understandings; and Essential Knowledge, Skills and Processes. The purpose of each column is explained below.

Understanding the Standard
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan lessons focusing on the standard.

Essential Understandings
This section delineates the key concepts and ideas that all students should grasp to demonstrate an understanding of the Standards of Learning. These essential understandings are presented to facilitate teacher planning.

Essential Knowledge, Skills, and Processes
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge, skills, and processes that define the standard.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge, skills, and processes from Standards of Learning presented in previous grades as they build expertise in English.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Kindergarten

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the kindergarten level, students will engage in a variety of oral language activities in order to develop their understanding of language and enhance their ability to communicate effectively. Of primary importance is the development of ~~phonemic skills~~ phonological awareness, ~~that are the precursor~~ which is essential for success in ~~learning to decode words~~ literacy. Emphasis will be placed on having the students build and use listening and speaking vocabularies through participation in oral language activities employing poems, rhymes, songs, and stories. Students will learn rules for conversation and skills for participation in discussions. They will also learn how to formulate basic investigative questions.

K.1 The student will demonstrate growth in the use of oral language.

a) Listen to a variety of literary forms, including stories and poems.
b) Participate in a variety of oral language activities including choral and echo speaking and recitation of short poems, rhymes, songs, and stories with repeated word order patterns.
c) Participate in oral generation of language experience narratives.
d) Participate in creative dramatics.
e) Use complete sentences that include subject, verb, and object.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will expand their oral language vocabulary by listening to and participating in a variety of ~~literary~~ literacy experiences~~, including fiction and nonfiction print materials and trade books~~ that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics. • ~~These interactions provide opportunities for students to mimic language and experiment with new words, word patterns, and rhymes in order to expand their working vocabularies.~~ • By participating in choral and echo speaking, language experience narratives and creative dramatics (e.g., songs, poems, role play, storytelling), students will expand their oral language. • A language experience narrative can be produced from any individual or group experience. For an individual language experience narrative the student dictates a story to the teacher. For the group language experience narrative students contribute ideas to develop sentences for a class story.	**All students should** • understand that oral language entertains and communicates information.	**To be successful with this standard, students are expected to** • ~~listen to a variety of literary forms, including predictable texts, patterned texts, poems, fairy tales, legends, stories, and informational texts found in fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~ • listen to texts read aloud and ask and answer questions for further understanding. • participate in choral and echo speaking and ~~echo reading~~ recitation of short poems, rhymes, songs, and stories with repeated patterns and refrains. • generate ideas to develop a group language experience narrative. • dictate sentences about a group experience for a group language experience narrative (e.g., a story about a class field trip). • dictate an experience or story to create an individual language experience narrative (e.g., a story about a family pet). • use drama to retell familiar stories, rhymes, and poems (e.g., storytelling with role play or puppets). • participate in creative dramatics, such as classroom songs, plays, skits, and group activities designed to give students frequent opportunities for listening and speaking. • use complete sentences that include subject, verb, and object when speaking.

K.1 The student will demonstrate growth in the use of oral language.

a) Listen to a variety of literary forms, including stories and poems.
b) Participate in a variety of oral language activities including choral and echo speaking and recitation of short poems, rhymes, songs, and stories with repeated word order patterns.
c) Participate in oral generation of language experience narratives.
d) Participate in creative dramatics.
e) Use complete sentences that include subject, verb, and object.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~identify words that rhyme~~.

K.2 The student will expand understanding and use of word meanings.

a) Increase listening and speaking vocabularies.
b) Use number words.
c) Use words to describe/name people, places, and things.
d) Use words to describe/name location, size, color, and shape.
e) Use words to describe/name actions.
f) Ask about words not understood.
g) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will expand ~~and use their listening and speaking vocabularies~~ understanding and use of word meanings through ~~across the curricula~~ cross-curricular activities ~~that develop their use of descriptive/naming words~~. • ~~This v~~Vocabulary growth aids in development of reading and comprehension as students progress in school. • Teachers should provide opportunities for students to participate in partner or group activities to use descriptive words (e.g., read and sing number poems and songs). • Teacher-initiated activities will expand students' language by introducing new vocabulary in the context of ~~fiction and nonfiction print materials and trade books~~ a variety of texts that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics, and by modeling ways to participate in discussions about learning. • Teacher modeling of the appropriate use of content vocabulary will help students expand	**All students should** • understand that learning new words enhances communication. • understand that word choice makes communication clearer. • understand that information can be gained by asking about words not understood.	**To be successful with this standard, students are expected to** • understand and use number words in conversations, during partner and group activities, and during teacher-directed instruction. • use words to describe or name people, places, feelings, and things during partner and group activities and during teacher-directed instruction. • use size, shape, color, and spatial words to describe people, places, and things during group or individual activities and during teacher-directed instruction. • use words such as *over*, *under*, *between*, and *beside* to describe location. • use a variety of words to describe the actions of characters and people in real and make-believe settings in response to stories or class activities. • recognize when they do not understand a word or phrase and seek clarification by asking a peer or an adult. • use vocabulary from content areas during partner or group activities and during teacher-directed instruction.

K.2 The student will expand understanding and use of word meanings.

a) Increase listening and speaking vocabularies.
b) Use number words.
c) Use words to describe/name people, places, and things.
d) Use words to describe/name location, size, color, and shape.
e) Use words to describe/name actions.
f) Ask about words not understood.
g) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
their use of word meanings.		

K.3 The student will build oral communication skills.

a) Express ideas in complete sentences and express needs through direct requests.
b) Begin to initiate conversations.
c) Begin to follow implicit rules for conversation, including taking turns and staying on topic.
d) Listen and speak in informal conversations with peers and adults.
e) Participate in group and partner discussions about various texts and topics.
f) Begin to use voice level, phrasing, and intonation appropriate for various language situations.
g) Follow one- and two-step directions.
h) Begin to ask how and why questions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will build oral communication skills within a language-rich environment through a variety of experiences. • ~~In this environment, students will accumulate experiences from which concepts and thoughts can be formed.~~ • With teacher support students ~~will learn to~~ generate how and why questions across ~~the~~ curricula and begin to use these questions to guide their search for answers. • ~~Students will have opportunities~~ ~~i~~In various group settings, students should have opportunities to initiate informal conversations with peers and adults, learning and practicing implicit rules for conversation ~~such as~~ (e.g., voice level and intonation appropriate for specific language situations).	**All students should** • understand that conversation is ~~a two-way interaction~~ interactive. • begin to understand that the setting influences rules for communication. • understand that information can be gained by ~~seeking answers to~~ generating questions and seeking answers.	**To be successful with this standard, students are expected to** • speak audibly in complete~~, simple~~ sentences, expressing thoughts, feelings and ideas clearly. • verbally express needs through direct requests. • participate in a range of collaborative discussions building on others' ideas and clearly expressing their own (e.g., one-on-one, small group, teacher-led). • initiate conversations with peers and teachers in a variety of school settings. • listen attentively to others in a variety of formal and informal settings involving peers and adults. • participate in partner or group activities, (i.e., conversations, discussions, book chats, retellings of stories, choral speaking, language experience narratives, morning routines, dramatizations and role play). • listen to and discuss ~~fiction and nonfiction print materials and trade books~~ a variety of texts that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics. • wait for their turn to speak, allowing others to speak without unnecessary interruptions. • ~~wait for their turn to speak~~

K.3 The student will build oral communication skills.

a) Express ideas in complete sentences and express needs through direct requests.
b) Begin to initiate conversations.
c) Begin to follow implicit rules for conversation, including taking turns and staying on topic.
d) Listen and speak in informal conversations with peers and adults.
e) Participate in group and partner discussions about various texts and topics.
f) Begin to use voice level, phrasing, and intonation appropriate for various language situations.
g) Follow one- and two-step directions.
h) Begin to ask how and why questions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~stay~~ maintain conversation on topic through multiple exchanges. • in group and partner discussions clearly state a thought related to the book or topic being discussed. • begin to use ~~voice level,~~ phrasing~~,~~ and intonation appropriate for the language situation. • match language to the purpose, situation, environment, and audience. • repeat and follow one~~-step~~ and two-step oral directions. • ~~ask how and why questions to gain information.~~ • ~~understand the difference between stating known facts and formulating how and why questions~~ • ask questions to obtain information, seek help, or clarify something not understood. • ~~predict how to find answers to questions~~ • ~~begin to use pictures and other visuals to answer questions.~~

K.4 The student will identify, say, segment, and blend various units of speech sounds.

a) Begin to discriminate between spoken sentences, words, and syllables.
b) Identify and produce words that rhyme.
c) Blend and segment multisyllabic words at the syllable level.
d) Segment one-syllable words into speech sound units including beginning phoneme(s) (onset) and ending (rimes).
e) Identify words according to shared beginning and/or ending sounds.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will focus on various units of speech sounds in words ~~and discern the phonemes of spoken language~~. • This skill includes an understanding of the hierarchical concepts of sentence, word, syllable, and letter. Consequently, students need to demonstrate the ability to ~~break down~~ segment a sentence orally into individual words and to ~~break down~~ segment individual words into individual syllables and sounds. • Phonological awareness is the term used to describe a student's understanding that spoken words consist of sounds. Students who are *phonologically aware* demonstrate an ability to hear and manipulate the sound structure of language at each of the word, syllable and phoneme (individual sound) levels. • Phonological awareness typically progresses in a developmental continuum, (i.e., rhyming → sentence segmenting → syllable blending/segmenting → syllable splitting [onset and rime blending/segmenting] → phoneme blending, segmenting, and manipulating). • Students who are *phonemically aware* are able to attend to the individual phonemes of spoken	**All students should** • understand that words are made up of small units of sound and that these sounds can be blended to make a word. • understand that words are made up of syllables. • understand that a spoken sentence is made up of individual words.	**To be successful with this standard, students are expected to** • focus on speech sounds. • ~~break down a sentence into individual words~~ • demonstrate the concept of word by ~~dividing~~ segmenting spoken sentences into individual words. • ~~break down~~ segment a word into individual syllables by clapping hands or snapping fingers. • discriminate between large phonological units of running speech, sentences, words, and syllables. • identify a word that rhymes with a spoken word. • supply a word that rhymes with a spoken word. • produce rhyming words and recognize pairs of rhyming words presented orally. • generate rhyming words based on a given rhyming pattern. • supply an appropriate rhyming word to complete a familiar nursery rhyme or a predictable text with rhyming lines. • blend and segment consonants and rimes of spoken words (e.g., /b/- /oat/ = *boat*, *black* = /bl/- /ack/). • blend and segment multisyllabic words into syllables (e.g. the teacher asks students to *say robot without the /ro-/* and students respond with */bot/)*. • recognize that a word ~~breaks down~~ can be segmented into individual

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
language by demonstrating the higher-order ability to blend, segment and manipulate them. • Students orally **blend** speech sound units **(**phonemes) together to make a word (e.g., /m/-/a/-/n/ → man). • Students **segment** spoken words into individual sounds (e.g., man → /m/- /a/- /n/. • Understanding rhyme allows students to generate new words from a known word (e.g., if the student knows the word "fun," then he/she can orally produce the word "run.") It is more difficult to produce a rhyme than to identify a rhyme when presented orally. • **Syllables** are units of speech that consist of a vowel preceded and/or followed by consonants. Each time a syllable is produced, the mouth opens and closes. Each syllable spoken consists of a single rhythmic beat (e.g., the word *absent* has two syllables: ab/sent). • ~~The level of complexity increases as students then isolate the initial and final sounds of a word. Isolating the medial sound is yet more complex. The most sophisticated skill is breaking the word into the phonemes that comprise it.~~ • **Phonemes** are the smallest units of sound in spoken language.		~~phonemes (onset) and ending (rimes)~~ speech sound units. • recognize how phonemes sound when spoken in isolation. • recognize similarities and differences in beginning and ending sounds ~~(phonemes)~~ of words. • determine the order of speech sounds ~~(phonemes)~~ in a given word by answering the following questions: ° What is the beginning sound you hear? ° What is the ending sound you hear? • ~~supply~~ produce a word that has the same beginning or ending sound ~~(phoneme)~~ as a spoken word (e.g., /***s**ock*/- /***s**un*/ and /*ho**t**/- /ra**t**/*). • identify pictures of objects whose names share the same beginning or ending sound ~~(phoneme)~~. • sort pictures ~~of~~ or objects whose names share the same beginning or ending sound ~~(phoneme)~~. • blend three ~~given~~ spoken phonemes to make words (e.g., ~~For example,~~ the teacher says */c/ /a/ /t/*, and the student blends the phonemes to say the word *cat.*). • segment one-syllable words into onset and rime (e.g., the teacher says the word *hat* and when asked, the student verbally says */h/* for the onset and */-at/* for the rime.) Students are not expected to know the terms onset and rime. • segment one-syllable words into speech sound~~s~~ units ~~(phonemes)~~ (e.g., the teacher says the word bat, and the student segments the sounds */b/- /a/- /t/*). • substitute the beginning consonant to make a new word (e.g., the teacher asks the student to say *cat, but in the place of /c/ she asks them to say /b/,*

K.4 The student will identify, say, segment, and blend various units of speech sounds.

a) Begin to discriminate between spoken sentences, words, and syllables.
b) Identify and produce words that rhyme.
c) Blend and segment multisyllabic words at the syllable level.
d) Segment one-syllable words into speech sound units including beginning phoneme(s) (onset) and ending (rimes).
e) Identify words according to shared beginning and/or ending sounds.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Through many learning experiences with songs, rhymes, and language play, students will develop the ability to hear, ~~say~~ produce, and manipulate phonemes. • The ability to segment and blend phonemes facilitates spelling and decoding. • **Onsets** are speech sounds (/b/, /c/, /f/, /h/) before a vowel. **Rimes** are comprised of the vowel and what follows (e.g., -at, -it, -op). If a one-syllable word begins with a vowel, it has only a rime. Many words are formed by combining onsets and rimes (bat, ~~cat~~ bit, ~~fat~~ but~~, hat~~) ~~(Note: Students are not expected to know these terms)~~.		and the student responds with *bat*).

At the kindergarten level, students will be immersed in a print-rich environment. They will learn the concepts of print, basic phonetic principles, comprehension of stories, and letter identification skills through systematic, direct instruction, individual and small group activities, and time spent exploring and reading books and other print material. Students will learn to identify and name the uppercase and lowercase letters of the alphabet, understand that letters represent sounds, and identify beginning consonant sounds in single consonant words. They will also learn to comprehend and relate stories through drama, retelling, drawing, and their own writing.

K.5 The student will understand how print is organized and read.

a) Hold print materials in the correct position.
b) Identify the front cover, back cover, and title page of a book.
c) Distinguish between print and pictures.
d) Follow words from left to right and from top to bottom on a printed page.
e) Match voice with print (concept of word).

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand book handling skills, directionality of print, and the correspondence of the spoken word to the written word. • The ability to match spoken words to print involves developing a student's *concept of word.* Instruction may include modeling how print is organized, pointing to words on a page as it is read, and having students "finger-point read" memorized text.	**All students should** • understand that all print materials in English follow similar patterns. • understand that there is a one-to-one correspondence between the spoken and written word.	**To be successful with this standard, students are expected to** • hold printed material the correct way. • identify the front and back covers of a book. • distinguish the title page from all the other pages in a book. • turn pages appropriately. • distinguish print from pictures. • follow text with a finger, pointing to each word as it is read from left to right and top to bottom. • locate lines of text, words, letters, and spaces. • match voice with print in syllables, words, and phrases. • locate periods, question marks, and exclamation points.

K.6 The student will demonstrate an understanding that print conveys meaning.

a) Identify common signs and logos.
b) Explain that printed materials provide information.
c) Read and explain own writing and drawings.
d) Read his/her name and read fifteen meaningful, concrete words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will learn that books, environmental print (print seen in one's environment), and other printed materials ~~have a constant~~ convey meaning and provide information for the reader. • Teachers should provide a variety of opportunities for ~~S~~students ~~should~~ to demonstrate their understanding of the constancy of print by drawing pictures and producing their own written messages to communicate ~~with others~~ ideas and information. • These messages may include scribbles, letter approximations, letter strings, and invented spellings. • Concrete words are specific words that refer to definite persons, places or things. • Students who recognize words automatically spend less time decoding and can pay more attention to comprehending what is being read. • ~~Students will read his/her name~~. • Provide opportunities for the student to read his/her name.	**All students should** • understand that print ~~communicates a message~~ conveys meaning.	**To be successful with this standard, students are expected to** • apply knowledge that print conveys ~~a message~~ meaning. • recognize and identify common signs, logos, and labels. • explain that printed ~~text~~ material provides information. • read and explain their own drawings and writings. • locate ~~high-frequency~~ commonly used words and phrases in familiar text. • recognize ~~ten~~ a selection of high-frequency and sight words as well as read fifteen meaningful, concrete words. (Each student may know a different set of words.) • recognize and identify their own first and last names. ~~and the first names of classmates~~ • ~~retell information gathered from looking at a picture or from listening to a text read to them.~~

K.7 The student will develop an understanding of basic phonetic principles.

a) Identify and name the uppercase and lowercase letters of the alphabet.
b) Match consonant, short vowel, and initial consonant digraph sounds to appropriate letters.
c) Demonstrate a speech-to-print match through accurate finger-point reading in familiar text that includes words with more than one syllable.
d) Identify beginning consonant sounds in single-syllable words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will ~~learn and understand how letters and sounds work in written language~~ develop an understanding of basic phonetic principles. • ~~Students will learn and understand how letters and sounds work in written language.~~ • ~~Students will learn to identify uppercase and lowercase letters in isolation in sequential order and in random order.~~ • Phonetic skills are the foundation for decoding and encoding words — i.e., they are the basic skills needed to develop fluency and automaticity in reading and writing. • A **digraph** is the spelling of one sound using two letters. Digraphs can spell consonant sounds (e.g., sh, ch, th, ng) or vowel sounds (e.g., ai, ay, ee, ea, oo, ow, ey, oi, oy, au, aw).	**All students should** • understand that there is a one-to-one correspondence between spoken and written words. • understand that written words are composed of letters that represent specific sounds.	**To be successful with this standard, students are expected to** • recognize and name rapidly and with ease uppercase and lowercase letters in sequence and in random order. • match uppercase and lowercase letter pairs. • ~~recognize and say~~ produce the usual sounds of ~~all letters~~ consonants, short vowels and initial consonant digraphs. • demonstrate concept of word by: ° tracking familiar print from left to right and top to bottom; and ° matching spoken words to print including words with more than one syllable. • write the grapheme (letter) that represents a spoken sound. • use basic knowledge of one-to-one letter-sound correspondences by producing sounds for each consonant. • isolate initial consonants in single-syllable words (~~For example,~~ e.g., */t/* is the first sound in *top*). • associate long and short sounds with common spellings for the five major vowels. • distinguish between similarly spelled words by identifying sounds of the letters that differ. • ~~identify the~~ segment onsets ~~(*/c/*)~~ and rimes ~~(*-at*)~~ and begin to ~~separate the sounds fully (*/c/ /a/ /t/*) by saying each sound aloud~~ blend to form the words.

K.7 The student will develop an understanding of basic phonetic principles.

a) Identify and name the uppercase and lowercase letters of the alphabet.
b) Match consonant, short vowel, and initial consonant digraph sounds to appropriate letters.
c) Demonstrate a speech-to-print match through accurate finger-point reading in familiar text that includes words with more than one syllable.
d) Identify beginning consonant sounds in single-syllable words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~blend onsets (*/c/*) and rimes (*-at*) to form words (*cat*)~~ • ~~substitute other onsets (*/b/* for */c/*) to form different words (*bat*).~~

K.8 The student will expand vocabulary.
a) Discuss meanings of words.
b) Develop vocabulary by listening to a variety of texts read aloud.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will expand their ~~oral language~~ vocabulary by listening to and participating in a variety of ~~literary~~ literacy experiences, including, but not limited to, discussion and listening to a variety of texts read aloud ~~including fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~. • ~~These interactions~~ Teachers reading texts aloud provide opportunities for students to have ~~mimic~~ language modeled for them and expose them to ~~experiment with~~ new words~~, word patterns, and rhymes~~ in order to expand their working vocabularies. • ~~This~~ Vocabulary growth aids in development of reading and comprehension ~~as students progress in school~~.	**All students should** • understand that vocabulary is made up of words and that words have meaning.	**To be successful with this standard, students are expected to** • discuss meanings of specific words in partner, group and teacher-guided settings. • identify new meanings for familiar words and apply them accurately (e.g., knowing *water* as a drink and learning the verb *water the flowers*). • sort common objects into categories (e.g., shapes, foods) to gain a sense of the concepts the categories represent. • use common adjectives to distinguish objects (e.g., the *small red* square; the *shy white cat*) (Students are not required to know the term adjective at this level.). • ask and respond to questions about unknown words in a text. • identify real-life connections between words and their use (e.g., places that are *loud*). • use newly learned words in literacy tasks. • ~~listen to a variety of literary forms, including predictable texts, patterned texts, poems, fairy tales, legends, stories, and informational texts found in fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~

K.9 The student will demonstrate comprehension of fictional texts.

a) Identify what an author does and what an illustrator does.
b) Relate previous experiences to what is read.
c) Use pictures to make predictions.
d) Begin to ask and answer questions about what is read.
e) Use story language in discussions and retellings.
f) Retell familiar stories, using beginning, middle, and end.
g) Discuss characters, setting, and events.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard ~~relative to fiction~~ is that students will understand the elements of a story (characters, setting, problem/solution, events) and begin to analyze these elements for meaning. • Students will learn that comprehension is an active process requiring them to use their own experiences and learn new vocabulary in order to get meaning from fictional texts ~~and nonfiction~~ that ~~is~~ are read aloud to them. • Students should be exposed to various types of fictional texts (e.g., storybooks, poems).	**All students should** • understand that ~~print material~~ fictional texts tell~~s~~ a story ~~or provides information~~. • understand that authors tell stories through words and illustrators ~~create books~~ tell stories with pictures.	**To be successful with this standard, students are expected to** • identify the roles of ~~an~~ the author and ~~an~~ the illustrator of selected texts. • make ongoing predictions based on illustrations and ~~or portions of a~~ text. • describe the relationship between illustration and the story (e.g., what moment in the story does the illustration depict). • link knowledge from their own experiences to make sense of and talk about a text. • give evidence that they understand the meaning of what is being read aloud, including the who, what, when, where, why, and how. • ask and respond to simple questions about the content of a book. • use vocabulary from a story in discussions and retellings. • retell a story from pictures or text in their own words ~~or re-enact it~~, arranging the events in the correct sequence (beginning, middle, and end). • use words to sequence events ~~such as~~ (e.g., *before*, *after*, and *next*). • produce artwork or a written response (letters or phonetically spelled words) that demonstrates comprehension of a story that they have heard read aloud. • use descriptive language to talk about characters, settings, and events of a story.

K.10 The student will demonstrate comprehension of nonfiction texts.
a) Use pictures to identify topic and make predictions.
b) Identify text features specific to the topic, such as titles, headings, and pictures.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard relative to nonfiction is that students will demonstrate comprehension of ~~nonfiction print materials and trade books~~ a variety of texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~. • Students will learn that comprehension is an active process requiring them to use their own experiences and learn new vocabulary in order to get meaning from ~~fiction and~~ nonfictional texts that ~~is~~ are read aloud to them. • Students' understanding of text features, (i.e., titles, headings, and graphics) will support comprehension of nonfiction texts.	**All students should** • understand that ~~print material tells a story or~~ nonfictional texts provide~~s~~ information.	**To be successful with this standard, students are expected to** • make ongoing predictions based on ~~illustrations~~ graphics ~~or~~ and ~~portions of a~~ text. • relate pictures and illustrations to the text in which they appear. • link knowledge from their own experiences to make sense of and talk about a text. • identify ~~name~~ the topic of a nonfiction selection. • ask and respond to simple questions about the content of a book. • discuss simple facts and information relevant to the topic. • identify text features including titles, headings and pictures in text.

At the kindergarten level, students will begin to build a connection between oral and written language. Awareness that spoken language can be written and written language can be read is a fundamental concept in communicating ideas. Students will learn to print the uppercase and lowercase letters of the alphabet as well as their first and last names. Kindergarten writing reflects the students' oral language. Students will communicate their ideas through drawings, scribbles, letter strings, letter approximations, and dictation to adults.

K.11 The student will print in manuscript.

a) Print uppercase and lowercase letters of the alphabet independently.

b) Print his/her first and last names.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will begin developing neat, legible handwriting. • ~~The intent of this standard is that s~~Students will learn to print uppercase and lowercase letters of the alphabet. • Students need explicit, direct instruction to learn to form uppercase and lowercase manuscript letters correctly. • Reproducing letters with automaticity assists with learning sounds, spelling words and word recognition. • ~~Students also need to be taught~~ Teaching appropriate pencil grip will assist students with printing in manuscript.	**All students should** • understand that there are correct ways to write the manuscript letters of the alphabet. • understand that their written name provides identification. • understand that printing properly formed letters makes manuscript writing legible.	**To be successful with this standard, students are expected to** • use appropriate pencil grip. • print upper- and lower-case letters of the alphabet independently. • use ~~standard~~ manuscript letter formation. • use ~~standard~~ manuscript number formation. • ~~recognize their first and last names~~ • form the letters of and space their first and last names. • ~~know that the first letter of their first name and the first letter of their last name are always capital letters~~ • write their first and last names for a variety of purposes.

K.12 The student will write to communicate ideas for a variety of purposes.

a) Differentiate pictures from writing.
b) Draw pictures and/or use letters and phonetically spelled words to write about experiences.
c) Use letters and beginning consonant sounds to spell phonetically words to describe pictures or write about experiences.
d) Write left to right and top to bottom.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand that writing is used for a variety of purposes, including sharing events and telling stories (narrative writing), informing others and making reports (informational writing), labeling and making lists (functional writing), and responding to literature. • Writing in kindergarten ~~sets the stage~~ prepares students for ~~formal writing~~ more formalized writing styles in ~~other~~ subsequent grades. • Students will draw upon their growing phonetic knowledge to spell words using letters and beginning consonant sounds when describing pictures or writing about experiences. • Beginning writings may include drawings, letter strings, scribbles, letter approximations, and other graphic representations, as well as phonetically spelled words.	**All students should** • understand that their writing serves a variety of purposes.	**To be successful with this standard, students are expected to** • distinguish print from pictures. • write daily for a variety of purposes (e.g., practicing formation of alphabet letters, labeling, and journal writing). • write on assigned and/or self-selected topics. • use writing, dictation, and drawing to compose informative/explanatory texts that name a topic (what they are writing about) and provide some information (e.g., My family…). • use writing, dictation, and drawing to narrate an event. • ~~write without resistance when given the necessary time, place, and materials~~ • generate text to communicate and make meaning by creating drawings, letter strings, scribbles, letter approximations, or other graphic representations, as well as phonetically spelled words. • write left to right and top to bottom.

K.13 The student will use available technology for reading and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use available technology for reading and writing.	**All students should** • understand that ~~computers are~~ technology is a way to interact with print.	**To be successful with this standard, students are expected to** • ~~use "skill and practice" software.~~ • ~~use word processing software.~~ • use available digital tools for reading and writing. • ask and respond to questions about material presented through media. • share their writing with others.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade One

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the first-grade level, students will continue to engage in a variety of oral language activities to develop their understanding of language and to enhance their ability to communicate effectively. They will continue to build vocabulary as they participate in listening and speaking activities in the classroom. They will also begin to use their oral language skills to gain and explain information. In addition, students will continue to develop the higher-level phonemic awareness skills of segmentation, deletion, and substitution.

1.1 The student will continue to demonstrate growth in the use of oral language.

a) Listen and respond to a variety of electronic media and other age-appropriate materials.
b) Tell and retell stories and events in logical order.
c) Participate in a variety of oral language activities, including choral speaking and reciting short poems, rhymes, songs, and stories with repeated patterns.
d) Participate in creative dramatics.
e) Express ideas orally in complete sentences.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to demonstrate growth in the use of oral language and vocabulary by listening to and discussing ~~fiction and nonfiction print materials and trade books~~ a variety of texts that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics. • Students ~~will~~ should have opportunities to interact with a variety of electronic media and participate in numerous oral language activities. • ~~These activities will~~ Students should be engaged in activities that encourage the use of complete sentences and include the telling or retelling of stories and events in logical order.	**All students should** • understand that oral language is ~~can be~~ used to ~~tell a story and to express ideas~~ communicate a variety of ideas for a variety of purposes.	**To be successful with this standard, students are expected to** • produce complete sentences when appropriate to task and situation. • participate in a variety of oral language activities, such as: ◦ ~~listening to and discussing fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~ ◦ ~~listening and responding to stories and poems presented through recordings and experiencing other audiovisual materials in the context of curricular goals and objectives~~. ◦ listening to stories and poems read aloud daily; ◦ participating in discussions about stories and poems; ◦ talking about words and their meanings as they are encountered in stories, poems, and conversations; ◦ giving reactions to stories and poems; ◦ asking and answering questions about what is said in order to gather additional information or clarify something not understood; ◦ verbally express ideas and feelings; and ◦ describe people, places, things, and events with details. • tell and retell stories and events in logical order by: ◦ retelling stories orally and through informal drama; ◦ dictating retelling of stories; ◦ indicating first, next, and last events in a story; and ◦ creating their own stories, poems, plays, and songs. • participate in daily oral language activities~~, including~~ (e.g., choral speaking and the reciting of short poems, rhymes, songs, and stories with repeated

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a) Listen and respond to a variety of electronic media and other age-appropriate materials.
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e) Express ideas orally in complete sentences.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		patterns). • participate in creative dramatics, (e.g., classroom songs, plays, skits, and group activities) designed to give students frequent opportunities for listening and speaking. • speak to one another, and listen to each other at appropriate times during lessons. • ~~express themselves in complete sentences.~~

1.2 The student will expand understanding and use of word meanings.

a) Increase listening and speaking vocabularies.
b) Begin to ask for clarification and explanation of words and ideas.
c) Use common singular and plural nouns.
d) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will expand their listening and speaking vocabularies and their understanding and use of word meanings through activities across curricula ~~that develop the use of describing and naming words~~. • ~~Students will demonstrate an increase in vocabulary by giving and following directions.~~ • Students ~~will learn~~ should have opportunities to practice asking for clarification and explanation of unfamiliar words that are encountered across curricula. • Students should have opportunities to use vocabulary from other content areas. • ~~This v~~Vocabulary growth aids in the development of reading ~~and~~ comprehension as students progress in school. • One method for increasing listening (receptive) and speaking (expressive) vocabulary is for the teacher to pause at times during classroom read-aloud sessions to draw attention to key vocabulary and to encourage students to use the words while speaking.	**All students should** • understand that specific word choice makes communication clearer. • understand that nouns can have quantifiable attributes (singular or plural).	**To be successful with this standard, students are expected to** • learn and use new words encountered in discussions and in books that the teacher ~~are~~ reads aloud. • ~~use words to orally describe actions, people, places, things, and ideas~~ participate in listening and speaking activities. • ask for meanings and clarification of unfamiliar words and ideas. • use common singular and plural nouns ~~appropriately~~ with matching verbs in basic sentences (e.g., *She walks*., *We walk.*). • use common irregular plural forms, such as *man*/*men*, *child*/*children*, and *mouse*/*mice*. • use vocabulary from other content areas.

1.3 The student will adapt or change oral language to fit the situation.

a) Initiate conversation with peers and adults.
b) Follow rules for conversation using appropriate voice level in small-group settings.
c) Ask and respond to questions.
d) Follow simple two-step oral directions.
e) Give simple two-step oral directions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use oral language to respond appropriately in group situations to both peers and adults. • Teacher modeling of questioning techniques will support students in generating a variety of questions across curricula and in using questions to guide their search for answers.	**All students should** • understand that the setting influences the rules for communication. • ~~ask and answer relevant questions about a specific topic.~~ • understand that information can be gained by asking and answering relevant questions about a specific topic.	**To be successful with this standard, students are expected to** • initiate conversation in a variety of school settings. • participate in a range of collaborative discussions building on others' ideas and clearly expressing their own (e.g., partner, small group, teacher led). • ask and respond to questions to check for understanding of information presented (e.g., stay on topic, link remarks to those of others). • sustain two-person conversation through multiple exchanges. • ~~stay on topic~~ • use voice level and intonation appropriate for ~~the~~ small-group settings. • follow rules for conversation, including listening and taking turns. • ask and respond to relevant questions in partner, group, and teacher-led settings. • follow simple two-step oral directions. • give simple two-step directions. • use words of time and position, including *first*, *second*, *next*, *on*, *under*, *beside*, and *over,* to give directions orally. • use action words (verbs), including, but not limited to, *mark*, *circle*, *color*, and *draw,* to give directions orally.

1.4 The student will orally identify, produce, and manipulate various units of speech sounds within words.

a) Create rhyming words.
b) Count phonemes (sounds) in one-syllable words.
c) Blend sounds to make one-syllable words.
d) Segment one-syllable words into individual speech sounds (phonemes).
e) Add or delete phonemes (sounds) to make new words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to build and practice ~~phonemic~~ phonological awareness skills. • Explicit instruction allows students to consciously reflect on, produce, and manipulate sounds. • Through songs, poems, stories, and word play, students will ~~count phonemes,~~ create rhyming words, count phonemes, ~~segment and substitute sounds and~~ blend sounds, ~~to make words.~~ and add or delete phonemes to make new words. • Phonological awareness is the term used to describe a student's understanding that spoken words consist of sounds. Students who are *phonologically aware* demonstrate an ability to hear and manipulate the sound structure of language at each of the word, syllable and phoneme (individual sound) levels. • Phonological awareness typically progresses in a developmental continuum, (i.e., rhyming → sentence segmenting → syllable blending/segmenting → syllable splitting [onset and rime blending/segmenting] → phoneme blending, segmenting, and manipulating). • Students who are *phonemically aware* are able to attend to the individual phonemes of spoken language by demonstrating the higher-order	**All students should** • understand that spoken words are made up of ~~individual phonemes~~ units of speech sounds within words, which can be ~~added or deleted~~ manipulated to make new words.	**To be successful with this standard, students are expected to** • identify, isolate, produce, and manipulate various units of speech sounds within words (e.g., syllables, onsets, rimes, and phonemes). • ~~generate~~ orally produce words that rhyme with an ~~teacher-given~~ audible guide word. • count phonemes in one-syllable words ~~with a maximum of three syllables~~. • ~~identify the onset and rime of words~~ • blend separately spoken phonemes to make ~~word parts and~~ ~~words with~~ one ~~to three~~ syllable~~s~~ into words. • segment words by ~~saying~~ producing each ~~sound~~ phoneme. • ~~add, delete, or change phonemes orally to change syllables or words~~ • identify whether the ~~middle~~ medial vowel sound is the same or different in a set of one-syllable words. • sort picture cards by beginning, medial, and ending phonemes. • delete a phoneme from an orally presented word to make a new word (e.g., rice/ice, beach/bee, weight/weigh, couch/cow). • add a phoneme from an orally presented word or rime to make a new word (e.g., pie/pipe, four/fork, cab/crab, ot/lot, ap/map). • change phonemes orally to make new words (e.g., rug/jug, bunch/lunch, card/cart, sat/sit).

1.4 The student will orally identify, produce, and manipulate various units of speech sounds within words.

a) Create rhyming words.
b) Count phonemes (sounds) in one-syllable words.
c) Blend sounds to make one-syllable words.
d) Segment one-syllable words into individual speech sounds (phonemes).
e) Add or delete phonemes (sounds) to make new words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
ability to blend, segment, and manipulate them. • **Syllables** are units of speech that consist of a vowel preceded and/or followed by consonants. Each time a syllable is produced; the mouth opens and closes. Each syllable spoken consists of a single rhythmic beat. For example, the word *absent* has two syllables: ab/sent. • **Onsets** are speech sounds (*/b/, /j/, /s/, /p/*) before a vowel. **Rimes** are the vowel and what follows (*-ack*). If a one-syllable word begins with a vowel, it has only a **rime**. Many words are formed by combining **onsets** and **rimes** (*back, jack, sack, pack*). (Note: Students are not expected to know these terms.) • **Phonemes** are the smallest units of sound in language. • Phonemic awareness can be developed as students practice distinguishing minimal pairs aurally. **Minimal pairs** are pairs of words which differ in only one phoneme (cape/tape, kite/tight, gas/gash).		

At the first-grade level, students will continue to be immersed in a print-rich environment. Having developed a concept of word and letter-sound correspondence, students will now concentrate on learning and integrating basic phonetic principles, decoding words in isolation, using meaning clues, and employing language and sentence structure to read and substantially increase their sight-word vocabulary. By the end of the first grade, they should have a reading vocabulary of 300 to 500 commonly used sight words and be able to decode single-syllable words.

These concepts and skills will be learned through systematic explicit direct instruction, individual and small-group activities, and time spent exploring and reading books and other print material. Through reading decodable books, students will build fluency and automaticity in using their knowledge of phonetic principles and print to read. Reading and listening to both fiction and nonfiction texts will give students opportunities to respond to readings in group discussions and through writing and drawing. Through reading and rereading, the students will build fluency and vocabulary and will become independent readers. Students will learn to use their knowledge of alphabetical order by first letter to find the meanings of unfamiliar words in picture and simple word dictionaries.

1.5 The student will apply knowledge of how print is organized and read.

a) Read from left to right and from top to bottom.
b) Match spoken words with print.
c) Identify letters, words, sentences, and ending punctuation.
d) Read his/her own writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand how to read print. • As students begin to read, they will apply their knowledge of directionality of text and their ability to match the spoken word to the print. • The ability to match spoken words to print involves a student's *concept of word.* A firm concept of word requires students to have an automatic knowledge of letter sounds, to be able to isolate consonant sounds at the beginning of words in context, and to remember previously viewed words from text.	**All students should** • understand that written text consists of letters, words, and sentences. • understand that oral language can be written and read.	**To be successful with this standard, students are expected to** • demonstrate concept~~s~~ of ~~print and spoken~~ word by tracking print from left to right and top to bottom, following print from one line to the next line (return sweep), and matching spoken words to print. • identify letters, words, ~~and~~ sentences, and ending punctuation (i.e., periods, question and quotation marks, and exclamation points). • differentiate between letters and words by recognizing spaces between words in sentences and ~~locating capital letters in sentences locating periods, question marks, and exclamation points, speech bubbles, and quotation marks~~ recognizing that a sentence starts with a capital letter and ends with a period, question mark, or exclamation point. • read their own writing.

1.6 The student will apply phonetic principles to read and spell.

a) Use beginning and ending consonants to decode and spell single-syllable words.
b) Use two-letter consonant blends to decode and spell single-syllable words.
c) Use beginning consonant digraphs to decode and spell single-syllable words.
d) Use short vowel sounds to decode and spell single-syllable words.
e) Blend beginning, middle, and ending sounds to recognize and read words.
f) Use word patterns to decode unfamiliar words.
g) Read and spell simple two-syllable compound words.
h) Read and spell commonly used sight words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to learn and apply phonetic principles to decode unfamiliar words. • Students will learn to ~~sound out words~~ apply phonetic skills rather than rely on pictures and context as their primary strategies for decoding words. • Students **blend** speech sound units (phonemes) together to produce a word (e.g., /m/-/a/-/n/ → man). • Students **segment** words into individual sounds (e.g., man→ /m/- /a/- /n/. • ~~Students will segment and blend beginning and ending consonant sounds and vowel sounds to decode single-syllable words.~~ • Students will transfer their knowledge of word patterns to identify other words with the same pattern. • Students will also continue to develop their skill at automatically recognizing ~~high-frequency~~ commonly used sight words. Students who recognize words automatically	**All students should** • understand that knowledge of phonetic principles ~~the sounds of letters~~ can be applied to read or spell words.	**To be successful with this standard, students are expected to** • apply knowledge of ~~beginning and ending consonants and short vowels~~ letter sounds in single-syllable words by: ° recognizing beginning, medial and ending ~~consonant sounds~~ phonemes; ° ~~separating~~ segmenting the ~~sounds~~ phonemes in a word into their complete sequence of individual phonemes (e.g., top: /t/-/o/-/p/, jump: /j/-/u/-/m/-/p/); and ° blending ~~separately spoken~~ phonemes to ~~make~~ decode or spell a word. ° ~~spelling words~~ • accurately decode unknown unfamiliar, orthographically regular, single-syllable words and nonsense words (e.g., *sit*, *zot*), using letter-sound mappings to sound them out. • apply knowledge of word patterns to decode unfamiliar words by recognizing word patterns~~, such as~~ (e.g., CVC) using onsets and rimes to create, read, and spell new words that include blends~~, such as~~(e.g., the *l* and *r* blends; and digraphs, including *ch*, *sh*, *th*, and *wh*). • use the consonant-vowel patterns CVC (e.g., pin), VC (e.g., in), and CVCC (e.g., wind), to decode and spell single-syllable words. • use the consonant-vowel patterns CVVC and CVCE to decode and spell some single-syllable words. • use knowledge that every syllable has a vowel sound to help determine if a word has one or two syllables.

1.6 The student will apply phonetic principles to read and spell.

a) Use beginning and ending consonants to decode and spell single-syllable words.
b) Use two-letter consonant blends to decode and spell single-syllable words.
c) Use beginning consonant digraphs to decode and spell single-syllable words.
d) Use short vowel sounds to decode and spell single-syllable words.
e) Blend beginning, middle, and ending sounds to recognize and read words.
f) Use word patterns to decode unfamiliar words.
g) Read and spell simple two-syllable compound words.
h) Read and spell commonly used sight words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
spend less time decoding and can pay more attention to comprehending what is being read. • **Onsets** are speech sounds (*/b/, /j/, /s/, /p/*) before a vowel. **Rimes** are the vowel and what follows (*-ack*). If a one syllable word begins with a vowel, it has only a **rime**. Many words are formed by combining **onsets** and **rimes** (*back, jack, sack, pack*). (Note: Students are not expected to know these terms.) • Alphabet letters written between /slashes/ refer to their pronunciation (e.g., */sh/* refers to the initial sound heard in the word *sugar).*		• ~~recognize and use~~ read and spell simple two-syllable compound words. • read and spell simple two-syllable compound words following basic patterns by segmenting the words into syllables. • read and spell commonly used ~~high-frequency~~ sight words.

1.7 The student will use semantic clues and syntax to expand vocabulary when reading.

a) Use words, phrases, and sentences.
b) Use titles and pictures.
c) Use information in the story to read words.
d) Use knowledge of sentence structure.
e) Use knowledge of story structure.
f) Reread and self-correct.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use ~~meaning~~ semantic clues and syntax to assist in developing an understanding of a text. • **Semantics** refer to the *meanings* of words or sentences. **Syntax** refers to the *rules or conventions* for the formation of grammatical sentences. (Note: Students are not expected to know these terms.) • Students will use pictures as well as the understanding of the story and topic to predict and check for comprehension ~~meaning~~ as they read. • ~~Students will use their knowledge of sentence structure (the order of words in a given type of sentence) when reading.~~ • Students' knowledge of sentence structure will include understanding that a sentence is a complete idea, which has a subject and a predicate. • ~~Whenever meaning breaks down, students will reread and self-correct to regain meaning~~. • Teacher prompting and scaffolding to direct the student to reread and self-correct will support comprehension. • **Prosody** refers to the rhythmic and intonational	**All students should** • understand that they will use a variety of strategies to read unfamiliar words.	**To be successful with this standard, students are expected to** • expand vocabulary by using frequently occurring root words to read inflectional forms (e.g., *look*, *looks*, *looked*, *looking*). • use sentence-level context as a clue to the meaning of words and phrases. • ~~use prior knowledge to interpret pictures~~ • use titles and pictures to make predictions about text. • use pictures and/or rereading to confirm vocabulary choice. • use ~~knowledge of the story or topic~~ information in the story to make predictions about vocabulary and text. • notice when words or sentences do not make sense in context. • ~~recognize complete sentences when reading~~ • use intonation, pauses, and ~~emphasis~~ emphases that signal the structure of the sentence when reading aloud (prosody). • use ~~clues of~~ punctuation clues, including period, question mark, exclamation point, commas, and quotation marks, to guide their ~~reading~~ comprehension. • ~~reread to confirm vocabulary choice~~ • use knowledge of story structure (i.e., characters, setting, problem/solution) to guide comprehension. • reread and self-correct when text does not make sense.

1.7 The student will use semantic clues and syntax to expand vocabulary when reading.

a) Use words, phrases, and sentences.
b) Use titles and pictures.
c) Use information in the story to read words.
d) Use knowledge of sentence structure.
e) Use knowledge of story structure.
f) Reread and self-correct.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
aspect of language which should be noticeable during oral reading. Prosody contributes to reading fluency and comprehension.		

1.8 The student will expand vocabulary.

a) Discuss meanings of words in context.
b) Develop vocabulary by listening to and reading a variety of texts.
c) Ask for the meaning of unknown words and make connections to familiar words.
d) Use text clues such as words or pictures to discern meanings of unknown words.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will expand their vocabulary by participating in a variety of literacy experiences. • Teachers reading texts aloud provide opportunities for students to have language modeled for them and expose them to new words, in order to expand their working vocabularies. • ~~Teacher-initiated activities will expand students' language by introducing new vocabulary in the context of fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~	**All students should** • understand that word meanings can be comprehended through context, discussion, connections to familiar words, and knowledge of vocabulary from other content areas.	**To be successful with this standard, students are expected to** • understand and discuss the meanings of new words as presented in context. • develop their vocabulary by listening to and reading a variety of texts (e.g., predictable, decodable, and narrative/expository texts written in the original, natural language of the authors). • use words, pictures, and other clues from text to confirm or self-correct, rereading as necessary. • ask for the meaning of unknown words and make connections to familiar words by: ◦ sorting words into categories (e.g., colors, animals); ◦ defining words by category and by one or more attributes (e.g., *a swan is a bird that swims, a cardinal is a red bird*); and ◦ identifying real-life connections between words and their use (e.g., places that are *safe*). • use vocabulary from other content areas in literacy tasks.

1.9 The student will read and demonstrate comprehension of a variety of fictional texts.

a) Preview the selection.
b) Set a purpose for reading.
c) Relate previous experiences to what is read.
d) Make and confirm predictions.
e) Ask and answer who, what, when, where, why, and how questions about what is read.
f) Identify characters, setting, and important events.
g) Retell stories and events, using beginning, middle, and end.
h) Identify the main idea or theme.
i) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard ~~relative to fiction~~ is that students will build fluency and experience success as ~~a~~ readers while reading aloud and will begin to develop and demonstrate comprehension skills by reading a variety of fiction and poetry selections. • Students will demonstrate comprehension of story elements in fiction and poetry selections by identifying the character, setting, and topic or main idea. • Students will continue to learn to relate their prior knowledge to the topic of the text and use this knowledge and information from the text to make and confirm predictions as well as to ask and answer questions. • Teachers should read a wide range of fiction and nonfiction texts aloud and explain differences between books that tell stories and books that provide information. • To determine a student's functional reading level for a specific text consider these word accuracy rates from Virginia's Phonological	**All students should** • understand that they should use a variety of strategies to assist with comprehension. • understand that orally read text has a rhythm and expression that helps convey meaning.	**To be successful with this standard, students are expected to** • preview reading material by looking at the book's cover and illustrations and by reading titles and headings. • ~~choose~~ set a purpose for reading by looking at the illustrations, ~~determining~~ activating prior knowledge, and predicting the outcome of the selection. • ~~draw on prior knowledge to make predictions before and during reading~~ • use knowledge from their own experience to make sense of and talk about a text. • draw on prior knowledge to make and confirm predictions ~~based on illustrations or portions of the text~~ before, during, and after reading. • ask and answer simple questions (e.g., who, what, when, where, why, and how)~~questions~~ about a selection. • ~~identify characters, setting, and important events~~ • identify and describe characters, settings, and important events in a story using details. • use illustrations and details to describe characters, settings, and important events in a story. • demonstrate comprehension by retelling stories and events orally or in

1.9 The student will read and demonstrate comprehension of a variety of fictional texts.

a) Preview the selection.
b) Set a purpose for reading.
c) Relate previous experiences to what is read.
d) Make and confirm predictions.
e) Ask and answer who, what, when, where, why, and how questions about what is read.
f) Identify characters, setting, and important events.
g) Retell stories and events, using beginning, middle, and end.
h) Identify the main idea or theme.
i) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
Awareness Literacy Screening (PALS): ~~Reading levels~~: ° independent level – ~~95%~~ 98-100% accuracy, or about ~~1~~ two of every ~~20~~ 100 words misread; student reads independently with little or no instructional support, and comprehension is strong. ° instructional level – 90-97% accuracy, or ~~about 1 of every 10~~ three to ten words of every 100 words misread (For preprimer text, instructional level is between 85%-97%.); student reads with modest accuracy and variable fluency and comprehension should be closely monitored. ° frustration level – less than 90% accuracy, or more than ~~1 of every 10~~ ten of every 100 words misread (For preprimer text, frustration level is less than 85%.); student reads with neither accuracy nor fluency, and therefore his or her comprehension will be affected. • Fluency develops as students have the opportunity to practice reading on their independent reading level. • ~~Students should read at least 60 words per~~		writing, using beginning, middle, and end structure, and demonstrating comprehension of the central message or lesson. • identify the ~~topic or~~ main idea or theme of a short fiction ~~or nonfiction~~ selection. • read a wide variety of self-selected and teacher-selected stories, and poems ~~and informational texts~~ aloud. • use expression and intonation to convey meaning when reading aloud (prosody). • ~~practice reading in texts on their independent reading level to develop accuracy, fluency, and expression~~ • reread as necessary to confirm and self-correct word recognition and understanding. • practice reading and rereading familiar stories, poems, and passages at their independent reading level to develop fluency, accuracy, and meaningful expression. • ~~create artwork or a written response that shows comprehension of a selection~~ • ~~extend the story orally or with drawings~~

1.9 The student will read and demonstrate comprehension of a variety of fictional texts.

a) Preview the selection.
b) Set a purpose for reading.
c) Relate previous experiences to what is read.
d) Make and confirm predictions.
e) Ask and answer who, what, when, where, why, and how questions about what is read.
f) Identify characters, setting, and important events.
g) Retell stories and events, using beginning, middle, and end.
h) Identify the main idea or theme.
i) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
~~minute in grade-level material~~ • The table below presents the results of research on oral reading fluency rates for students at the 90th, 75th and 50th percentiles throughout the school year. These fluency rates are reported as words correct per minute (WCPM) for first-grade students reading first-grade text: Percentile / Midyear WCPM / Spring WCPM 90 / 81 / 111 75 / 47 / 82 50 / 23 / 53 Hasbrouck, J.E., & Tindal, G.A. (2006) • **Prosody** refers to the rhythmic and intonational aspect of language which should be noticeable during oral reading. Prosody contributes to reading fluency and comprehension.		

1.10 The student will read and demonstrate comprehension of a variety of nonfiction texts.

a) Preview the selection.
b) Use prior and background knowledge as context for new learning.
c) Set a purpose for reading.
d) Identify text features such as pictures, headings, charts, and captions.
e) Make and confirm predictions.
f) Ask and answer who, what, where, when, why, and how questions about what is read.
g) Identify the main idea.
h) Read and reread familiar passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard ~~relative to nonfiction~~ is that students will read and demonstrate comprehension of nonfiction ~~print materials and trade books~~ texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~. • Students will continue to learn to relate their prior knowledge to the topic of the text and use this knowledge and information from the text to make and confirm predictions as well as to ask and answer questions.	**All students should** • understand that they should use a variety of strategies to assist with comprehension of nonfiction texts. • understand that orally read text has a rhythm and expression that helps convey meaning.	**To be successful with this standard, students are expected to** • read with purpose and understanding. • preview reading material by looking at the book's cover and illustrations or other graphics and by reading titles and headings. • ~~choose~~ set a purpose for reading by looking at the illustrations or other graphics, ~~determining~~ activating prior knowledge, and predicting the outcome of the selection. • identify text features (e.g., illustrations, photographs, headings, charts and captions). • use text features to locate facts and information in a text (e.g., headings, tables of contents, glossaries). • distinguish between information provided by pictures or illustrations and information provided by words in the text. • make and confirm predictions before, during, and after reading. • ask and answer simple questions (e.g., who, what, when, where, why, and how) about a selection. • read a wide variety of self-selected and teacher-selected informational texts aloud. • read various nonfiction forms, including letters, lists, recipes, newspapers, and magazines.

1.10 The student will read and demonstrate comprehension of a variety of nonfiction texts.

a) Preview the selection.
b) Use prior and background knowledge as context for new learning.
c) Set a purpose for reading.
d) Identify text features such as pictures, headings, charts, and captions.
e) Make and confirm predictions.
f) Ask and answer who, what, where, when, why, and how questions about what is read.
g) Identify the main idea.
h) Read and reread familiar passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• identify the ~~topic or~~ main idea and key details of a short ~~fiction or~~ nonfiction selection. • practice reading and rereading texts on their independent reading level to develop accuracy, fluency, and meaningful expression.

1.11 The student will use simple reference materials.

a) Use knowledge of alphabetical order by first letter.

b) Use a picture dictionary to find meanings of unfamiliar words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that ~~students will use~~ simple, and accessible reference materials will serve as resources for student learning. • Students will use their knowledge of alphabetical order by first letter to find words in picture dictionaries.	**All students should** • understand that many reference materials are organized in alphabetical order. • understand that reference materials provide information.	**To be successful with this standard, students are expected to** • use simple reference materials. • alphabetize a list of five to eight words according to first letter. • use a picture dictionary to locate unfamiliar words.

At the first-grade level, reading and writing will develop together. Students will be given daily opportunities to write and read their writing. As their knowledge of letter-sound correspondence and their sight-word vocabulary increases, they will be able to use these skills to put their ideas and thoughts on paper. Students need to be encouraged to write for real purposes by writing such things as letters, notes, signs, stories, and labels. At this level, students will concentrate on writing a complete simple sentence, using basic conventions. With teacher guidance and support, ~~T~~they will also begin to revise and edit selected pieces of their writing for a specific audience.

1.12 The student will print legibly.

a) Form letters accurately.
b) Space words within sentences.
c) Use the alphabetic code to write unknown words phonetically.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will learn to produce manuscript writing that can be easily read. • Students need explicit, direct instruction in order to learn to form uppercase and lowercase letters correctly. • Students also need many purposeful opportunities to ~~practice~~ develop ~~and master~~ sound-symbol correspondence while practicing and mastering handwriting skills. • Students need to develop their understanding that each speech sound or phoneme of language has its own distinctive graphic representation. This is referred to as the *alphabetic principle*.	**All students should** • understand that there are correct ways to write the letters of the alphabet and that proper spacing is necessary in order for writing to be legible. • understand sound-symbol correspondence in writing unfamiliar words.	**To be successful with this standard, students are expected to** • use appropriate pencil grip. • use manuscript ~~standard l~~etter formation. • print all upper and lowercase letters. • use manuscript ~~standard~~ number formation. • space words in sentences. • apply the alphabetic principle while writing unfamiliar words. • ~~space sentences in writing.~~

1.13 The student will write to communicate ideas for a variety of purposes.

a) Generate ideas.
b) Focus on one topic.
c) Revise by adding descriptive words when writing about people, places, things, and events.
d) Use complete sentences in final copies.
e) Begin each sentence with a capital letter and use ending punctuation in final copies.
f) Use correct spelling for commonly used sight words and phonetically regular words in final copies.
g) Share writing with others.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will ~~begin to learn the process for communicating their ideas~~ understand that writing is used for a variety of purposes, including sharing events and telling stories (narrative writing), informing others and making reports (informational writing), labeling and making lists (functional writing), and responding to literature. • ~~Students will learn to plan and write their thoughts in complete sentences with appropriate end punctuation.~~ • Students will use their phonetic knowledge and growing knowledge of ~~high-frequency~~ commonly used sight words to spell words correctly when writing. • ~~Students will be given~~ Providing opportunities for students to share their writing with friends, family, and teachers gives student writing a purpose.	**All students should** • understand that writers communicate ideas for a variety of purposes. • understand that writers plan, write, and share their writing with others.	**To be successful with this standard, students are expected to** • use previous experiences to generate ideas. • participate in teacher-directed brainstorming activities to generate ideas. • participate in teacher-directed prewriting strategies, such as webbing, clustering, and semantic mapping, to organize ideas and information. • ~~participate in teacher-directed charting activities to organize information~~ • ~~write a sentence that focuses on one topic~~ • write informative/explanatory pieces that name a topic, some facts, and concluding sentence (e.g., write about Benjamin Franklin). • write narrative pieces that include at least two sequenced events, with some details, and conclusion. • ~~begin to elaborate ideas~~ revise their written pieces by ~~using~~ adding descriptive words (adjectives) when writing about people, places, things, and events; focusing on the topic; and responding to questions and suggestions from peers and teachers. • ~~write~~ in final copies, use ~~simple,~~ complete sentences that begin with a capital letter and use correct ending punctuation. • spell commonly used ~~high-frequency~~ sight words and phonetically regular words correctly in final copies. • ~~sound out~~ apply the alphabetic principle when writing words ~~in order to spell them phonetically~~.

1.13 The student will write to communicate ideas for a variety of purposes.

a) Generate ideas.
b) Focus on one topic.
c) Revise by adding descriptive words when writing about people, places, things, and events.
d) Use complete sentences in final copies.
e) Begin each sentence with a capital letter and use ending punctuation in final copies.
f) Use correct spelling for commonly used sight words and phonetically regular words in final copies.
g) Share writing with others.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use print resources in the classroom in order to spell words. • ~~use correct end punctuation~~ • ~~begin each sentence with a capital letter~~ • use familiar writing forms, including lists, letters, stories, reports, messages, and poems. • distinguish draft writing from final-product writing. • share their writing with others.

1.14 The student will use available technology for reading and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use available technology for reading and writing. • Students also need opportunities to explore and use ~~word processing software~~ available technology to facilitate their writing.	**All students should** • understand that technology is a way to interact with print. • understand that reading and writing skills can be adapted for use with available technology.	**To be successful with this standard, students are expected to** • use ~~a word processor~~ digital tools to produce and publish writing. • use available media for reading and writing. • use electronic templates (e.g., graphic organizers) to organize information. • ask and respond to questions about material presented through media. • share their writing with others.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Two

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the second-grade level, students will engage in a variety of oral activities to develop an understanding of language structure and enhance their ability to communicate effectively. They will listen and speak in discussions and presentations that expand their vocabularies, increase their background knowledge, and enhance both their reading and writing skills.

2.1 The student will demonstrate an understanding of oral language structure.

a) Create oral stories to share with others.
b) Create and participate in oral dramatic activities.
c) Use correct verb tenses in oral communication.
d) Use increasingly complex sentence structures in oral communication.
e) Begin to self-correct errors in language use.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to demonstrate their growth in the use of oral language and vocabulary. • ~~Students will~~ Teachers should provide opportunities for students to use their knowledge of sentence structure, verb tenses, and vocabulary to create oral stories that have a beginning, middle, and end.	**All students should** • participate in group activities by creating oral stories using complex sentences and appropriate verb tenses.	**To be successful with this standard, students are expected to** • use the story structure of beginning, middle, and end to tell a story of an experience. • maintain and manipulate voice, such as pausing, tempo, and pitch, to convey mood. • add appropriate elaboration and detail while recounting or describing an event. • dramatize familiar stories (e.g., plays, skits, reader's theater). • use present, past, and future tenses appropriately. • provide a referent for pronouns (e.g., ***Serena*** *wanted to sing but* ***she*** *was afraid*). • demonstrate subject-verb agreement. • use more complex sentence structure with conjunctions, such as *while, when, if, because, so,* and *but,* when describing events and giving explanations. • speak in complete sentences when appropriate to task and situation to provide details and clarification. • begin to self-correct errors made when communicating orally.

2.2 The student will expand understanding and use of word meanings.

a) Increase listening and speaking vocabularies.
b) Use words that reflect a growing range of interests and knowledge.
c) Clarify and explain words and ideas orally.
d) Identify and use synonyms and antonyms.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will ~~continue to~~ expand ~~listening and speaking vocabularies~~ understanding and use of word meanings ~~in the context of fiction and nonfiction trade books and other print materials~~ through the use of a variety of texts that reflect the Virginia Standards of Learning for English, history and social science, science, and mathematics. • ~~Students will learn~~ Teachers should provide opportunities for students to use antonyms, synonyms, and descriptive language to explain and clarify ideas. • Growth in oral language aids in the development of fluency, vocabulary, and comprehension.	**All students should** • understand that specific vocabulary helps explain and clarify ideas.	**To be successful with this standard, students are expected to** • listen to and discuss ~~fiction and nonfiction trade books and other print materials~~ a variety of texts ~~that reflect the Virginia Standards of Learning for English, history and social science, science, and mathematics~~. • use appropriate descriptive language to express ideas, opinions, and feelings. • use language to categorize objects, people, places, or events. • explain the meanings of words within the context of how they are used. • ask questions to clarify or gain further information. • recognize when two or more different words are being used orally to mean contrasting or opposite things. • recognize when different words are being used orally to mean the same or similar things. • use synonyms and antonyms in oral communication. • use specific content area vocabulary in discussions.

2.3 The student will use oral communication skills.

a) Use oral language for different purposes: to inform, to persuade, to entertain, to clarify, and to respond.
b) Share stories or information orally with an audience.
c) Participate as a contributor and leader in a group.
d) Retell information shared by others.
e) Follow three- and four-step directions.
f) Give three- and four-step directions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use oral language skills to respond appropriately in group situations. • Students learn to use selected vocabulary and information to match their purpose — to inform, to persuade, ~~or~~ to entertain, to clarify, and to respond. • Students will learn to ~~summarize~~ retell information as they continue to share stories. • Teachers should provide opportunities for students ~~will~~ to learn the dynamics and roles of working in small groups. • ~~Students will demonstrate an increase in vocabulary by giving and following three-step or four-step directions.~~	**All students should** • understand that oral communication can be used for a variety of purposes. • participate in group activities by sharing stories or information and by following and giving directions.	**To be successful with this standard, students are expected to** • participate in a range of collaborative discussions building on others' ideas and clearly expressing their own (e.g., one-on-one, small group, teacher led). • participate in collaborative conversations for various purposes (e.g., to inform, to persuade, to entertain, to clarify, and to respond). • ask and respond to questions to check for understanding of information presented (e.g., stay on topic, link remarks to those of others). • follow rules for discussions and assigned group roles. • use proper pitch and volume. • speak clearly and distinctly. • share and retell an experience or story to an audience in a logical order, with appropriate facts, and descriptive details. • select vocabulary and nonverbal expressions appropriate to purpose and audience. • express ideas clearly and in an organized manner. • ~~share with an audience stories or information relevant to a topic~~ • contribute information, ask questions, clarify, ~~summarize~~ gather additional information, retell, respond, or build on another person's idea in a small-group setting. • confer with small-group members about how to present information to the class.

2.3 The student will use oral communication skills.

a) Use oral language for different purposes: to inform, to persuade, to entertain, to clarify, and to respond.
b) Share stories or information orally with an audience.
c) Participate as a contributor and leader in a group.
d) Retell information shared by others.
e) Follow three- and four-step directions.
f) Give three- and four-step directions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		• carry out a specific group role, such as leader, recorder, materials manager, or reporter.
		• engage in taking turns in conversations by:
		  ° making certain all group members have an opportunity to contribute;
		  ° listening attentively by making eye contact while facing the speaker; and
		  ° eliciting information or opinions from others.
		• follow three-step and four-step directions.
		• give three-step and four-step directions.
		• sequence three or four steps chronologically in oral directions.

2.4 The student will orally identify, produce, and manipulate various units of speech sounds within words.

a) Count phonemes (sounds) within one-syllable words.
b) Blend sounds to make one-syllable words.
c) Segment one-syllable words into individual speech sounds (phonemes).
d) Add or delete phonemes (sounds) to make words.
e) Blend and segment multisyllabic words at the syllable level.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will orally identify, produce, and manipulate various units of speech sounds within words. • Explicit, step by step, instruction is engaging and allows students to consciously reflect on and manipulate sounds. • Through songs, poems, stories, and word play, students will count phonemes, create rhyming words, segment, substitute and blend sounds to make words. • **Phonemes** are the smallest units of sound in language (e.g., man has three phonemes /m/-/a/-/n/). • Phonological awareness is the term used to describe a student's understanding that spoken words consist of sounds. Students who are *phonologically aware* demonstrate an ability to hear and manipulate the sound structure of language at each of the word, syllable and phoneme (individual sound) levels. • Phonological awareness typically progresses in a developmental continuum, (i.e., rhyming → sentence segmenting → syllable blending/segmenting → syllable splitting [onset and rime blending/segmenting] → phoneme blending, segmenting, and manipulating).	**All students should** • understand that spoken words are made up of individual phonemes, which can be manipulated to make new words.	**To be successful with this standard, students are expected to** • count phonemes in one-syllable words (e.g., man has three phonemes /m/-/a/-/n/, chop has three phonemes /ch/-/o/-/p/, and drop has four phonemes /d/-/r/-/o/-/p/). • isolate and manipulate phonemes. • blend sounds to make one-syllable words (e.g., /p/-/a/-/n/ → pan , /d/-/r/-/i/-/p/ → drip). • segment words by saying each sound (e.g., pan → /p/-/a/-/n/, drip → /d/-/r/-/i/-/p/). • add a phoneme from an orally presented word or rime to make a new word (e.g., pie/pipe, four/fork, cab/crab, ot/lot, ap/map). • delete a phoneme from an orally presented word to make a new word (e.g., rice/ice, beach/bee, weight/weigh, couch/cow). • blend and segment multisyllabic words at the syllable level. identify syllables in a word (e.g., students tap *snowball* → /*snow*/- /*ball*/, clapout the word *hamburger* → /*ham*/- /*bur*/-/*ger*/). • state the word created by blending given syllables together (e.g., /*fan*/-/*tas*/-/*tic*/ → *fantastic*). • delete a syllable from a word and state what remains (e.g., say *snowman* without *snow*). • manipulate sounds in words to form new or nonsense words (e.g., say *snowball*. Now say *snowball* with /*man*/ instead of /*ball*/. Say *hamburger*. Now say *hamburger* with /*gum*/ instead of /*ger*/).

2.4 The student will orally identify, produce, and manipulate various units of speech sounds within words.

a) Count phonemes (sounds) within one-syllable words.
b) Blend sounds to make one-syllable words.
c) Segment one-syllable words into individual speech sounds (phonemes).
d) Add or delete phonemes (sounds) to make words.
e) Blend and segment multisyllabic words at the syllable level.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students who are *phonemically aware* are able to attend to the individual phonemes of spoken language by demonstrating the higher-order ability to blend, segment, and manipulate them. • Students orally **blend** phonemes (sounds) together to make a word (e.g., /m/-/a/-/n/ → man, /ch/-/o/-/p/ → chop). • Students **segment** spoken words into individual sounds (e.g., man → /m/- /a/- /n/, chop → /ch/- /o/- /p/).		

At the second-grade level, students will continue to be immersed in a print-rich environment. To decipher text, they will use what they have learned about phonemes, decoding, rhyming words, onsets and rimes, contextual clues, and the structure of sentences. Silent and independent reading will increase, with some parts of books read aloud for emphasis, clarification, or pleasure. When they read independently, students will understand and enjoy books that are considerably longer and more complex in plot, syntax, and structure. Students will read and reread to build fluency, which provides the bridge between word recognition and comprehension. Fluent readers are able to make connections among the ideas in the text and between the text and their background knowledge. Students will learn and apply the comprehension strategies of identifying main ideas, making and confirming predictions, and formulating questions about what they are learning across the curricula. Students will also use their knowledge of alphabetical order to locate information.

2.5 The student will use phonetic strategies when reading and spelling.

a) Use knowledge of consonants, consonant blends, and consonant digraphs to decode and spell words.
b) Use knowledge of short, long, and r-controlled vowel patterns to decode and spell words.
c) Decode regular multisyllabic words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to learn and apply their phonetic skills to decode and spell words. • **Consonant blends** are voiced (each letter is heard) combinations of two or three consonants (e.g., *fl-*, *cl-*, *dr-*, *str-).* • **Consonant digraphs** are combinations of two consonants forming a new sound (e.g., *sh-*, *wh-*, *ch-*, *th-*). • **R-controlled vowel patterns** – when a vowel is followed by an *r* it makes a special sound (e.g., /*ar*/- as in *car*, /or/- as in *manor*, /*ir*/-as in *bird*, /*ur*/- as in *turn*, /*er*/- as in *butter*).	**All students should** • understand the need to apply phonetic strategies to decode and spell words.	**To be successful with this standard, students are expected to** • use phonics, meaning clues, and language structure strategies to reread and self-correct. • apply knowledge of consonants and consonant blends to decode and spell words. • apply knowledge of consonant digraphs *(sh, wh, ch, th)* to decode and spell words. • distinguish long and short vowels when reading one-syllable regularly spelled words. • apply knowledge of the consonant-vowel patterns~~, such as~~ CV (e.g., *go*), VC (e.g., *in*) , CVC (e.g., *pin*), CVCE (e.g., *take*), CVVC (e.g., *wait*), and CVCC (e.g., *wind*), to decode and spell words. • apply knowledge of r-controlled vowel patterns to decode and spell words. • read regularly spelled one- and two-syllable words automatically. • decode regular multisyllabic words. • use phonetic strategies and context to self-correct ~~reading when meaning breaks down~~ for comprehension. • decode words with common prefixes and suffixes.

2.6 The student will use semantic clues and syntax to expand vocabulary when reading.

a) Use information in the story to read words.
b) Use knowledge of sentence structure.
c) Use knowledge of story structure and sequence.
d) Reread and self-correct.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use information from the story and their knowledge of ~~language structure~~ semantic clues and syntax to expand vocabulary when reading. • **Semantic clues** are words that provide meaning and help readers decode and comprehend a text (e.g., The *bear* scared me. The test was a *bear*.) • **Syntactic (syntax) knowledge** is based on familiar word order or grammar that helps readers determine meaning (e.g., students familiar with oral language would know which of the following two sentences sounds right and/or makes sense: *The pitcher threw the ball* or *The ball threw the pitcher*).	**All students should** • understand that they will use a variety of strategies to read unfamiliar words.	**To be successful with this standard, students are expected to** • ~~use prior knowledge to interpret pictures and diagrams in order to predict text~~ • use meaning clues to support decoding. • use surrounding words in a sentence to determine the meaning of a word. • ~~use the context of the sentence to distinguish~~ determine which of the multiple meanings of a word in context makes sense by using semantic clues. • use knowledge of word order, including subject, verb, and adjectives, to check for meaning. • use story structure, titles, pictures, and diagrams to check for meaning. • use ~~phonics~~ phonetic strategies, semantic ~~meaning~~ clues, and ~~language structure strategies~~ syntax to reread and self-correct. • reread to clarify meaning.

2.7 The student will expand vocabulary when reading.

a) Use knowledge of homophones.
b) Use knowledge of prefixes and suffixes.
c) Use knowledge of antonyms and synonyms.
d) Discuss meanings of words and develop vocabulary by listening and reading a variety of texts.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~The intent of this standard is that students will use a variety of strategies to increase fluency and get meaning from print.~~ • The intent of this standard is that students will expand their vocabulary through an understanding of homophones, prefixes, suffixes, ~~contractions, singular possessives, abbreviations,~~ synonyms, and antonyms. • Students will also develop vocabulary by discussing meanings of words and by listening and reading a variety of text across the content areas. • **Homonyms** are words that are typically pronounced the same and have different meanings**.** Two common types of homonyms are *homophones and homographs.* • **Homophones** are words that are pronounced the same and have different meanings regardless of their spelling (e.g., principle/ principal, prince/prints). • **Homographs** are words that are pronounced differently and share the same spelling (e.g., *We saw the dove fly*, or *She dove into the swimming pool*). • **Antonyms** are words with opposite meanings	**All students should** • understand that their knowledge of homophones, prefixes, suffixes, ~~contractions, singular possessives, simple abbreviations,~~ synonyms, and antonyms can help them read unfamiliar words.	**To be successful with this standard, students are expected to** • use knowledge of homophones (e.g., such as *pair* and *pear*). • identify and recognize meanings of common prefixes and suffixes (e.g., *un-*, *re-*, *mis-*, *dis-*, *-y*, *-ly*, *-er*, *-ed*, *-ing*, *-est*, *-ful*, *-less*, *-able*). • use a known root word as a clue to the meaning of an unknown word with the same root (e.g., *sign*, *signal*). • use common prefixes and suffixes to decode words. • determine the meaning of words when a known prefix is added to a known word (e.g., tie/untie, fold/unfold, write/rewrite, call/recall). • ~~demonstrate an understanding of common suffixes, such as *-er*, *-y*, *-ful*, *-less*, *-est*, and *-ly*~~ • supply synonyms and antonyms for a given word. • use knowledge of antonyms when reading (e.g., *hot/cold*, *fast/slow*, *first/last*). • use knowledge of synonyms when reading (e.g., *small/little*, *happy/glad*). • demonstrate an understanding of what the apostrophe signifies in singular possessive words (e.g., ~~*Mary's*~~ *Maria's*). • demonstrate an understanding of the meaning of contractions (e.g., *don't-do not*). • discuss meanings of words and develop vocabulary (e.g., closely related adjectives such as slender, thin, scrawny).

2.7 The student will expand vocabulary when reading.

a) Use knowledge of homophones.
b) Use knowledge of prefixes and suffixes.
c) Use knowledge of antonyms and synonyms.
d) Discuss meanings of words and develop vocabulary by listening and reading a variety of texts.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
(e.g., off/on, fast/slow). • **Synonyms** are words with similar meanings (e.g., small, little, tiny). • **Affixes** are word elements that are attached to a stem, base, or root. Common affixes are **prefixes,** which are added to the beginning of words (e.g., *un-*, *re-*, *mis-*, *dis-*, *non-* and *pre-*), and **suffixes**, which are added to the end of words (e.g., *-ly*, *-er*, *-y*, *-ful*, *-less*, *-able*, *-ed*, *-ing*, *-est*).		• use specific vocabulary from content area study to express interests and knowledge (e.g., in discussions, by summarizing, through generating and answering questions).

2.8 The student will read and demonstrate comprehension of fictional texts.

a) Make and confirm predictions.
b) Relate previous experiences to the main idea.
c) Ask and answer questions about what is read.
d) Locate information to answer questions.
e) Describe characters, setting, and important events in fiction and poetry.
f) Identify the problem and solution.
g) Identify the main idea.
h) Summarize stories and events with beginning, middle, and end in the correct sequence.
i) Draw conclusions based on the text.
j) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to develop and demonstrate comprehension skills by reading a variety of fictional texts ~~and nonfiction selections~~. • Students will continue to learn to relate their prior knowledge to the topic of the text and use this knowledge, along with information from the text, to make and confirm predictions. • Strategies to activate prior knowledge include brainstorming, class discussions, pre-questions, visual aids, and graphic organizers. • Strategies to increase prior knowledge include building on what students already know, discussing real-life experiences, and providing vicarious experiences through reading. • Students will demonstrate comprehension of story elements in fiction by identifying the characters, setting, and main idea. • The **main idea** is the most important idea from the paragraph or story.	**All students should** • understand that comprehension requires making, confirming and revising predictions. • understand that they must attend to the details of the text in order to comprehend.	**To be successful with this standard, students are expected to** • set a purpose for reading. • use prior knowledge to predict information, and to interpret pictures and diagrams. • use titles and headings to generate ideas about the text • use information from the text to make predictions before, during and after reading. • use information from a selection to confirm predictions (e.g., recall and/or return to the text to locate information to confirm predictions). • find evidence to support predictions (e.g., return to text to locate information, support predictions, and answer questions). • apply knowledge of story structure to predict what will happen next (e.g., beginning/middle/end, problem/solution). • ask and answer simple who, what, when, where, why, and how questions to demonstrate understanding of main details and events in text. • begin to skim for information to answer questions. • explain how illustrations and images contribute to and clarify text.

2.8 The student will read and demonstrate comprehension of fictional texts.

a) Make and confirm predictions.
b) Relate previous experiences to the main idea.
c) Ask and answer questions about what is read.
d) Locate information to answer questions.
e) Describe characters, setting, and important events in fiction and poetry.
f) Identify the problem and solution.
g) Identify the main idea.
h) Summarize stories and events with beginning, middle, and end in the correct sequence.
i) Draw conclusions based on the text.
j) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Teachers should provide opportunities for students ~~will continue~~ to respond in writing to what is read. • Fluency develops as students have many opportunities to practice reading ~~on~~ at their independent reading level. • ~~Reading levels~~ To determine a student's functional reading level for a specific text consider these word accuracy rates from Virginia's Phonological Awareness Literacy Screening (PALS): ° independent level – ~~95%~~ 98-100% accuracy, or about ~~1~~ two of every ~~20~~ 100 words misread; student reads independently with little or no instructional support, and comprehension is strong. ° instructional level – 90-97% accuracy, or ~~about 1 of every 10~~ three to ten words of every 100 words misread; student reads with modest accuracy and variable fluency and comprehension should be closely monitored. ° frustration level – less than 90% accuracy,		• describe a character's traits, feelings, and actions as presented in a story or poem. • describe how characters in a story or poem respond to key events. • describe the setting and important events of a story. • identify the problems and solutions ~~presented in a story~~ in stories. • use information from illustrations and words to demonstrate comprehension of characters, settings, and plots. • compare and contrast at least two versions of the same story (e.g., Cinderella stories). • identify the main idea in paragraphs or stories (e.g., identify the sentence or idea that best summarizes the paragraph or story). • begin to use knowledge of transition words ~~(signal words), such as~~ (e.g., *first*, *next*, and *soon)*, to understand how information is organized in sequence. • organize information, using graphic organizers (e.g., story map, sequence of events). • use the framework of beginning, middle, and end to summarize and retell story events.

2.8 The student will read and demonstrate comprehension of fictional texts.

a) Make and confirm predictions.
b) Relate previous experiences to the main idea.
c) Ask and answer questions about what is read.
d) Locate information to answer questions.
e) Describe characters, setting, and important events in fiction and poetry.
f) Identify the problem and solution.
g) Identify the main idea.
h) Summarize stories and events with beginning, middle, and end in the correct sequence.
i) Draw conclusions based on the text.
j) Read and reread familiar stories, poems, and passages with fluency, accuracy, and meaningful expression.

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(Teacher Notes)</th><th>ESSENTIAL UNDERSTANDINGS</th><th>ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES</th></tr>
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or more than ~~1 of every 10~~ ten of every 100 words misread; student reads with neither accuracy nor fluency, and therefore his or her comprehension will be affected.

• ~~Students should read about 70 to 110 words per minute in grade-level material by spring.~~

• The table below presents the results of research on oral reading fluency rates for students at the 90th, 75th and 50th percentiles throughout the school year. These rates are reported as words correct per minute (WCPM) for second-grade students reading second-grade text:
<table>
<tr><th>Percentile</th><th>Fall WCPM</th><th>Midyear WCPM</th><th>Spring WCPM</th></tr>
<tr><td>90</td><td>106</td><td>125</td><td>142</td></tr>
<tr><td>75</td><td>79</td><td>100</td><td>117</td></tr>
<tr><td>50</td><td>51</td><td>72</td><td>89</td></tr>
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Hasbrouck, J.E., & Tindal, G.A. (2006)
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• describe the structure of a story (e.g., beginning introduces the story, ending concludes the action).
• write responses to what they read (e.g., response logs, write the story with a new ending).
• practice reading and rereading ~~in~~ text that is on their independent reading level to develop accuracy, fluency, and expression.
• pause at commas and periods during oral reading.
• apply phonics, meaning clues, and language structure to decode words and increase fluency.
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2.9 The student will read and demonstrate comprehension of nonfiction texts.

a) Preview the selection using text features.
b) Make and confirm predictions about the main idea.
c) Use prior and background knowledge as context for new learning.
d) Set purpose for reading.
e) Ask and answer questions about what is read.
f) Locate information to answer questions.
g) Identify the main idea.
h) Read and reread familiar passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard ~~relative to nonfiction~~ is that students will read and demonstrate comprehension of nonfiction ~~print materials and trade books~~ texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~. • ~~The intent of this standard is that students will continue to develop and demonstrate comprehension skills by reading a variety of fiction and nonfiction selections~~ • Students will continue to learn to relate their prior knowledge to the topic of the text and use this knowledge, along with information from the text, to make and confirm predictions. • Students will relate their own experiences to make sense of and talk about a topic by: ° recognizing similarities between personal experiences and the text (text to self); ° recognizing similarities between the current text and other texts read (text to	**All students should** • demonstrate comprehension of nonfiction. • understand that comprehension requires making, confirming and revising predictions. • understand that they must attend to the details of the text in order to comprehend.	**To be successful with this standard, students are expected to** • set a purpose for reading. • use prior knowledge to predict information. • interpret illustrations, such as diagrams, charts, graphs, and maps, to make predictions about the text. • use titles and headings to generate ideas about the text. • skim text for section headings, bold type, and picture captions to help set a purpose for reading. • use print clues, such as bold type, italics, and underlining, to assist in reading. • use information from the text to make and revise predictions. • use text features to make predictions (e.g., illustrations and captions, heading and subheadings, bold and italic print, tables of contents, glossaries, graphs, charts, tables). • use information from a selection to confirm predictions (e.g., return to the text to locate information, support predictions and answer questions). • ~~find evidence to support predictions~~ • use knowledge of sequence to make predictions while reading functional text such as recipes and other sets of directions (e.g., *first*, *second*, *next*).

2.9 The student will read and demonstrate comprehension of nonfiction texts.

a) Preview the selection using text features.
b) Make and confirm predictions about the main idea.
c) Use prior and background knowledge as context for new learning.
d) Set purpose for reading.
e) Ask and answer questions about what is read.
f) Locate information to answer questions.
g) Identify the main idea.
h) Read and reread familiar passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
text); and ◦ recognizing similarities between what is known about the topic and what is discovered in the new text (text to world). • Students will also begin to learn the skills of summarizing and ~~locating~~ skimming to locate specific information in nonfiction text. • Students will continue to respond in writing to what is read. • The **main idea** is the most important idea from the paragraph or story. • Common graphic organizers include: ◦ Venn diagram; ◦ cause and effect; ◦ sequencing; ◦ compare and contrast; and ◦ cycle.		• begin to skim text for information to answer specific questions. • use knowledge from their own experiences to make sense of and talk about a topic, recognizing similarities between: ◦ personal experiences and the text; ◦ the current text and other texts read; and ◦ what is known about the topic and what is discovered in the new text. • use information from the text to locate information and answer questions (e.g., illustrations and captions, heading and subheadings, bold and italic print, tables of contents, glossaries, graphs, charts, tables). • identify the main idea (e.g., identify the most important idea from a paragraph). • identify the sequence of steps in functional text such as recipes or other sets of directions. • follow the steps in a set of written directions (e.g., recipes, crafts, board games, mathematics problems, science experiments). • ask and answer questions about what is read to demonstrate understanding (e.g., who, what, when, where, why, and how). • locate information in ~~textbooks and other trade books~~ texts to answer questions (e.g., use text features to locate and answer questions - headings, subheadings, bold print, charts, tables of contents). • begin to use knowledge of transition words (signal words) ~~such as~~ (e.g., *first*, *next*, and *soon*), to understand how information is organized.

2.9 The student will read and demonstrate comprehension of nonfiction texts.

a) Preview the selection using text features.
b) Make and confirm predictions about the main idea.
c) Use prior and background knowledge as context for new learning.
d) Set purpose for reading.
e) Ask and answer questions about what is read.
f) Locate information to answer questions.
g) Identify the main idea.
h) Read and reread familiar passages with fluency, accuracy, and meaningful expression.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• organize information, using graphic organizers. • write responses to what they read. • reread as necessary to confirm and self-correct for word accuracy and comprehension. • ~~read fiction and nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~

2.10 The student will demonstrate comprehension of information in reference materials.

a) Use table of contents.
b) Use pictures, captions, and charts.
c) Use dictionaries, glossaries, and indices.
d) Use online resources.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use available reference materials to locate information.	**All students should** • understand how to locate information in simple reference materials.	**To be successful with this standard, students are expected to** • locate titles and page numbers, using a table of contents. • use a table of contents to locate information in content-area books. • interpret pictures, captions, diagrams, and tables. • interpret information presented in bar graphs, charts, and pictographs. • use dictionaries, glossaries, and indices to locate key facts or information. • consult reference materials as needed to spell, check spelling, and understand grade-appropriate words. • alphabetize words to the second and third letter. • locate words in reference materials, using first, second, and third letter. • locate guide words, entry words, and definitions in dictionaries and indices. • use online resources to gather information on a given topic (e.g., teacher identified Web sites and online reference materials).

At the second-grade level, students will continue to develop reading and writing together. They will be given daily opportunities to write and will be expected to revise selected pieces and share them with others. Students often pattern their writing after familiar authors. When students write stories and letters, the instructional emphasis will be on having a beginning, middle, and end. At the sentence level, they will be expected to begin to elaborate on their ideas and use basic conventions. They will also begin to apply written communication skills across all content areas.

2.11 The student will maintain legible printing and begin to make the transition to cursive.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will maintain ~~manuscript~~ legible printing ~~through use and at the same time begin to make~~ while making the transition to cursive. • When to make the transition to cursive is a local decision, however, once begun, cursive writing should be taught and practiced in a systematic, direct manner.	**All students should** • understand that legible printing is an important tool of written communication.	**To be successful with this standard, students are expected to** • write ~~neatly~~ legibly. • space words in sentences. • space sentences in writing. • learn basic strokes for cursive.

2.12 The student will write stories, letters, and simple explanations.

a) Generate ideas before writing.
b) Organize writing to include a beginning, middle, and end for narrative and expository writing.
c) Expand writing to include descriptive detail.
d) Revise writing for clarity.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to learn the process for communicating their ideas through writing. • The emphasis will be on generating and organizing ideas before writing and revising for clarity after writing. • At this level, teachers should introduce two important modes for writing: ◦ **Informative/explanatory** – students write informative/explanatory texts to examine a topic and convey ideas and information clearly; and ◦ **Narrative** - students write narratives to develop real or imagined experiences or events using descriptive details, and clear event sequences. • The three domains of writing are: ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers (e.g., staying on topic; providing a beginning, middle, and end); ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers (e.g., specific vocabulary, descriptive words, tone/voice); and ◦ **usage/mechanics** – the features that cause	**All students should** • understand that written communication should be well planned and clear to the reader.	**To be successful with this standard, students are expected to** • generate ideas and organize information before writing by: ◦ participating in brainstorming activities; ◦ making lists of information; ◦ talking to classmates or teacher about what to write; and ◦ use~~e~~ing graphic organizers to plan their writing. • ~~brainstorm for ideas~~ • ~~organize information with graphic organizers, such as story maps, webs, and event frames.~~ • ~~verbalize their writing plan to a partner or teacher~~ • ~~write stories that~~ include a beginning, middle, and end in narrative and expository writing. • write informative/explanatory pieces that introduce the topic, use facts, and provide a concluding statement. • write narratives describing events with details, sequence, and a closure. • stay on topic. • write complete sentences. • begin to ~~group sentences into~~ compose paragraphs. • use adjectives to elaborate and expand simple sentences. • describe events, ideas, and personal stories with descriptive details. • use time-order words, such as *first*, *next*, *then*, and *last*, to sequence and organize their writing.

2.12 The student will write stories, letters, and simple explanations.

a) Generate ideas before writing.
b) Organize writing to include a beginning, middle, and end for narrative and expository writing.
c) Expand writing to include descriptive detail.
d) Revise writing for clarity.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
written language to be acceptable and effective for standard discourse (e.g., spelling, punctuation, capitalization, grammar). (Note: Students are not expected to know these terms.)		• produce, and expand complete simple and compound sentences (e.g., *The girl listened to the music; The little girl listened to the loud music*). • strengthen writing as needed by revising writing for clarity (e.g., sentences begin with capital letters and end with punctuation, writing stays on topic, writing includes details). • consult beginning reference materials, to check and correct spelling (e.g., beginning dictionaries). • delete or add words to clarify meaning during the revising process. • avoid stringing ideas together with *and* or *then*. • begin to learn and use the writing domains of composing, written expression, and usage/mechanics. • ~~use available technology to write.~~

2.13 The student will edit writing for correct grammar, capitalization, punctuation, and spelling.

a) Recognize and use complete sentences.
b) Use and punctuate declarative, interrogative, and exclamatory sentences.
c) Capitalize all proper nouns and the word *I*.
d) Use singular and plural nouns and pronouns.
e) Use apostrophes in contractions and possessives.
f) Use contractions and singular possessives.
g) Use knowledge of simple abbreviations.
h) Use correct spelling for commonly used sight words, including compound words and regular plurals.
i) Use commas in the salutation and closing of a letter.
j) Use verbs and adjectives correctly in sentences.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to learn to edit and self-correct their writing. • Students should apply grammatical rules to their writing. • **Declarative sentences** form a statement (e.g., She is my friend.). • **Interrogative sentences** form a question (e.g., What time is it?). • **Exclamatory sentences** use powerful emotions or feelings (e.g.,We won the game!).	**All students should** • understand that proper grammar, capitalization, punctuation and spelling contribute to the meaning of writing.	**To be successful with this standard, students are expected to** • recognize and use complete sentences. • punctuate declarative, interrogative, and exclamatory sentences (e.g., period, question mark, exclamation point). • capitalize all proper nouns and ~~all~~ words at the beginning of sentences. • capitalize the word *I*. • use singular and plural nouns and pronouns. • ~~use singular and plural pronouns~~ • use frequently occurring irregular plural nouns (e.g., *feet*, *children*, *teeth*, *fish*). • use apostrophes ~~in~~ to form contractions and common singular possessives. • identify simple abbreviations, including those for titles (e.g., *Mr*., *Mrs*., *Ms*., and *Dr*.), calendar words (e.g., *Jan., Feb., Mon., Tue.*), and address words (e.g., *St., Rd.*). • spell ~~high-frequency~~ commonly used sight words, compound words, and regular plurals correctly. • use commas in the salutation (e.g., *Dear Tyrell*,) and closing (e.g.,

2.13 The student will edit writing for correct grammar, capitalization, punctuation, and spelling.

a) Recognize and use complete sentences.
b) Use and punctuate declarative, interrogative, and exclamatory sentences.
c) Capitalize all proper nouns and the word *I*.
d) Use singular and plural nouns and pronouns.
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f) Use contractions and singular possessives.
g) Use knowledge of simple abbreviations.
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i) Use commas in the salutation and closing of a letter.
j) Use verbs and adjectives correctly in sentences.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		(*Sincerely,*) of a letter. • use verbs and adjectives correctly in sentences (e.g., The friendly *girls talk* loudly. The friendly *girl talks* loudly.).

2.14 The student will use available technology for reading and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will make use of available technology for reading and writing. • Provide opportunities for students to explore and use available technology to facilitate their reading and writing.	**All students should** • use available technology for reading and writing.	**To be successful with this standard, students are expected to** • use available technology and media ~~to write~~ for reading and writing. • use available technology to produce writing. • use available media for reading and writing. • ask and respond to questions about material presented through media.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Three

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the third-grade level, students will learn oral communication skills to participate in discussions about learning and take part in collaborative learning projects. In order to be contributing participants in discussions, students must know the skills involved in effectively communicating ideas and opinions, including such skills as actively listening to others and constructively agreeing or disagreeing with them. While using grammatically correct language, students will learn how to present information succinctly and confidently in oral presentations.

3.1 The student will use effective communication skills in group activities.

a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said.
b) Ask and respond to questions from teachers and other group members.
c) Explain what has been learned.
d) Use language appropriate for context.
e) Increase listening and speaking vocabularies.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will communicate effectively during discussions in group settings. • Students will interact with group members by asking and responding to questions and explaining what has been said or learned. • Teacher should provide opportunities for students to develop skills for both speaking (expressive) and listening (receptive) vocabulary (e.g., have one student read a paragraph that is rich in descriptive detail aloud to a partner or group of students. Those students then draw the scene as they listen.)	**All students should** • participate effectively in group activities by using language appropriate for the context and by taking turns in conversations and moving group discussions forward. • increase listening and speaking vocabularies.	**To be successful with this standard, students are expected to** • participate in a range of collaborative discussions building on others' ideas and clearly expressing their own (e.g., one-on-one, small group, teacher led). • engage in taking turns in conversations by: ◦ making certain all group members have an opportunity to contribute; ◦ listening attentively by making eye contact while facing the speaker; ◦ eliciting information or opinions from others; ◦ supporting opinions with appropriate ideas, examples, and details; and ◦ indicating disagreement in a constructive manner. • take initiative in moving a group discussion forward by: ◦ following rules for discussions and assigned group roles; ◦ contributing information that is on topic; ◦ answering questions; ◦ asking clarifying questions of the speaker; ◦ summarizing the conclusions reached in the discussion; and ◦ explaining what has been learned. • ask and respond to questions to check for understanding of information presented (e.g., stay on topic, link remarks to those of others). • use language appropriate for the context of the discussion. • increase their listening and speaking vocabularies through group activities such as: ◦ engaging in activities that require following directions; and ◦ attempting to use new words in meaningful sentences.

3.2 The student will present brief oral reports using visual media.

a) Speak clearly.
b) Use appropriate volume and pitch.
c) Speak at an understandable rate.
d) Organize ideas sequentially or around major points of information.
e) Use contextually appropriate language and specific vocabulary to communicate ideas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will convey information through a formal oral presentation using visual media.
• Students will be expected to organize information logically, ~~and~~ use ~~correct grammar~~ language appropriate for the context, and use specific vocabulary for communicating ideas.
• During the oral report, students will be expected to use a rate, volume, and pitch that keeps the audience engaged.
	All students should
	• ~~cluster or sequence~~ organize information on a topic when presenting an oral report.
	• speak clearly at an understandable rate and volume.
		To be successful with this standard, students are expected to
		• deliver oral presentations in an engaging manner that maintains audience interest by:
		  ◦ reporting on a topic, telling a story, or recounting an experience with appropriate facts and relevant details;
		  ◦ presenting information with expression and confidence;
		  ◦ varying tone, pitch, and volume to convey meaning;
		  ◦ speaking at an understandable rate;
		  ◦ selecting words and phrases for effect;
		  ◦ using visual media (e.g., images, posters, and charts) to emphasize or enhance facts or details;
		  ◦ using specific vocabulary appropriate for the audience and the topic; and
		  ◦ using grammatically correct language.
		• stay on topic during presentations.
		• organize ideas sequentially or around major points of information.
		• answer questions from the audience.
		• evaluate their own presentations, using class-designed criteria.

At the third-grade level, students will make the transition from a focus on learning how to read to an emphasis on reading to learn and reading for enjoyment. An emphasis will be placed on learning about words, reading age-appropriate text with fluency and expression, and learning comprehension strategies. They will build reading comprehension through reading a variety of literature, to include, but not be limited to, narrative fiction, such as folktales, and nonfiction materials, such as biographies and autobiographies. Students will continue to develop strategic reading skills, such as word analysis and construction of meaning from text. Process strategies that they implement before, during, and after reading will assist their comprehension in all subjects (for example, when reading word problems in mathematics, investigating scientific concepts, and comparing important people and events in history). Students will use a variety of print resources to research topics.

3.3 The student will apply word-analysis skills when reading.
a) Use knowledge of regular and irregular vowel patterns.
b) Decode regular multisyllabic words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use word-attack skills to decode words in order to read fluently. • These skills include the use of phonics (~~all~~ regular and irregular vowel patterns and consonant combinations), ~~structural analysis (roots and affixes),~~ and context to read multisyllabic words ~~with multiple pronunciations~~.	**All students should** • understand the need to apply word-analysis skills to decode words.	**To be successful with this standard, students are expected to** • apply knowledge of ~~all~~ regular and irregular vowel patterns to decode words. • apply knowledge of ~~diphthongs, such as, *aw* and *oy*~~ ambiguous vowel patterns (e.g., ou/ow, oi/oy, oo, aw) to decode words. • apply knowledge of the change in tense (-*ed*), number (-*s*), and degree (-*er* and -*est*) signified by inflected endings to decode words. • decode regular multisyllabic words in order to read fluently.

3.4 The student will expand vocabulary when reading.

a) Use knowledge of homophones.
b) Use knowledge of roots, affixes, synonyms, and antonyms.
c) Apply meaning clues, language structure, and phonetic strategies.
d) Use context to clarify meaning of unfamiliar words.
e) Discuss meanings of words and develop vocabulary by listening and reading a variety of texts.
f) Use vocabulary from other content areas.
g) Use word reference resources including the glossary, dictionary, and thesaurus.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will expand their vocabulary when reading.
• Students who are able to apply ~~meaning~~ semantic clues, language structure, and phonetic strategies independently become fluent readers.
• Students will use combined knowledge of phonics and word analysis skills in decoding words (e.g., prefixes, suffixes, multisyllabic words).
• **Homonyms** are words that are typically pronounced the same and have different meanings. Two common types of homonyms are *homophones and homographs.*
• **Homophones** are words that are pronounced the same and have different meanings regardless of their spelling (e.g., principle/ principal, prince/prints).
• **Homographs** are words that are pronounced differently and share the same spelling (e.g., *We saw the dove fly*., or *She dove into the swimming pool*).
• **Affixes** are added to root words and change the word's meaning (e.g., prefix, suffix).
	All students should
	• use meaning clues, language structure, phonetic strategies, text structure, and surface features of text to read.
	• use reference resources to learn word meanings.
		To be successful with this standard, students are expected to
		• use knowledge of ~~homonyms/~~homophones~~, such as~~ (e.g., *be/bee*, *hear/here*, and *sea/see*) to understand unfamiliar words.
		• apply knowledge of roots to decode unknown words with the same root (e.g., *company, companion*).
		• apply knowledge of affixes, (e.g., prefixes such as *ex-*, *dis-*, *un-*, *re-*, *mis-*, *non-*, *pre-*; suffixes such as *-ly*, *-ful*, *-less*, *-able*, *-tion*, *-ness*, *and –ment*) to decode words.
		• determine the meaning of new words formed when a known affix is added to the known word (e.g., *care/careless*, *heat/reheat*).
		• use knowledge of synonyms (e.g., *big/large, mad/angry, ache/pain*).
		• use knowledge of antonyms, (e.g., asleep/awake, smile/frown, start/finish).
		• use context clues to verify meaning of unfamiliar words and determine appropriate homophone usage.
		• using context clues, such as a restatement, a renaming or synonym, an example, or a direct description or definition included in the sentence or paragraph, to clarify the meaning of unfamiliar words.
		• apply understanding of language structure to make meaning from text by
		  ° using ~~signal~~ transition words of time sequence~~, such as~~ (e.g., *first*, *second*, *next*, *later*, *after*, and *finally*);
		  ° using ~~signal~~ transition words of compare-contrast~~, such as~~ (e.g., *like*, *unlike*, *different*, and *same*); and

3.4 The student will expand vocabulary when reading.

a) Use knowledge of homophones.
b) Use knowledge of roots, affixes, synonyms, and antonyms.
c) Apply meaning clues, language structure, and phonetic strategies.
d) Use context to clarify meaning of unfamiliar words.
e) Discuss meanings of words and develop vocabulary by listening and reading a variety of texts.
f) Use vocabulary from other content areas.
g) Use word reference resources including the glossary, dictionary, and thesaurus.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ using ~~signal~~ transition words of cause-effect~~, such as~~ (e.g., *because*, *if…then*, *when…then*). ◦ using vocabulary from history and social science, mathematics, and science; and ◦ using the glossary, dictionary, and thesaurus as reference resources to learn word meanings.

3.5 The student will read and demonstrate comprehension of fictional text and poetry.

a) Set a purpose for reading.
b) Make connections between previous experiences and reading selections.
c) Make, confirm, or revise predictions.
d) Compare and contrast settings, characters, and events.
e) Identify the author's purpose.
f) Ask and answer questions about what is read.
g) Draw conclusions about text.
h) Identify the problem and solution.
i) Identify the main idea.
j) Identify supporting details.
k) Use reading strategies to monitor comprehension throughout the reading process.
l) Differentiate between fiction and nonfiction.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~The intent of this standard is that students will develop a variety of comprehension strategies that they can apply to make meaning from text.~~ • The intent of this standard is that students will apply different strategies to read and comprehend fictional text ~~including fiction, nonfiction, content texts, and other printed materials~~ and poetry. • Students should be able to connect their previous experiences and knowledge to the text in order to make predictions and then use evidence from the text to confirm or revise their predictions. • Students will talk and write about similarities and differences that they see in various books by the same author or in various selections within the same genre. • In classroom discussion, students will	**All students should** • develop a variety of comprehension strategies that can be applied to make meaning from fictional text and poetry ~~selections~~. • develop an increased understanding of the essential elements and characteristics of fictional text and poetry. • develop the ability to use key supporting details to determine the lessons or morals from fictional text and poetry.	**To be successful with this standard, students are expected to** • read for a specific purpose by: ◦ locating specific information in a reading selection; ◦ identifying details that support a stated main idea; and ◦ expressing a stated main idea in their own words. • make a variety of connections with the text, such as: ◦ connections between their own personal experiences and what is happening in the text; ◦ connections between the text they are reading and other texts they have read, such as identifying a similar plot or character; and ◦ connections between what they already know about the topic and what they find in the reading that is new to them. • use specific details to make, justify, and modify predictions by: ◦ identifying details from their own experiences and knowledge that supports their predictions; ◦ identifying information from the text that supports or contradicts a prediction; and ◦ revising predictions based on new understandings.

3.5 The student will read and demonstrate comprehension of fictional text and poetry.

a) Set a purpose for reading.
b) Make connections between previous experiences and reading selections.
c) Make, confirm, or revise predictions.
d) Compare and contrast settings, characters, and events.
e) Identify the author's purpose.
f) Ask and answer questions about what is read.
g) Draw conclusions about text.
h) Identify the problem and solution.
i) Identify the main idea.
j) Identify supporting details.
k) Use reading strategies to monitor comprehension throughout the reading process.
l) Differentiate between fiction and nonfiction.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
contribute their ideas about an author's craft, including such elements as word choice, plot and organization, beginnings and endings of selections, and character development. • Students will ~~learn about specific~~ read various types of ~~folktales~~ fictional texts (e.g., children's adventure stories, folktales, legends, fables, fantasy, realistic fiction, and myth), and poetry. ◦ ~~**tall tale** – exaggerates larger-than-life characters, such as Pecos Bill and John Henry, which may or may not have a historical basis and may create a humorous picture of these characters~~ ◦ ~~**trickster tale** – tells the story of a character (the trickster) who fools others, the good character does not fall for the trick, the bad character does fall for the trick and gets what he/she deserves~~ ◦ ~~**legend** – records the deeds of real or supposedly real individuals who have been~~		• gain meaning before, during, and after reading by: ◦ asking and answering questions about what is read to clarify meaning; ◦ asking and answering questions to predict what will happen next; ◦ understanding that sometimes two or more pieces of information need to be put together to answer a question; ◦ understanding that some questions are answered directly in the text; ◦ understanding that the answers to some questions must be inferred from the reader's background experiences and knowledge; and ◦ understanding the basic ~~plots~~ lessons or morals of fairy tales, myths, folktales, legends, and fables from diverse cultures. • apply knowledge of characterization by ◦ describing ~~identifying~~ a character's attributes (traits, motivations or feelings); ◦ using evidence from the text to support generalizations about the character; ◦ ~~identifying how the attributes of one character are similar to or different from those of another character~~ ◦ compar~~e~~ing and contrasting ~~two~~ characters within a selection or between/among two or more selections; and

3.5 The student will read and demonstrate comprehension of fictional text and poetry.

a) Set a purpose for reading.
b) Make connections between previous experiences and reading selections.
c) Make, confirm, or revise predictions.
d) Compare and contrast settings, characters, and events.
e) Identify the author's purpose.
f) Ask and answer questions about what is read.
g) Draw conclusions about text.
h) Identify the problem and solution.
i) Identify the main idea.
j) Identify supporting details.
k) Use reading strategies to monitor comprehension throughout the reading process.
l) Differentiate between fiction and nonfiction.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
~~elevated to the status of hero because they demonstrated virtues respected by their culture~~ ◦ ~~**fairy tale** – begins with "Once upon a time…" and ends with "…happily ever after," has events usually happening in threes, and usually involves magic~~ ◦ ~~**pourquoi tale** – explains how or why something has come to be~~ ◦ ~~**myth** – a traditional story of a supposedly historical event, presenting part of the world view of a people or explaining a practice, belief, or natural phenomenon~~ • After reading, students should be able to demonstrate new understandings through writing, discussion, and graphic representations. • Fluent readers read with automaticity, and they reread and self-correct as needed.		◦ explaining how the actions of characters contribute to the sequence of events. • make generalizations about a character based on that character's response to a problem, the character's goal, and what the character says ~~to other characters~~ or thinks. • apply knowledge of setting by: ◦ identifying the time and place of a story, using supporting details from the text; and ◦ identifying the details that make two settings similar or different. • ~~write responses that go beyond literal restatements.~~ • ~~support with specific details generalizations about characters from a selection~~ • compare and contrast settings, characters, and events. • identify the author's purpose (e.g., entertain, perform, persuade). • ask and answer questions about the text to demonstrate understanding. • draw conclusions about text to make meaning ~~a character and/or the plot~~

3.5 The student will read and demonstrate comprehension of fictional text and poetry.

a) Set a purpose for reading.
b) Make connections between previous experiences and reading selections.
c) Make, confirm, or revise predictions.
d) Compare and contrast settings, characters, and events.
e) Identify the author's purpose.
f) Ask and answer questions about what is read.
g) Draw conclusions about text.
h) Identify the problem and solution.
i) Identify the main idea.
j) Identify supporting details.
k) Use reading strategies to monitor comprehension throughout the reading process.
l) Differentiate between fiction and nonfiction.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~Reading levels~~ To determine a student's functional reading level for a specific text consider these word accuracy rates from Virginia's Phonological Awareness Literacy Screening (PALS): ◦ independent level – ~~95%~~ 98-100% accuracy, or about ~~1~~ two of every ~~20~~ 100 words misread; student reads independently with little or no instructional support, and comprehension is strong. ◦ instructional level – 90-97% accuracy, or ~~about 1 of every 10~~ three to ten words of every 100 words misread; student reads with modest accuracy and variable fluency and comprehension should be closely monitored. ◦ frustration level – less than 90% accuracy, or more than ~~1 of every 10~~ ten of every 100 words misread; student reads with		~~from a selection~~. • identify the problem (conflict) and solution, main idea, and supporting details. • use reading strategies to monitor comprehension throughout the reading process by: ◦ previewing and making predictions before reading; ◦ asking questions to confirm or refute predictions during reading; ◦ using context to confirm or self-correct word recognition and understanding, rereading as necessary; ◦ becoming aware of when they do not understand (e.g., by reflecting upon and articulating what exactly is causing difficulty); and ◦ discussing the story or poem and/or writing a summary after reading. • learn to differentiate between fiction and nonfiction by distinguishing realism from fantasy, and fact from opinion. • ~~organize information or events~~ • read with sufficient accuracy and fluency to support comprehension. • practice reading and rereading familiar ~~fiction and nonfiction~~ text that is on

3.5 The student will read and demonstrate comprehension of fictional text and poetry.

a) Set a purpose for reading.
b) Make connections between previous experiences and reading selections.
c) Make, confirm, or revise predictions.
d) Compare and contrast settings, characters, and events.
e) Identify the author's purpose.
f) Ask and answer questions about what is read.
g) Draw conclusions about text.
h) Identify the problem and solution.
i) Identify the main idea.
j) Identify supporting details.
k) Use reading strategies to monitor comprehension throughout the reading process.
l) Differentiate between fiction and nonfiction.
m) Read with fluency and accuracy.

<table>
<tr><th>UNDERSTANDING THE STANDARD
(Teacher Notes)</th><th>ESSENTIAL UNDERSTANDINGS</th><th>ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES</th></tr>
<tr><td>neither accuracy nor fluency, and therefore his or her comprehension will be affected.

• The table below presents the results of research on oral reading fluency rates for students at the 90th, 75th and 50th percentiles throughout the school year. These rates are reported as words correct per minute (WCPM) for third-grade students reading third-grade text:

<table>
<tr><th>Percentile</th><th>Fall WCPM</th><th>Midyear WCPM</th><th>Spring WCPM</th></tr>
<tr><td>90</td><td>128</td><td>146</td><td>162</td></tr>
<tr><td>75</td><td>99</td><td>120</td><td>137</td></tr>
<tr><td>50</td><td>71</td><td>92</td><td>107</td></tr>
</table>
Hasbrouck, J.E., & Tindal, G.A., 2006</td><td></td><td>their independent reading level to develop ~~with~~ fluency, ~~and~~ accuracy, and expression.</td></tr>
</table>

3.6 The student will continue to read and demonstrate comprehension of nonfiction texts.

a) Identify the author's purpose.
b) Use prior and background knowledge as context for new learning.
c) Preview and use text features.
d) Ask and answer questions about what is read.
e) Draw conclusions based on text.
f) Summarize major points found in nonfiction texts.
g) Identify the main idea.
h) Identify supporting details.
i) Compare and contrast the characteristics of biographies and autobiographies.
j) Use reading strategies to monitor comprehension throughout the reading process.
k) Identify new information gained from reading.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will read and demonstrate comprehension of nonfiction ~~print materials and trade books~~ texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~.
• ~~Students will demonstrate comprehension of a selection by using before , during , and after reading strategies.~~
• ***Before*** reading, students should preview the text and activate prior knowledge to formulate ideas and make predictions of what the text is about and how it is organized.
• ***During*** reading, students should maintain an active interaction with text while revising and refining their previous ideas and predictions.
	All students should
	• demonstrate comprehension of nonfiction.
	• understand that text formats can be used to set a purpose for reading.
	• demonstrate an understanding of the characteristics of biography and autobiography.
		To be successful with this standard, students are expected to
		• ~~read nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~
		• identify the author's purpose (e.g., entertain, inform, persuade).
		• ~~make a variety of connections with the text~~ use prior and background knowledge as context for new learning by: ~~such as~~
		  ° ~~connections~~ recognizing similarities between their own personal experiences and the text;
		  ° ~~connections~~ recognizing similarities between the text they are reading and other texts they have read; and
		  ° ~~connections~~ recognizing similarities between what they already know about the topic and what they find in the reading that is new to them.
		• use text formats such as the following to preview and set a purpose for reading:
		  ° ~~poetry features, such as lines and stanzas~~
		  ° content text features, such as headings and chapter layout by topic;
		  ° functional formats, such as advertisements, flyers, and directions;

3.6 The student will continue to read and demonstrate comprehension of nonfiction texts.

a) Identify the author's purpose.
b) Use prior and background knowledge as context for new learning.
c) Preview and use text features.
d) Ask and answer questions about what is read.
e) Draw conclusions based on text.
f) Summarize major points found in nonfiction texts.
g) Identify the main idea.
h) Identify supporting details.
i) Compare and contrast the characteristics of biographies and autobiographies.
j) Use reading strategies to monitor comprehension throughout the reading process.
k) Identify new information gained from reading.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
New ideas are linked to prior learning. • ***After*** reading, students should consolidate what they have read in an effort to fully comprehend the text. New ideas are linked to prior learning. • Students will learn the shared characteristic of biography and autobiography: both are based on verifiable facts about real-life people. • Students will learn the distinguishing characteristics of biography and autobiography. ~~autobiography is a type of nonfiction in which a person tells the story of his/her own life, while biography is a type of nonfiction in which a person tells the story of someone else's life~~.		◦ specialized type, such as bold face and italics; and ◦ visually and graphically represented information, such as charts, graphs, graphic organizers, pictures, and photographs. • apply understanding of text structure to guide reading by: ◦ making predictions based on knowledge of text form types, such as narrative, informational, graphic, and functional; ◦ making predictions based on knowledge of literary forms, such as ~~folktale,~~ biography~~,~~ and autobiography; and ◦ identifying sequence and cause-effect relationships of information in functional texts, such as recipes and other sets of directions. • gain meaning before, during, and after reading by: ◦ asking and answering questions to clarify meaning; ◦ understanding that sometimes two or more pieces of information need to be put together to answer a question; and ◦ understanding that some questions are answered directly in the text. • draw conclusions about what they have read. • summarize major points in a selection. • identify details that support the main idea of a nonfiction selection.

3.6 The student will continue to read and demonstrate comprehension of nonfiction texts.

a) Identify the author's purpose.
b) Use prior and background knowledge as context for new learning.
c) Preview and use text features.
d) Ask and answer questions about what is read.
e) Draw conclusions based on text.
f) Summarize major points found in nonfiction texts.
g) Identify the main idea.
h) Identify supporting details.
i) Compare and contrast the characteristics of biographies and autobiographies.
j) Use reading strategies to monitor comprehension throughout the reading process.
k) Identify new information gained from reading.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• state in their own words the main idea of a nonfiction selection. • ~~organize, using graphic organizers such as a Venn diagram or time line, information by chronological sequence, by cause-effect relationship, and through comparing and contrasting~~ • ~~summarize what they have read~~ • ~~know the shared and distinguishing characteristics of autobiography and biography~~ • compare and contrast the ~~lives of two people described in~~ characteristics of biographies and~~/or~~ autobiographies. • monitor their comprehension throughout the reading process by: ° becoming aware of when they do not understand; ° identifying exactly what is causing them difficulty; and ° generating their own questions to help integrate units of meaning. • use ~~surface~~ text features ~~of text~~ to make meaning ~~from text~~ by: ° applying phonetic strategies; ° using punctuation indicators, such as commas, periods, exclamation points, question marks, and apostrophes showing contraction and possession;

3.6 The student will continue to read and demonstrate comprehension of nonfiction texts.

a) Identify the author's purpose.
b) Use prior and background knowledge as context for new learning.
c) Preview and use text features.
d) Ask and answer questions about what is read.
e) Draw conclusions based on text.
f) Summarize major points found in nonfiction texts.
g) Identify the main idea.
h) Identify supporting details.
i) Compare and contrast the characteristics of biographies and autobiographies.
j) Use reading strategies to monitor comprehension throughout the reading process.
k) Identify new information gained from reading.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ applying knowledge of simple and compound sentence structures; ◦ knowing when meaning breaks down and then rereading to self-correct; and ◦ using illustrations to gain information (e.g., maps, photographs). • identify new information gained from reading. • practice reading and rereading ~~read~~ familiar ~~fiction and~~ nonfiction texts with fluency and accuracy.

3.7 The student will demonstrate comprehension of information from a variety of print and electronic resources.
a) Use encyclopedias and other reference books, including online reference materials.
b) Use table of contents, indices, and charts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use a variety of print and electronic resources to gather information on a specific topic. • Students will select which resource is best for locating a specific type of information.	**All students should** • understand ways to select the best resource for gathering information on a given topic.	**To be successful with this standard, students are expected to** • make decisions about which resource is best for locating a given type of information. • locate selected information in ~~glossaries, dictionaries, thesauruses~~, encyclopedias, atlases, and other print and online reference materials. • retrieve information from electronic sources. • use the Internet to find information on a given topic. • ~~use a printer to create hard copies of information retrieved from electronic sources.~~

At the third-grade level, students will continue to develop their writing skills. When they write letters, stories, and simple explanations, the instructional emphasis will be on paragraph development. Their sentences will become more complex, and they will learn to select details to elaborate the ~~central~~ main idea of the paragraph. Students will revise and edit for correct sentence formation, grammar, capitalization, punctuation, and spelling. They will use their written communication skills across the curricula.

3.8 The student will write legibly in cursive.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand that good handwriting is an important tool of written communication. Neat and legible handwriting is well received by the reader, while messy, hard-to-read writing may lead to misunderstanding ~~and annoyance~~. • Although cursive letters are often introduced in second grade, it is at the third-grade level that the transition from manuscript to cursive should be completed. • Toward this long-term goal of developing legible, neat, rapid handwriting, this standard focuses on students' developing and practicing good handwriting habits, such as proper posture, paper position, and pencil grip.	**All students should** • understand that neat, legible cursive handwriting is an important tool of written communication.	**To be successful with this standard, students are expected to** • use correct letter formation. • practice appropriate handwriting habits, including proper posture, position of paper, and pencil grip. • learn to write ~~neatly~~ legibly in cursive.

3.9 The student will write for a variety of purposes.

a) Identify the intended audience.
b) Use a variety of prewriting strategies.
c) Write a clear topic sentence focusing on the main idea.
d) Write a paragraph on the same topic.
e) Use strategies for organization of information and elaboration according to the type of writing.
f) Include details that elaborate the main idea.
g) Revise writing for clarity of content using specific vocabulary and information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will develop ~~strategies for~~ writing strategies to communicate ideas for a variety of purposes. • In order to produce ~~copies~~ written pieces that vary in purpose, form, and audience, students need to be able to draw from a personal bank of strategies appropriate for planning, organizing, and revising their writing. • Two important modes for writing are: ◦ **Informative/explanatory** – students write informative/explanatory texts to examine a topic and convey ideas and information clearly; and ◦ **Narrative** – students write narrative to develop real or imagined experiences or events using descriptive details, and clear event sequences. • Students will continue learning the features of the domains of writing and how to revise their writing for clarity. • The three domains of writing are: ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers; ◦ **written expression** – those features that	**All students should** • understand how to plan and compose a ~~descriptive~~ paragraph on the same topic. • understand how to plan and compose written pieces for a variety of purposes ~~stories, friendly letters, simple explanations, and short reports~~.	**To be successful with this standard, students are expected to** • ~~generate ideas and plan writing~~ use a variety of pre-writing strategies by: ◦ identifying the intended audience; ◦ using ideas from class brainstorming activities; ◦ making lists of information; ◦ talking to classmates about what to write; ◦ reading texts by peer and professional authors; ◦ using ~~a cluster diagram, story map, or other~~ graphic organizers; and ◦ selecting an appropriate writing form for nonfiction writing (~~such as~~ e.g., explanation, directions, simple report), expressive writing (~~such as~~ e.g., narrative, reflection, and letter), and creative writing (~~such as~~ e.g., fiction and poetry). • write a clear topic sentence that focuses on the main idea. • keep their written paragraphs on one topic. • follow the organization of particular forms of writing for: ◦ ~~stories – beginning, middle, and end;~~ ◦ letters – date, greeting, body, and closing; ◦ ~~explanations – opening; information presented in a way to show the relationship of ideas, such as chronological order; and closing~~ ◦ ~~short reports – opening, grouping of like information into clear paragraphs, ordering of paragraphs so that there is a logical flow of information, and closing~~ ◦ informative/explanatory purposes – introduce a topic and group related information in paragraph form – use facts, definitions, quotations, details, or other examples and

3.9 The student will write for a variety of purposes.

a) Identify the intended audience.
b) Use a variety of prewriting strategies.
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d) Write a paragraph on the same topic.
e) Use strategies for organization of information and elaboration according to the type of writing.
f) Include details that elaborate the main idea.
g) Revise writing for clarity of content using specific vocabulary and information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
show the writer purposefully shaping and controlling language to affect readers; and ◦ **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse.		information to develop the topic – use specific vocabulary to inform and explain the topic – provide a concluding statement or section ◦ narratives – sequence events – use transition words and phrases for sentence variety and to manage the sequence of events – use specific vocabulary to convey experiences and events – provide a conclusion • incorporate transitional ~~(signal)~~ words that clarify sequence~~, such as~~ (e.g., *first*, *next*, and *last*). • use linking words (e.g., *also*, *another*, *and*, *more*) and linking phrases (e.g., *in order to*, *because of this*, *for example*) to connect ideas within categories of information. • apply knowledge of the writing domains of composing, written expression, and usage/mechanics. • ~~use available technology to write~~ • read their own writing orally to check for sentence rhythm (sentence variety). • ~~select~~ add specific details ~~of sight, sound, touch, taste, and smell in order to paint a verbal picture of a person, place, thing, or event~~ that further elaborate the main idea. • use examples from their reading as models to imitate in their writing.

3.9 The student will write for a variety of purposes.

a) Identify the intended audience.
b) Use a variety of prewriting strategies.
c) Write a clear topic sentence focusing on the main idea.
d) Write a paragraph on the same topic.
e) Use strategies for organization of information and elaboration according to the type of writing.
f) Include details that elaborate the main idea.
g) Revise writing for clarity of content using specific vocabulary and information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~create verbal pictures,~~ use~~ing~~ precise nouns, verbs, and adjectives. • use strategies for organization of information ~~that~~ and elaborate~~e~~ion ~~ideas within a sentence~~ relevant to the type of writing. • clarify writing when revising by including specific vocabulary and information.

3.10 The student will edit writing for correct grammar, capitalization, punctuation, and spelling.

a) Use complete sentences.
b) Use transition words to vary sentence structure.
c) Use the word *I* in compound subjects.
d) Use past and present verb tense.
e) Use singular possessives.
f) Use commas in a simple series.
g) Use simple abbreviations.
h) Use apostrophes in contractions with pronouns and in possessives.
i) Use the articles *a, an,* and *the* correctly.
j) Use correct spelling for frequently used sight words, including irregular plurals.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand and use the editing process. • Students will demonstrate command of the conventions of standard English capitalization, punctuation, and spelling when writing. • Students will identify the following parts of speech: nouns, verbs, and pronouns. • *Articles* are used to modify nouns. There are two articles in English: *a/an* and *the*. *A/an* is used to modify nouns that are neither specific nor particular while *the* is used to refer to specific or particular nouns. Therefore, *a/an* is referred to as the *indefinite* article and *the* as the *definite* article (e.g., "Let's play *a* game", refers to any game while "Let's play *the* game", refers to a specific game.).	**All students should** • understand that grammatically correct language and mechanics contribute to the meaning of writing.	**To be successful with this standard, students are expected to** • use complete sentences. • use transition words to vary sentence structure. • use the word *I* in compound subjects. • use past and present verb tenses. • use singular possessives. • punctuate correctly: ° commas in a simple series; ° apostrophes in contractions with pronouns, (e.g., *I'd, we've*); ° using conventions of dialogue, ~~such as~~ (e.g., quotation marks to indicate someone is saying something, indentation to show that the speaker has changed, and signal words like *he said* and *she exclaimed*); and ° using knowledge of how ideas are connected between sentences when one word is used in place of another, such as the use of a pronoun for a noun, the use of a general location word (~~such as~~ e.g., *here* or *there*) for a specific location, and the use of a synonym for an earlier word (~~such as~~ e.g., *animal* for *dog*). • use simple abbreviations.

3.10 The student will edit writing for correct grammar, capitalization, punctuation, and spelling.

a) Use complete sentences.
b) Use transition words to vary sentence structure.
c) Use the word *I* in compound subjects.
d) Use past and present verb tense.
e) Use singular possessives.
f) Use commas in a simple series.
g) Use simple abbreviations.
h) Use apostrophes in contractions with pronouns and in possessives.
i) Use the articles *a*, *an*, and *the* correctly.
j) Use correct spelling for frequently used sight words, including irregular plurals.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use articles ***a***, ***an*** and ***the*** correctly. • use correct spelling for frequently used words, including irregular plurals (e.g., *men, children*). • use correct spelling for frequently used sight words, including irregular plurals.

3.11 The student will write a short report.

a) Construct questions about the topic.
b) Identify appropriate resources.
c) Collect and organize information about the topic into a short report.
d) Understand the difference between plagiarism and using own words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will develop the skills necessary to produce a short written report. • **Plagiarism** is using someone else's ideas or words without giving credit.	**All students should** • understand how information should be collected, analyzed and organized as a part of the process of writing a short report. • understand the difference between plagiarism and using their own words in their writing.	**To be successful with this standard, students are expected to** • focus on a central topic. • develop a list of questions pertaining to a specific topic. • identify and use appropriate resources. • follow the organization of particular forms of writing for short reports (e.g., opening, grouping of like information into clear paragraphs, ordering of paragraphs so that there is a logical flow of information, and closing). • review their written drafts so that the language and/or thoughts of another author are given proper credit.

3.12 The student will use available technology for reading and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to use available technology for reading and writing.	**All students should** • understand that reading and writing skills can be adapted for use with available technology.	**To be successful with this standard, students are expected to** • use available technology for reading and writing. • read electronic media to gather specific information, to gain knowledge, and for enjoyment. • use available technology to compose, edit and share writing. • ask and respond to questions about material presented through media.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Four

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the fourth-grade level, students will apply oral communication skills to participate in discussions about learning and take part in collaborative learning projects. In order to be contributing participants in discussions, students must apply the skills involved in effectively communicating ideas and opinions, including skills such as actively listening to others and constructively agreeing or disagreeing with them. While using grammatically correct language and specific vocabulary, students will learn how to present information succinctly and confidently in oral presentations.

4.1 The student will use effective oral communication skills in a variety of settings.

a) Present accurate directions to individuals and small groups.
b) Contribute to group discussions across content areas.
c) Seek ideas and opinions of others.
d) Use evidence to support opinions.
e) Use grammatically correct language and specific vocabulary to communicate ideas.
f) Communicate new ideas to others.
g) Demonstrate the ability to collaborate with diverse teams.
h) Demonstrate the ability to work independently.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to develop the skills needed to communicate in ~~group~~ a variety of settings. • Students will strengthen their communication skills by contributing to individual and small group discussions, seeking the ideas and opinions of others and beginning to use evidence to support their own personal opinions. • Students will also refine the skill of conveying accurate directions to individuals or small groups in such a way that others can follow the directions. Emphasis will be on directions for doing things that have a natural sequence or organization.	**All students should** • participate effectively in discussions by: ◦ asking clarifying questions; ◦ providing explanations; when necessary; ◦ reflecting on the ideas and opinions of others; and ◦ supporting opinions with examples and details. • demonstrate an ability to work independently and in small groups.	**To be successful with this standard, students are expected to** • participate in a range of discussions building on others' ideas and clearly expressing their own (e.g., one-on-one, in groups, teacher-led). • give accurate directions by ◦ identifying the information needed by the listener; ◦ organizing and sequencing the information in a logical way; ◦ explaining or defining any terms that might be unfamiliar to the listener; ◦ articulating the information in a clear, organized manner; and ◦ making connections to previous common knowledge of a group of listeners. • participate in a variety of partner and/or group discussions by ◦ following rules for discussions and assigned partner or group roles; ◦ offering comments that are relevant to the topic of discussion; ◦ asking appropriate questions to solicit knowledge and opinions of others; ◦ supporting opinions with appropriate examples and details; ◦ identifying reasons and evidence a speaker provides to support particular points; ◦ communicating new ideas to others; ◦ responding to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others; ◦ reviewing key ideas expressed in discussions and explaining their own

4.1 The student will use effective oral communication skills in a variety of settings.

a) Present accurate directions to individuals and small groups.
b) Contribute to group discussions across content areas.
c) Seek ideas and opinions of others.
d) Use evidence to support opinions.
e) Use grammatically correct language and specific vocabulary to communicate ideas.
f) Communicate new ideas to others.
g) Demonstrate the ability to collaborate with diverse teams.
h) Demonstrate the ability to work independently.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		ideas and understanding; ◦ distinguishing fact from opinion; ◦ avoiding hindering the progress of the discussion (learning not to interrupt); ◦ taking turns speaking during a discussion; ◦ maintaining appropriate eye contact and attentive body language while listening; and ◦ respecting the comments of others, especially if the comments express opinions that are different from one's own. • use grammatically correct language. • use specific vocabulary to enhance oral communication. • work independently and with diverse teams in a variety of settings.

4.2 The student will make and listen to oral presentations and reports.

a) Use subject-related information and vocabulary.
b) Listen to and record information.
c) Organize information for clarity.
d) Use language and style appropriate to the audience, topic, and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will make formal oral presentations. • Students will organize information to make class presentations and reports. • Students will listen and take notes from other students' presentations.	**All students should** • apply basic patterns of organization when preparing an oral presentation. • develop the skills necessary for active listening.	**To be successful with this standard, students are expected to** • make oral presentations and reports by ◦ reporting on a topic or text, telling a story, or recounting an experience in an organized manner, using specific vocabulary, appropriate facts and descriptive details to support main ideas or themes; ◦ organizing information around a central idea with supporting details and using specific vocabulary; ◦ organizing information for clarity; ◦ ~~creating a simple visual, such as a poster or technology-tool presentation, that helps listeners follow the presentation;~~ ◦ speaking clearly, using appropriate voice level and speaking rate; ◦ differentiating language and style when appropriate to task and situation (e.g., presentations, small-group discussions); ◦ selecting words and phrases to convey precise ideas; ◦ using voice inflection for effect; and ◦ adding visual displays to presentations when appropriate to enhance development of theme and/or main ideas. • use active listening skills by ◦ looking at the speaker; ◦ thinking about the main points the speaker is making; and ◦ taking notes.

4.3 The student will learn how media messages are constructed and for what purposes.
a) Differentiate between auditory, visual, and written media messages.
b) Identify the characteristics of various media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will learn that media messages are constructed for a purpose. Students will examine the following: ◦ **Audience** (Who is the person or persons meant to see the message?) ◦ **Purpose** (Why is the message being sent – is it meant to persuade, inform, entertain, sell, or a combination of these?) • **Auditory media** can be heard (e.g., music, radio, speeches, video, etc.). • **Visual media** can be viewed (e.g., television, video, Web-based materials, etc.). • **Written media** includes text (e.g., newspapers, magazines, books, advertising, etc.).	**All students should** • understand media messages are constructed and students have the ability to deconstruct messages by looking at several attributes: authorship, format, audience, content, and purpose.	**To be successful with this standard, students are expected to** • access media messages and identify what types of media are used. • identify attributes of a constructed message (i.e., audience and purpose).

At the fourth-grade level, students will build on their reading and reading comprehension skills. They will continue to develop fluency as they use strategies such as word analysis, use of context clues, and the making of inferences to gain meaning from text. Students will use reading strategies before, during, and after reading to develop and demonstrate comprehension. The use of graphic organizers will facilitate students' understanding of text organization and will help them summarize and draw conclusions from fiction and nonfiction text. Students will read widely from content-area texts and nonfiction ~~trade books~~ literature. They will also collect information from a variety of resources in order to acquire additional knowledge about a topic. They will construct questions about their topic, gather information, and synthesize the information for use in their oral presentations and writings.

4.4 The student will expand vocabulary when reading.

a) Use context to clarify meanings of unfamiliar words.
b) Use knowledge of roots, affixes, synonyms, antonyms, and homophones.
c) Use word-reference materials, including the glossary, dictionary, and thesaurus.
d) Develop vocabulary by listening to and reading a variety of texts.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to build vocabulary by applying their knowledge of word structure and context clues to determine the meanings of unfamiliar words. • ~~Students should read about 120 words per minute in grade level material.~~ • Students will use combined knowledge of all letter-sound correspondences, syllabication patterns, roots, and affixes to read accurately multisyllabic words. • **Affixes** are added to root words to form new words (e.g., prefixes, suffixes). • **Prefixes** are added to the front of the root (e.g., like→dislike). • **Suffixes** are added to the end of the root (e.g., short→shorten). • **Homonyms** are words that are typically pronounced the same and have different meanings**.** Two common types of homonyms are *homophones and homographs.* • **Homophones** are words that are pronounced the same and have different meanings regardless of their spelling (e.g., principle/ principal, prince/prints).	**All students should** • use the content and structure of a sentence, paragraph, or reading selection to help determine the meaning of an unfamiliar word. • use a variety of strategies and word recognition skills to ~~read fluently~~ support comprehension. • know the type of information found in word reference materials such as a glossary, dictionary, and thesaurus.	**To be successful with this standard, students are expected to** • use context as a clue to clarify the meaning of unfamiliar words or phrases (e.g., definitions, examples, or restatements of text). • use clues in the context of a sentence, paragraph, or reading selection to predict and explain the meanings of words that have more than one ~~meaning (multiple meanings of words)~~ definition. • use their knowledge of affixes (prefixes and suffixes) to read and understand the meanings of words. • use their knowledge of synonyms (words with ~~like~~ similar meanings) and antonyms (words with opposite meanings) to understand the meanings of unfamiliar words. • derive word meaning by using their knowledge of ~~homonyms/~~homophones (words that are pronounced the same but are spelled differently and have different meanings), such as *read/red*, *no/know*, *hear/here.* • use context to select the applicable definition of a ~~multiple-meaning~~ word from a glossary or dictionary. • ~~use knowledge of word origins.~~ • identify and consult the word-reference material(s), including the glossary, dictionary, and thesaurus, most likely to contain needed information to clarify word meaning. • develop vocabulary by listening to and reading a variety of texts. • determine the meaning of general academic and content-specific words or phrases in a text.

4.4 The student will expand vocabulary when reading.

a) Use context to clarify meanings of unfamiliar words.
b) Use knowledge of roots, affixes, synonyms, antonyms, and homophones.
c) Use word-reference materials, including the glossary, dictionary, and thesaurus.
d) Develop vocabulary by listening to and reading a variety of texts.
e) Use vocabulary from other content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Homographs** are words that are pronounced differently and share the same spelling (e.g., *We saw the dove fly*., or *She dove into the swimming pool*). • **Antonyms** are opposites (e.g., off/on, fast/slow). • **Synonyms** are words that have similar meanings (e.g., small, little, tiny). • Students will use word-reference materials to learn new words. • Students will use vocabulary from content areas.		• study word meanings across content areas. • ~~read familiar text with fluency, accuracy, and expression.~~

4.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction texts, and poetry.

a) Explain the author's purpose.
b) Describe how the choice of language, setting, characters, and information contributes to the author's purpose.
c) Identify the main idea.
d) Summarize supporting details.
e) Identify the problem and solution.
f) Describe the relationship between text and previously read materials.
g) Identify sensory words.
h) Draw conclusions/make inferences about text.
i) Make, confirm, or revise predictions.
j) Identify cause and effect relationships.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to read and comprehend fictional texts, narrative nonfiction texts, and poetry. • **Narrative nonfiction** is a retelling in story format about real people, animals, places or events. It contains facts and is usually in chronological order (e.g., autobiographies and biographies). • Students will also learn how authors craft their purpose and message by the choice of language, setting, characters, and specific information. • Students will demonstrate comprehension of a selection by using before-, during-, and after-reading strategies (e.g., using graphic organizers, question generation, and summarization) . • ~~Students will become able to identify and~~	**All students should** • develop a variety of comprehension strategies. • ~~understand that there are different forms of fiction (realistic, historical, and fantasy).~~ • read a variety of fictional texts, narrative nonfiction texts, and poetry. • explain events, procedures, ideas, or concepts in fictional texts, narrative nonfiction texts, and poetry, including what happened and why, based on specific information in the text.	**To be successful with this standard, students are expected to** • explain ~~why~~ the author's ~~wrote the piece (identify~~ purpose~~),~~ (e.g., to entertain, inform, or persuade). • find words or sentences that help identify the author's purpose. • find language, setting, and characters, details, and other information that help identify the author's purpose. • ~~know that fictional stories, such as fantasy, describe imaginary characters and events~~ • describe in depth a character, setting, or event drawing on specific details from the text (e.g., words, actions, or a character's thoughts). • understand that ~~historical fiction~~ narrative nonfiction is a story based on facts. • identify the facts contained in a piece of ~~historical fiction~~ narrative nonfiction. • ~~compare the use of fact and fantasy in historical fiction with the use of fact and fantasy in other forms of literature~~

4.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction texts, and poetry.

a) Explain the author's purpose.
b) Describe how the choice of language, setting, characters, and information contributes to the author's purpose.
c) Identify the main idea.
d) Summarize supporting details.
e) Identify the problem and solution.
f) Describe the relationship between text and previously read materials.
g) Identify sensory words.
h) Draw conclusions/make inferences about text.
i) Make, confirm, or revise predictions.
j) Identify cause and effect relationships.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
~~explain the specific elements of literature for the different forms of narrative text — realistic fiction, historical fiction, and fantasy~~. • Students will learn how to identify major events and supporting details. • Students will identify sensory words and describe the effect those particular words have on the reader. • Students will use reading strategies throughout the reading process to monitor comprehension. Strategies include: ° draw conclusions/make inferences about text; and ° make, confirm, and revise ongoing predictions. • To determine a student's functional reading level for a specific text consider these word accuracy rates from Virginia's Phonological Awareness Literacy Screening (PALS): ° independent level – 98-100% accuracy, or		• identify ~~major events~~ main ideas of a text and summarize using supporting details. • identify the problem (conflict) and solution. • discuss the similarities and differences between text and previously read materials (e.g., similar themes and topics, patterns of events). • identify sensory words that describe sights, sounds, smells, and tastes, and describe how they make the reader feel. • refer to details and examples in a text when explaining what the text says, drawing conclusions/making inferences from text. • identify cause and effect relationships. • make, confirm, or revise predictions. • read familiar text with fluency, accuracy, and expression. • ~~know that narrative poetry tells a story through verse.~~ • read with sufficient accuracy and fluency to support comprehension. • become aware of when they do not understand, (e.g., by reflecting upon and learning to articulate what exactly is causing difficulty).

4.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction texts, and poetry.

a) Explain the author's purpose.
b) Describe how the choice of language, setting, characters, and information contributes to the author's purpose.
c) Identify the main idea.
d) Summarize supporting details.
e) Identify the problem and solution.
f) Describe the relationship between text and previously read materials.
g) Identify sensory words.
h) Draw conclusions/make inferences about text.
i) Make, confirm, or revise predictions.
j) Identify cause and effect relationships.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
about two of every 100 words misread; student reads independently with little or no instructional support, and comprehension is strong. ◦ instructional level – 90-97% accuracy, or three to ten words of every 100 words misread; student reads with modest accuracy and variable fluency and comprehension should be closely monitored. ◦ frustration level – less than 90% accuracy, or more than ten of every 100 words misread; student reads with neither accuracy nor fluency, and therefore his or her comprehension will be affected. • The table below presents the results of research on oral reading fluency rates for students at the 90th, 75th and 50th percentiles throughout the school year. These rates are reported as words correct per minute (WCPM) for fourth-grade students reading fourth-grade text:		

4.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction texts, and poetry.

a) Explain the author's purpose.
b) Describe how the choice of language, setting, characters, and information contributes to the author's purpose.
c) Identify the main idea.
d) Summarize supporting details.
e) Identify the problem and solution.
f) Describe the relationship between text and previously read materials.
g) Identify sensory words.
h) Draw conclusions/make inferences about text.
i) Make, confirm, or revise predictions.
j) Identify cause and effect relationships.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
<table><tr><th>Percentile</th><th>Fall WCPM</th><th>Midyear WCPM</th><th>Spring WCPM</th></tr><tr><td>90</td><td>145</td><td>166</td><td>180</td></tr><tr><td>75</td><td>119</td><td>139</td><td>152</td></tr><tr><td>50</td><td>94</td><td>112</td><td>123</td></tr></table> Hasbrouck, J.E., & Tindal, G.A., 2006		

4.6 The student will read and demonstrate comprehension of nonfiction texts.

a) Use text structures, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
b) Formulate questions that might be answered in the selection.
c) Explain the author's purpose.
d) Identify the main idea.
e) Summarize supporting details.
f) Draw conclusions and make simple inferences using textual information as support.
g) Distinguish between cause and effect.
h) Distinguish between fact and opinion.
i) Use prior knowledge and build additional background knowledge as context for new learning.
j) Identify new information gained from reading.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will read and demonstrate comprehension of nonfiction ~~print materials and trade books~~ texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~. • Students will demonstrate comprehension of a selection by using before-, during-, and after-reading strategies (e.g., using graphic organizers, question generation, and summarization). • ***Before*** reading, students ~~will become able to~~ use text ~~features~~ structures to predict and categorize information. • ***During*** reading, students ~~will~~ formulate	**All students should** • summarize key details of informational texts, connecting new information to prior knowledge. • identify and use text structures ~~features~~, such as headings, paragraphs, and format, to preview a text and make predictions in order to comprehend. • actively ask questions, visualize, make connections, and predict as they read.	**To be successful with this standard, students are expected to** • ~~read nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~ • use text ~~set in~~ structures, such as special type styles (e.g., boldfaced, italics) and color, captions under pictures and graphics, and headings of sections and chapters, to predict and categorize information in both print and digital texts. • understand how written text and accompanying illustrations connect to convey meaning (e.g., charts, graphs, diagrams, timelines, animations). • generate questions to guide reading of text ~~through reading strategies, such as KWL (Ogle) or DRTA (Stauffer)~~. • explain ~~why~~ the ~~author wrote the piece~~ author's purpose (e.g., to entertain, persuade, inform). • identify the ~~important information~~ main idea and ~~provide~~ supporting details ~~for each important idea~~ within a selection ~~to summarize~~ summarizing the

4.6 The student will read and demonstrate comprehension of nonfiction texts.

a) Use text structures, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
b) Formulate questions that might be answered in the selection.
c) Explain the author's purpose.
d) Identify the main idea.
e) Summarize supporting details.
f) Draw conclusions and make simple inferences using textual information as support.
g) Distinguish between cause and effect.
h) Distinguish between fact and opinion.
i) Use prior knowledge and build additional background knowledge as context for new learning.
j) Identify new information gained from reading.
k) Use reading strategies throughout the reading process to monitor comprehension.
l) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
questions and make and revise ongoing predictions and inferences, using given information. • ***After*** reading, students ~~will~~ confirm or dismiss previous predictions and inferences. Students also summarize content by identifying important ideas and providing details. • Teachers should provide opportunities for s~~S~~tudents to ~~will~~ make connections between what they read in the selection and their prior knowledge.		text by using tools such as graphic organizers, outlining, and notes. • combine information from various places in the text to draw a conclusion. • make simple inferences, using information from the text. • identify cause-and-effect relationships. • distinguish between fact and opinion. • apply prior knowledge to make predictions and to describe the relationship between content and previously learned concepts. • ~~write responses that go beyond literal restatements in order to make connections to their own lives and to other selections~~ • ~~understand that nonfiction material, such as biographies and informational text, tells about real people, places, objects, and/or events~~ • identify new information learned from reading. • read familiar text with fluency, accuracy, and expression. • become aware of when they do not understand (e.g., by reflecting upon and articulating what exactly is causing difficulty).

At the fourth-grade level, students will develop and build their writing skills by writing effective narratives, poems, and explanations. They will use the writing skills of selecting and narrowing a topic, developing a plan for writing, and organizing information into several paragraphs with a central idea and supporting details. The instructional focus will include an emphasis on written expression. Revising and editing for correct sentence formation, grammar, capitalization, punctuation, and spelling will continue to be important skills at this grade level. Students will also use available technology to write their narratives and explanations.

4.7 The student will write cohesively for a variety of purposes.

a) Identify intended audience.
b) Focus on one aspect of a topic.
c) Use a variety of pre-writing strategies.
d) Organize writing to convey a central idea.
e) Recognize different modes of writing have different patterns of organization.
f) Write a clear topic sentence focusing on the main idea.
g) Write two or more related paragraphs on the same topic.
h) Use transition words for sentence variety.
i) Utilize elements of style, including word choice and sentence variation.
j) Revise writing for clarity of content using specific vocabulary and information.
k) Include supporting details that elaborate the main idea.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will apply their knowledge of a writing process and the domains of writing to write ~~effective narratives and explanations~~ for a variety of purposes. • Two important modes for writing are: ° **Informative/explanatory** – students write informative/explanatory texts to examine a topic and convey ideas and information clearly. ° **Narrative** – students write narrative to develop real or imagined experiences or events using descriptive details, and clear event sequences. • ~~As students develop their understanding of poetry and its features, they will become more able to create and write rhymed, unrhymed, and patterned poetry~~ • The three domains of writing are ° **composing** – the structuring and elaborating a writer does to construct an effective message	**All students should** • demonstrate the capacity to generate, focus, and organize ideas for writing. • revise the language, organization, and content of a piece of writing for a specific purpose.	**To be successful with this standard, students are expected to** • apply knowledge of the writing domains of composing, written expression, and usage/mechanics. • produce clear and coherent writing in which the development and organization are appropriate to purpose and audience. • recognize different modes of writing have different patterns of organization ° informative/explanatory – clearly introduce a topic and group related information in paragraphs – use facts, definitions, quotations, details, or other examples and information to develop the topic – use specific vocabulary to inform and explain the topic; and – provide a concluding statement or section related to the topic ° narrative – organize an event sequence that unfolds naturally – use transition words and phrases for sentence variety and to manage the sequence of events – use specific vocabulary, words, and phrases to convey experiences and events

4.7 The student will write cohesively for a variety of purposes.

a) Identify intended audience.
b) Focus on one aspect of a topic.
c) Use a variety of pre-writing strategies.
d) Organize writing to convey a central idea.
e) Recognize different modes of writing have different patterns of organization.
f) Write a clear topic sentence focusing on the main idea.
g) Write two or more related paragraphs on the same topic.
h) Use transition words for sentence variety.
i) Utilize elements of style, including word choice and sentence variation.
j) Revise writing for clarity of content using specific vocabulary and information.
k) Include supporting details that elaborate the main idea.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
for readers (e.g., staying on topic; beginning, middle, and end); ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers (e.g., specific vocabulary, descriptive words, tone/voice); and ◦ **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse (e.g., spelling, punctuation, capitalization, grammar). • **Transition words and phrases** provide organization to student writing by improving the connections between thoughts. Categories of transitions include, but are not limited to: ◦ **example** (e.g., *that is*, *for example*, *in fact*) ◦ **sequence** (e.g., *then*, *next*, *finally*) ◦ **time or location** (e.g., *before*, *meanwhile*, *nearby*). • Students should have practice writing on demand,		– provide a conclusion • create a plan and organize thoughts to convey a central idea before writing. • use a variety of prewriting strategies (e.g., brainstorming, listing, free-writing, and using graphic organizers). • focus, organize, and elaborate to construct an effective cohesive message for the reader. • write a clear topic sentence focused on the main idea. • purposefully shape and control language to affect readers. • select specific information to guide readers more purposefully through the piece. • use specific vocabulary and vivid word choice. • write ~~several~~ two or more related paragraphs on a topic. • use precise language and vocabulary to explain a topic. • link ideas within paragraphs using words and phrases (e.g., another, for example, since, also). • include sentences of various lengths and beginnings to create a pleasant, informal rhythm.

4.7 The student will write cohesively for a variety of purposes.

a) Identify intended audience.
b) Focus on one aspect of a topic.
c) Use a variety of pre-writing strategies.
d) Organize writing to convey a central idea.
e) Recognize different modes of writing have different patterns of organization.
f) Write a clear topic sentence focusing on the main idea.
g) Write two or more related paragraphs on the same topic.
h) Use transition words for sentence variety.
i) Utilize elements of style, including word choice and sentence variation.
j) Revise writing for clarity of content using specific vocabulary and information.
k) Include supporting details that elaborate the main idea.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
for shorter time frames, and over extended periods of time.		• use available reference resources (e.g., dictionary and thesaurus) as aids to revising writing for clarity. • use facts and details in sentences to elaborate the main idea. • ~~know that unrhymed poetry has lines ending with words that do not rhyme~~ • ~~write rhymed, unrhymed, and patterned poetry, such as a cinquain, limerick, and haiku~~ • use available technology to gather information and to aid in writing.

4.8 The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.

a) Use subject-verb agreement.
b) Include prepositional phrases.
c) Eliminate double negatives.
d) Use noun-pronoun agreement.
e) Use commas in series, dates, and addresses.
f) Incorporate adjectives and adverbs.
g) Use correct spelling for frequently used words, including common homophones.
h) Use singular possessives.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand and use the editing process. • Students will demonstrate command of the conventions of standard English grammar, capitalization, punctuation, and spelling in writing (e.g., correct capitalization, commas in series, correct spelling of frequently used words). • ~~Students will also identify the following parts of speech:; nouns, pronouns, verbs, adjectives, adverbs, and prepositions.~~ • ~~Students will identify the following parts of a sentence: subject, predicate, and prepositional phrase.~~	**All students should** • understand that grammatically correct language and mechanics contribute to the meaning of writing.	**To be successful with this standard, students are expected to** • apply knowledge of the writing domains of composing, written expression, and usage/mechanics. • use subject-verb agreement (singular nouns with singular verbs; plural nouns with plural verbs). • appropriately identify and use the following parts of a sentence in writing: subject, predicate, and prepositional phrase. • ~~use prepositional phrases~~ • avoid the use of double negatives. • appropriately identify and use the following parts of speech: nouns, pronouns, verbs, adjectives, adverbs, and prepositions in their writing. • use noun/pronoun agreement (pronoun agrees in number and gender with its antecedent). • use commas in series, dates, and addresses. • use adjectives and adverbs (use adverbs instead of adjectives where appropriate, (e.g., "He played *really* well." instead of "He played *real* well."). • ~~use the articles, *a*, *an*, and *the* correctly~~ • use the correct spelling of frequently used words, including common

4.8 The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.

a) Use subject-verb agreement.
b) Include prepositional phrases.
c) Eliminate double negatives.
d) Use noun-pronoun agreement.
e) Use commas in series, dates, and addresses.
f) Incorporate adjectives and adverbs.
g) Use correct spelling for frequently used words, including common homophones.
h) Use singular possessives.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		homonyms/homophones (e.g., *threw/through*). • use singular possessives. • use a rubric to self-assess writing.

At the fourth-grade level, students will conduct short research projects based on focused questions. Students will gather relevant information from sources and integrate the information while avoiding plagiarism.

4.9 The student will demonstrate comprehension of information resources to research a topic.

a) Construct questions about a topic.
b) Collect information from multiple resources including online, print, and media.
c) Use technology as a tool to organize, evaluate, and communicate information.
d) Give credit to sources used in research.
e) Understand the difference between plagiarism and using own words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use information resources to locate information on a topic. • With assistance and support, students will collect information from multiple resources including online, print, and media. • After collecting needed information, students will learn to evaluate and synthesize the information to use in their oral reports or writings. • **Plagiarism** is using someone else's ideas or words without giving credit.	**All students should** • understand how information is to be collected, analyzed, and organized as a part of the process of writing a short report.	**To be successful with this standard, students are expected to** • formulate initial questions about a topic and seek information by identifying, locating, exploring, and effectively using a variety of sources of information. • ~~formulate research questions based on a topic.~~ • recognize, organize, and record information pertinent to the topic and blend ideas accurately. • select and use appropriate references~~, such as dictionaries,~~(e.g., atlases, almanacs, and encyclopedias)~~, and thesauruses~~, including ~~online, print, and media~~ electronic resources. • identify key terms to use in searching for information. • skim to find information related to a topic. • select information that is related to their topic. • evaluate and combine (synthesize) related information from two or more sources. • use technology to organize, evaluate, and communicate information. • give credit to sources used in research.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Five

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the fifth-grade level, students will continue to refine their oral-communication skills. They will further develop their ability as active listeners and as effective participants in large- and small-group activities. They will improve their skills in planning oral presentations and using grammatically correct language and specific vocabulary when delivering oral presentations, as well as including visual aids and appropriate ~~dramatic~~ gestures to enhance their delivery. Students will be~~come~~ able to summarize their presentations before delivery and summarize the presentations of others after listening to them.

5.1 The student will listen, draw conclusions, and share responses in subject-related group learning activities.

a) Participate in and contribute to discussions across content areas.
b) Organize information to present in reports of group activities.
c) Summarize information gathered in group activities.
d) Communicate new ideas to others.
e) Demonstrate the ability to collaborate with diverse teams.
f) Demonstrate the ability to work independently.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to develop the skills necessary to participate in large- and small-group learning activities. • Students will be active participants in discussions across content areas. They will become able to assume the role of the speaker and the role of the listener. • Students will refine their organizational skills in preparing, presenting, and summarizing information gathered in group activities. • Students will also be~~come~~ able to summarize their own material prior to delivering a presentation.	**All students should** • participate effectively in subject-related group learning activities. • use their organizational skills in preparing, presenting, and summarizing information gathered in group activities. • communicate and collaborate with diverse teams while maintaining the ability to work independently as necessary to accomplish assigned tasks.	**To be successful with this standard, students are expected to** • participate in a range of discussions building on others' ideas and clearly expressing their own (e.g., one-on-one, in groups, teacher-led). • follow rules for discussions and assigned group roles. • participate as active listeners in group learning activities by: ◦ listening for main ideas; ◦ listening for sequence of ideas; and ◦ taking notes. • participate as informed contributors in subject-related group learning activities by: ◦ asking and answering questions at appropriate times; ◦ responding to specific questions by making comments that contribute to the discussion and elaborating on the remarks of others; ◦ communicating new ideas to others; ◦ clarifying confusing points; ◦ summarizing main ideas; ◦ organizing information from group discussion for presentation; ◦ preparing ~~an outline~~ a prewriting tool (e.g., outline, web, or graphic organizer) for presentation prior to delivery; and ◦ summarizing a presentation orally prior to delivery. • exhibit the ability to collaborate with diverse teams. • demonstrate that they can work independently on group-related tasks.

5.2 The student will use effective verbal and nonverbal communication skills to deliver planned oral presentations.

a) Maintain eye contact with listeners.
b) Use gestures to support, accentuate, and dramatize verbal message.
c) Use facial expressions to support and dramatize verbal message.
d) Use posture appropriate for communication setting.
e) Determine appropriate content for audience.
f) Organize content sequentially around major ideas.
g) Summarize main points as they relate to main idea or supporting details.
h) Incorporate visual media to support the presentation.
i) Use language and style appropriate to the audience, topic, and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will learn to plan and deliver oral presentations. • ~~The intent of this standard is that students will continue to refine their communication skills.~~ • Students will enhance their oral presentations with appropriate body language, correct posture, and eye contact with listeners. • Students will begin to use dramatic gestures and facial expressions that are suitable to the content and the audience.	**All students should** • understand how gestures, facial expressions, posture, and body language affect delivery of the message. • select and organize information when preparing for an oral presentation. • use visual aids when preparing for an oral presentation.	**To be successful with this standard, students are expected to** • demonstrate appropriate eye contact with listeners. • use ~~dramatic~~ appropriate facial expressions and gestures to support, accentuate, or dramatize the message. • speak clearly at an understandable pace. • use acceptable posture according to the setting and the audience. • ~~use appropriate facial expressions to support, accentuate, or dramatize presentations.~~ • select information that develops the topic and is appropriate for the audience. • report on a topic or text sequencing ideas logically and using relevant facts and descriptive details to support main ideas or themes. • narrow the topic. • organize content sequentially and group together related information. • put information in order, providing an overview of the information at the beginning or a summary of the information at the end. • create and/or use visual aids ~~to illustrate information~~ in presentations when appropriate to enhance development of themes and/or main ideas (e.g., graphics, sound).

5.2 The student will use effective verbal and nonverbal communication skills to deliver planned oral presentations.

a) Maintain eye contact with listeners.
b) Use gestures to support, accentuate, and dramatize verbal message.
c) Use facial expressions to support and dramatize verbal message.
d) Use posture appropriate for communication setting.
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f) Organize content sequentially around major ideas.
g) Summarize main points as they relate to main idea or supporting details.
h) Incorporate visual media to support the presentation.
i) Use language and style appropriate to the audience, topic, and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use grammatically correct language. • expand, combine, and reduce sentences for meaning, interest, and style. • use specific vocabulary and style to enhance oral presentations.

5.3 The student will learn how media messages are constructed and for what purposes.
a) Differentiate between auditory, visual, and written media messages.
b) Identify the characteristics and effectiveness of a variety of media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will learn all media messages are constructed and that to understand the whole meaning of the message they can *deconstruct* it, looking at the following attributes: ◦ **Authorship** (Who constructed the message?); ◦ **Format** (This is not just the medium being used but also how the creators used specific elements for effect, i.e., color, sound, emphasis on certain words, amateur video, children's voices.); ◦ **Audience** (Who is the person or persons meant to receive the message? How will different people *interpret* the message?); ◦ **Content** (This is not just the visible content but the *embedded* content as well which includes underlying assumptions of values or points of view; facts and opinions may be intermixed.); and ◦ **Purpose** (Why is the message being sent—is it meant to persuade, inform, entertain, sell, or a combination of these?). • **Auditory media** can be heard (e.g., music, radio shows, podcasts). • **Visual media** can be viewed (e.g., television, video, Web-based materials, print ads).	**All students should** • understand media messages are constructed and students have the ability to deconstruct messages by looking at several attributes: authorship, format, audience, content, and purpose. • understand how to evaluate the effectiveness of a media message by examining the various attributes of messages.	**To be successful with this standard, students are expected to** • access media messages and identify what types of media are used. • identify the attributes of a constructed message (i.e., authorship, format, audience, content, and purpose). • deconstruct several types of media messages by addressing the main question(s) raised by the media attributes. • create age-appropriate media messages (e.g., videos, podcasts, print advertisements) for evaluation, focusing on effectiveness of the message.

5.3 The student will learn how media messages are constructed and for what purposes.

a) Differentiate between auditory, visual, and written media messages.

b) Identify the characteristics and effectiveness of a variety of media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Written media** includes text (e.g., newspapers, magazines, books, blogs).		

At the fifth-grade level, students will become increasingly independent readers of a variety of literary forms. Strategies such as word analysis and the use of context clues and word references will help students increase fluency as well as comprehension. They will begin to read text critically in order to examine implied relationships and understandings, recognize how character and plot are developed, and formulate and justify opinions about the text. They will organize the information they extract from the text and represent their understandings on charts, maps, and graphs.

5.4 The student will expand vocabulary when reading.

a) Use context to clarify meaning of unfamiliar words and phrases.
b) Use context and sentence structure to determine meanings and differentiate among multiple meanings of words.
c) Use knowledge of roots, affixes, synonyms, antonyms, and homophones.
d) Identify an author's use of figurative language.
e) Use dictionary, glossary, thesaurus, and other word-reference materials.
f) Develop vocabulary by listening to and reading a variety of texts.
g) Study word meanings across content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to build vocabulary by applying their knowledge of word structure and context clues to determine the meanings of unfamiliar words. • ~~Students should read about 120 words per minute in grade level material.~~ • Students will use combined knowledge of all letter-sound correspondences, syllabication patterns, roots, and affixes to read accurately multisyllabic words in context and out. • Students will ~~continue to~~ build their knowledge of word origins by learning about Greek and Latin affixes. • Students will also use word-reference materials to learn new words. • **Homonyms** are words that are typically pronounced the same and have different meanings**.** Two common types of homonyms are *homophones* and *homographs.* • **Homophones** are words that are pronounced the same and have different meanings regardless of their spelling (e.g., principle/ principal, prince/prints).	**All students should** • apply knowledge of word structure and context clues to determine the meanings of unfamiliar words. • ~~read with fluency and accuracy.~~	**To be successful with this standard, students are expected to** • use context as a clue to infer the correct meanings of unfamiliar words and phrases. • use context and sentence structure to determine meanings and differentiate among multiple meanings of words. • apply knowledge of roots ~~words~~, ~~prefixes, and suffixes~~ affixes (prefixes and suffixes), synonyms, antonyms, and homophones. • ~~continue~~ begin to learn about Greek and Latin affixes. • understand that often a word can be divided into root word, prefix, and suffix in order to determine its pronunciation. • understand how a prefix changes the meaning of a root word. • identify when an author uses language figuratively. • use word references and context clues to determine which meaning is appropriate in a given situation. • identify the word-reference materials, such as a dictionary, glossary, or thesaurus, that is most likely to contain the information needed. • develop vocabulary by listening to and reading a variety of texts. • study cross-curricular vocabulary.

5.4 The student will expand vocabulary when reading.

a) Use context to clarify meaning of unfamiliar words and phrases.
b) Use context and sentence structure to determine meanings and differentiate among multiple meanings of words.
c) Use knowledge of roots, affixes, synonyms, antonyms, and homophones.
d) Identify an author's use of figurative language.
e) Use dictionary, glossary, thesaurus, and other word-reference materials.
f) Develop vocabulary by listening to and reading a variety of texts.
g) Study word meanings across content areas.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Homographs** are words that are pronounced differently and share the same spelling (e.g., *We saw the dove fly*., or *She dove into the swimming pool*).		

5.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction, and poetry.

a) Describe the relationship between text and previously read materials.
b) Describe character development.
c) Describe the development of plot and explain the resolution of conflict(s).
d) Describe the characteristics of free verse, rhymed, and patterned poetry.
e) Describe how an author's choice of vocabulary contributes to the author's style.
f) Identify and ask questions that clarify various points of view.
g) Identify main idea.
h) Summarize supporting details from text.
i) Draw conclusions and make inferences from text.
j) Identify cause and effect relationships.
k) Make, confirm, or revise predictions.
l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to demonstrate comprehension of a selection by using before-, during-, and after-reading strategies. • Students will continue to read and comprehend fictional texts, narrative nonfiction texts, and poetry. • **Narrative nonfiction** is a retelling in story format about real people, animals, places or events. It contains facts and is usually in chronological order (e.g., autobiographies and biographies). • Students will become critical readers by analyzing point of view, word choice, plot, beginnings and endings, and character development. • Students will continue to further their knowledge	**All students should** • choose from a variety of comprehension strategies. • read a variety of fictional texts, narrative nonfiction texts, and poetry. • describe character and plot development.	**To be successful with this standard, students are expected to** • discuss the similarities and differences between a text and previously read materials (e.g., compare and contrast characters). • understand that characters are developed by: ° what is directly stated in the text; ° their speech and actions; and ° what other characters in the story say or think about them. • understand that some characters change during the story or poem and some characters stay the same. • understand that the main character has a ~~problem~~ conflict that usually gets resolved. • identify the conflict or problem of the plot. • understand that plot is developed through a series of events. • identify the events in sequence that lead to resolution of the conflict.

5.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction, and poetry.

a) Describe the relationship between text and previously read materials.
b) Describe character development.
c) Describe the development of plot and explain the resolution of conflict(s).
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i) Draw conclusions and make inferences from text.
j) Identify cause and effect relationships.
k) Make, confirm, or revise predictions.
l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
of plot and character and their understanding of how each is developed in a literacy selection. • Students will then locate information in the text to support their predictions and conclusion. • To determine a student's functional reading level for a specific text consider these word accuracy rates from Virginia's Phonological Awareness Literacy Screening (PALS): ° independent level – 98-100% accuracy, or about two of every 100 words misread; student reads independently with little or no instructional support, and comprehension is strong. ° instructional level – 90-97% accuracy, or three to ten words of every 100 words misread; student reads with modest accuracy and variable fluency and comprehension should be closely monitored. ° frustration level – less than 90% accuracy,		• discuss why an author might have used particular words and phrases. • identify the characteristics of free verse (poetry with neither regular meter nor rhyme scheme), rhymed poetry, and patterned poetry. • describe how an author's choice of vocabulary contributes to the author's style. • identify and ask questions that clarify various points of view. • identify main idea. • summarize supporting details from text. • draw conclusions/make inferences from text. • identify cause and effect relationships. • make, confirm, or revise predictions. • become aware of when they do not understand (e.g., by reflecting upon and articulating what exactly is causing difficulty).

5.5 The student will read and demonstrate comprehension of fictional texts, narrative nonfiction, and poetry.

a) Describe the relationship between text and previously read materials.
b) Describe character development.
c) Describe the development of plot and explain the resolution of conflict(s).
d) Describe the characteristics of free verse, rhymed, and patterned poetry.
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h) Summarize supporting details from text.
i) Draw conclusions and make inferences from text.
j) Identify cause and effect relationships.
k) Make, confirm, or revise predictions.
l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

<table>
<tr><th>UNDERSTANDING THE STANDARD
(Teacher Notes)</th><th>ESSENTIAL UNDERSTANDINGS</th><th>ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES</th></tr>
<tr><td>
or more than ten of every 100 words misread; student reads with neither accuracy nor fluency, and therefore his or her comprehension will be affected.
The table below presents the results of research on oral reading fluency rates for students at the 90th, 75th and 50th percentiles throughout the school year. These rates are reported as words correct per minute (WCPM) for fifth-grade students reading fifth-grade text:
<table>
<tr><th>Percentile</th><th>Fall WCPM</th><th>Midyear WCPM</th><th>Spring WCPM</th></tr>
<tr><td>90</td><td>166</td><td>182</td><td>194</td></tr>
<tr><td>75</td><td>139</td><td>156</td><td>168</td></tr>
<tr><td>50</td><td>110</td><td>127</td><td>139</td></tr>
</table>
Hasbrouck, J.E., & Tindal, G.A., 2006
</td><td></td><td>
read familiar text with fluency, accuracy, and expression to support comprehension.
recognize structural elements of poems (e.g., verse, rhythm) and drama (e.g., casts, dialogue).
</td></tr>
</table>

5.6 The student will read and demonstrate comprehension of nonfiction texts.

a) Use text organizers, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
b) Use prior knowledge and build additional background knowledge as context for new learning.
c) Skim materials to develop a general overview of content and to locate specific information.
d) Identify the main idea of nonfiction texts.
e) Summarize supporting details in nonfiction texts.
f) Identify structural patterns found in nonfiction.
g) Locate information to support opinions, predictions, and conclusions.
h) Identify cause and effect relationships following transition words signaling the pattern.
i) Differentiate between fact and opinion.
j) Identify, compare, and contrast relationships.
k) Identify new information gained from reading.
l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will read and demonstrate comprehension of nonfiction ~~print materials and trade books~~ texts across the curriculum, including age-appropriate materials that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics~~, in order to build vocabulary and content knowledge~~. • Students will demonstrate comprehension of a selection by using before-, during-, and after-reading strategies (e.g., using graphic organizers, question generation, and summarization). • ***Before*** reading, students will ~~become able to~~ use text organizers to predict and categorize information. • ***During*** reading, students will formulate	**All students should** • preview, pose questions, and make predictions before reading. • understand how the organizational patterns make the information easier to comprehend. • make connections between what they read in the selection and their prior knowledge.	**To be successful with this standard, students are expected to** • ~~read nonfiction print materials and trade books that reflect the Virginia Standards of Learning in English, history and social science, science, and mathematics.~~ • use text ~~set in special~~ features, such as type styles (e.g., boldfaced, italics) and color, captions under pictures and graphics, and headings of sections and chapters, to predict and categorize information in both print and digital texts. • apply prior knowledge to make predictions and build additional background knowledge as context for learning. • skim material from print and digital texts to develop a general overview or to locate specific information. • determine the main idea of a text and summarize supporting key details. • identify structural and organizational patterns such as cause and effect, comparison/contrast, problem/solution, and chronological order.

5.6 The student will read and demonstrate comprehension of nonfiction texts.

a) Use text organizers, such as type, headings, and graphics, to predict and categorize information in both print and digital texts.
b) Use prior knowledge and build additional background knowledge as context for new learning.
c) Skim materials to develop a general overview of content and to locate specific information.
d) Identify the main idea of nonfiction texts.
e) Summarize supporting details in nonfiction texts.
f) Identify structural patterns found in nonfiction.
g) Locate information to support opinions, predictions, and conclusions.
h) Identify cause and effect relationships following transition words signaling the pattern.
i) Differentiate between fact and opinion.
j) Identify, compare, and contrast relationships.
k) Identify new information gained from reading.
l) Use reading strategies throughout the reading process to monitor comprehension.
m) Read with fluency and accuracy.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
questions and make and revise ongoing predictions and inferences, using given information. • ***After*** reading, students will confirm or dismiss previous predictions and inferences. Students will also summarize content, identify important ideas, provide details, ~~make inferences,~~ formulate opinions, and use writing to clarify their thinking (e.g., graphic organizers, responsive journaling). • Interactions between reader and text will become more sophisticated and deliberate as students make inferences, formulate opinions, and write ~~use writing~~ to clarify their thinking.		• identify specific information in text that supports predictions. • form opinions and draw conclusions from the selection. • locate details to support opinions, predictions, and conclusions. • identify cause and effect relationships following transition words signaling the pattern. • distinguish between fact and opinion. • identify, compare, and contrast relationships between characters, events, and facts. • identify new information learned from reading. • become aware of when they do not understand (e.g., by reflecting upon and articulating what exactly is causing difficulty). • read familiar text with fluency, accuracy, and expression.

At the fifth-grade level, students will continue to grow as writers, experimenting with new modes and purposes. They will spend more time on revising and editing their work as they gain greater understanding of written expression. Precise and descriptive vocabulary and varied sentence structure will become important tools for creating tone and voice within a text. Students will be expected to have greater control over the conventions of writing, including sentence formation, grammar, capitalization, spelling, and punctuation.

5.7 The student will write for a variety of purposes: to describe, to inform, to entertain, to explain, and to persuade.

a) Identify intended audience.
b) Use a variety of prewriting strategies.
c) Organize information to convey a central idea.
d) Write a clear topic sentence focusing on the main idea.
e) Write multiparagraph compositions.
f) Use precise and descriptive vocabulary to create tone and voice.
g) Vary sentence structure by using transition words.
h) Revise for clarity of content using specific vocabulary and information.
i) Include supporting details that elaborate the main idea.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will continue to write as a method of communication and as a means of expressing themselves.
• Students will organize their thoughts and choose appropriate vocabulary to convey their message effectively.
• There will be a continued emphasis on the students' ability to shape and control language purposefully and to master the features of the composing and written expression domains.
• **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing.
• The three domains of writing are
  ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers (e.g., staying on topic; beginning, middle, and end)
  ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers (e.g., specific vocabulary, descriptive words, tone/voice)
	All students should
	• plan and organize information as they write for a variety of purposes: to describe, to inform, to entertain, to explain, and to persuade.
	• use precise, descriptive vocabulary and vary sentence structure as they revise for clarity.
		To be successful with this standard, students are expected to
		• apply knowledge of the writing domains of composing, written expression, and usage/mechanics.
		• produce a clear and coherent written piece in which the development and organization are appropriate to purpose and audience.
		• create a plan, and organize thoughts before writing.
		• use a variety of prewriting strategies (e.g., brainstorming, listing, free-writing, and using graphic organizers.
		• focus, organize, and elaborate to construct an effective message for the reader.
		• write a clear topic sentence focusing on the main idea.
		• purposefully shape and control language to demonstrate an awareness of the intended audience.
		• select specific information to guide readers more purposefully through the piece.
		• write multiparagraph compositions focused on a topic, grouping related information in paragraphs and sections.
		• choose precise descriptive vocabulary and information to create tone

5.7 The student will write for a variety of purposes: to describe, to inform, to entertain, to explain, and to persuade.

a) Identify intended audience.
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c) Organize information to convey a central idea.
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g) Vary sentence structure by using transition words.
h) Revise for clarity of content using specific vocabulary and information.
i) Include supporting details that elaborate the main idea.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
° **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse (e.g., spelling, punctuation, capitalization, grammar). • **Transition words and phrases** provide organization to student writing by improving the connections between thoughts. Categories of transitions include, but are not limited to: ° **example** (e.g., *that is, for example, in fact)* ° **sequence** (e.g., *then, next, finally*) ° **time or location** (e.g., *before, meanwhile, nearby)*		and voice • use narrative techniques, such as dialogue, description, and pacing, to develop experiences or characters. • use precise language and content-specific vocabulary to inform about or explain a topic, to persuade, describe or entertain. • include sentences of various lengths and beginnings to create a pleasant, informal rhythm. • vary sentence structure by using transition words and phrases. • use precise language and phrases to develop writing (e.g., consequently, specifically, especially). • clarify writing when revising. • include supporting details that elaborate the main idea. • use available technology to gather information and to aid in writing.

5.8 The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.

a) Use plural possessives.
b) Use adjective and adverb comparisons.
c) Identify and use interjections.
d) Use apostrophes in contractions and possessives.
e) Use quotation marks with dialogue.
f) Use commas to indicate interrupters.
g) Use a hyphen to divide words at the end of a line.
h) Edit for fragments and run-on sentences.
i) Eliminate double negatives.
j) Use correct spelling of commonly used words.
k) Identify and use conjunctions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand and use the editing process. • Students will work to gain more control over the conventions of writing, including composing effective sentences with subject verb agreement, spelling, capitalization, and punctuation. • Students will ~~also identify~~ effectively use the following parts of speech: nouns, pronouns, verbs, adjectives, adverbs, prepositions, and interjections. • Teachers should begin to encourage students to incorporate variety into sentences, by appropriate use of subordinate (dependent) clauses. • Students should have practice writing on demand, for shorter time frames, and over extended periods of time.	**All students should** • understand that editing for correct sentence formation, grammar, capitalization, spelling, and punctuation makes the meaning of the writing clearer to the reader.	**To be successful with this standard, students are expected to** • punctuate correctly ◦ apostrophes in contractions ~~such as~~ (e.g., *isn't*), and possessives ~~such as~~ (e.g., *Jan's*); ◦ commas (e.g., items in a series, to set off the words *yes* and *no*); ◦ quotation marks with dialogue; and ◦ ~~commas in the salutation and closing of a letter~~ ◦ hyphens to divide words at the end of a line. • use adverb comparisons~~, such as~~ (e.g., *fast, faster, fastest*). • use adjective comparisons~~, such as~~ (e.g., *big, bigger, biggest*). • use adverbs instead of adjectives where appropriate~~,~~ (e.g., "He played *really* well." instead of "He played *real* well."). • use plural possessives, (e.g.~~,~~ "The *books'* covers are torn."). • identify and use interjections~~, such as~~ (e.g., "*Yikes, look at the size of that bug*!"). • avoid fragments ~~(Use of clausal fragments, such as *"Although he was not supposed to go out of the house."*, is not penalized in direct writing at this level.)~~ • avoid run-ons~~,~~ (e.g., *"I opened the door, the dog went out."*).

5.8 The student will edit writing for correct grammar, capitalization, spelling, punctuation, sentence structure, and paragraphing.

a) Use plural possessives.
b) Use adjective and adverb comparisons.
c) Identify and use interjections.
d) Use apostrophes in contractions and possessives.
e) Use quotation marks with dialogue.
f) Use commas to indicate interrupters.
g) Use a hyphen to divide words at the end of a line.
h) Edit for fragments and run-on sentences.
i) Eliminate double negatives.
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k) Identify and use conjunctions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~avoid excessive coordination, e.g., *"I opened the door and the dog went out and he chased the cat and then he came back inside."*~~ • eliminate double negatives. • use correct spelling of commonly used words. • identify and use conjunctions.

At the fifth-grade level, students will conduct short research projects based on focused questions. Students will gather relevant information from sources and integrate the information while avoiding plagiarism.

5.9 The student will find, evaluate, and select appropriate resources for a research product.

a) Construct questions about a topic.
b) Collect information from multiple resources including online, print, and media.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Organize information presented on charts, maps, and graphs.
e) Develop notes that include important concepts, summaries, and identification of information sources.
f) Give credit to sources used in research.
g) Define the meaning and consequences of plagiarism.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use information resources to locate information on a topic. • Students will collect information from multiple resources including online, print, and media. • After collecting needed information, students will learn to evaluate and synthesize the information to use in their oral reports or writings. • Students will need to give credit to the author, title, and date of a resource used in research. • **Plagiarism** is using someone else's ideas or words without giving credit.	**All students should** • formulate initial questions about a topic and seek information by identifying, locating, exploring, and effectively using a variety of sources of information. • recognize, organize, and record information pertinent to the topic and blend ideas accurately. • give credit to sources used in research.	**To be successful with this standard, students are expected to** • use available technology to gather information and to aid in writing. • conduct short research projects that use sources to build knowledge on a topic. • formulate research questions based on a topic. • select and use appropriate references (e.g., atlases, almanacs, and encyclopedias) including online, print, and media resources. • use available technology and media to organize, evaluate, and communicate information (e.g., presentation software, digital media). • identify key terms to use in searching for information. • organize information presented on charts, maps, and graphs. • skim to find information related to a topic. • select information that is related to the topic at hand. • evaluate and combine (synthesize) related information from two or more sources. • develop notes that include important concepts, summaries, and identification of information sources. • summarize or paraphrase information in notes and finished work. • prevent plagiarism and its consequences by giving credit to authors when

5.9 The student will find, evaluate, and select appropriate resources for a research product.

a) Construct questions about a topic.
b) Collect information from multiple resources including online, print, and media.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Organize information presented on charts, maps, and graphs.
e) Develop notes that include important concepts, summaries, and identification of information sources.
f) Give credit to sources used in research.
g) Define the meaning and consequences of plagiarism.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		ideas and/or words are used in research. • provide a list of sources including author, title, and date.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Six

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the sixth-grade level, students will participate in small group and classroom discussions. They will express personal opinions and come to understand not only differing points of view but also the differences between facts and opinions. Small-group analysis and self-analysis of the effectiveness of communication will be introduced. When students speak formally and informally in small groups or individual presentations, ~~grammatically correct English will be the expectation~~ they will be expected to use grammatically correct English. In addition, students will understand the basic elements of media literacy.

6.1 The student will participate in and contribute to small-group activities.

a) Communicate as leader and contributor.
b) Evaluate own contributions to discussions.
c) Summarize and evaluate group activities.
d) Analyze the effectiveness of participant interactions.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use oral language effectively. • Students will evaluate the effectiveness of the contributions of participants in a variety of roles in a discussion group.	**All students should** • interact as both group leader and member. • use verbal and nonverbal feedback from the audience to evaluate their own contributions. • process and verbalize the content and impact of each participant's contribution to a discussion.	**To be successful with this standard, students are expected to** • ensure that all group members participate in the exchange of information. • use strategies that contribute to the discussion. • receive and understand feedback from the others. • pose and respond to questions. • relate and retell information. • restate briefly and critically the main idea(s) or theme(s) discussed within a group. • use active listening to focus on what is said and what is implied. • summarize what is heard. • retain and rethink ideas based on what is heard. • infer and assimilate new ideas. • use a checklist and/or rubric to evaluate the participation of self and others.

6.2 The student will present, listen critically, and express opinions in oral presentations.

a) Distinguish between fact and opinion.
b) Compare and contrast viewpoints.
c) Present a convincing argument.
d) Paraphrase and summarize what is heard.
e) Use language and vocabulary appropriate to audience, topic, and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will refine and apply critical listening skills while participating in oral presentations as both the speaker and members of the audience. • Students will ~~put forth~~ present convincing arguments and compare and contrast viewpoints. • Students will paraphrase and summarize what they have heard, using grammatically correct language and appropriate vocabulary.	**All students should** • recognize that facts can be verified and that opinions cannot. • recognize that each member brings to the group a unique viewpoint reflective of his or her background. • paraphrase by putting into their own words what has been said by others. • paraphrase and summarize by restating the main points more succinctly than the original presentation. • organize a presentation.	**To be successful with this standard, students are expected to** • take ~~two-column~~ notes ~~when listening~~ to record facts/opinions or ~~two~~ differing viewpoints. • organize convincing arguments to include: ◦ facts; ◦ statistics; ◦ examples; and ◦ ~~expert authority~~ ◦ logical reasoning. • ~~restate~~ paraphrase or summarize what others have said. • plan and deliver an oral presentation, using the following steps: ◦ determine topic and purpose; ◦ identify the intended audience; ◦ gather information; ◦ organize the information; ~~with outlines, file cards, or graphic organizers~~ ◦ ~~create visual aids~~ use multimedia to clarify presentation information; ◦ choose vocabulary appropriate to topic, purpose, and audience; ◦ phrase with grammatically correct language; and ◦ practice delivery. • use ~~rules and~~ strategies for summarizing, such as the following: ◦ delete trivia and redundancy; ◦ substitute a general term for a list; and ◦ find or create a main idea statement.

6.3 The student will understand the elements of media literacy.

a) Compare and contrast auditory, visual, and written media messages.
b) Identify the characteristics and effectiveness of a variety of media messages.
c) Craft and publish audience-specific media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will be able to identify elements of media literacy recognizing that elements of media literacy are based on audience and purpose. They will also learn all media messages are constructed and that to understand the whole meaning of the message they can *deconstruct* it, looking at the following attributes: ◦ **Authorship** (Who constructed the message?) ◦ **Format** (This is not just the medium being used but also how the creators used specific elements for effect, i.e., color, sound, emphasis on certain words, amateur video, kids' voices.) ◦ **Audience** (Who is the person or persons meant to see the message? How will different people *see* the message?) ◦ **Content** (This is not just the visible content but the *embedded* content as well which includes underlying assumptions of values or points of view; facts and opinions may be intermixed.) ◦ **Purpose** (Why is the message being sent—is it meant to persuade, inform, entertain, sell, or a combination of these?) • **Auditory media** can be heard (e.g., music, radio shows, podcasts).	**All students should** • recognize that a public service announcement (PSA) is an advertisement for the benefit of the public. The purpose of a public service announcement can be to raise awareness. (e.g., advertisements targeting tobacco cessation). • compare and contrast reading to, listening, or viewing an audio, video, or live version of the same text. • understand the effectiveness of any media message is determined by the results on the intended audience. For example, the *Don't Drink and Drive* campaign has been an effective campaign because the number of traffic accidents due to drunk driving has been reduced.	**To be successful with this standard, students are expected to** • deconstruct and compare/contrast several types of media messages by addressing questions raised by media attributes. • recognize production elements in media are composed based on audience and purpose. • create media messages, such as public service announcements aimed at a variety of audiences with different purposes. • identify the elements of a variety of media including layout, pictures, and text features in print media; camera shots, angles, lighting, editing, and sound in TV, radio, and film. • access media message to compare and contrast information presented in different media and/or formats. • understand that three most common camera angles or shots are the close-up, long shot, and medium shot.

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• **Visual media** can be viewed (e.g., television, video, Web-based materials, print ads). • **Written media** includes text (e.g., newspapers, magazines, books, blogs). • There are a variety of camera angles, which can add perspective or point of view to what is being pictured. Sometimes the camera angle can greatly influence the audience. A close-up only shows part of a subject usually in great detail; a long shot often establishes the scene (car driving up to a hotel or an overview of a city); a medium shot shows the whole subject (a person, car etc.).		

At the sixth-grade level, students will expand the study of roots and affixes as well as the use of context to develop independence in vocabulary acquisition. ~~Analogies and f~~-Figurative language will be introduced. Students will read independently and in groups for appreciation and comprehension of a variety of fiction, narrative nonfiction, nonfiction, and poetry. Both classic and recent works will be included. Students will apply critical reading and reasoning skills across the content areas, including history and social science, science, and mathematics.
When selecting text, teachers will consider appropriateness of subject and theme, as well as text complexity.

6.4 The student will read and learn the meanings of unfamiliar words and phrases within authentic texts.

a) Identify word origins and derivations.
b) Use roots, cognates, affixes, synonyms, and antonyms to expand vocabulary.
c) Use context and sentence structure to determine meanings and differentiate among multiple meanings of words.
d) Identify and analyze figurative language.
e) Use word-reference materials.
f) Extend general and specialized vocabulary through speaking, listening, reading, and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will become independent learners of vocabulary. Teachers should choose vocabulary from context. • Students will be exposed to prefixes, suffixes, roots, derivations, and inflections of polysyllabic words and understand that words with similar parts may be related to each other in meaning and origin. • Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction Cognates can occur within the same language or across languages— *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Figurative language ~~and analogies~~ will be introduced and, students will continue the use of context to help determine the meaning of unfamiliar words ~~will be continued~~. • Students will be introduced to word relationships and nuances in word meanings. • Determine the meaning of words and phrases	**All students should** • use word structure to analyze and show relationships among words. • use common, grade-appropriate Greek or Latin affixes and roots as clues to determine meanings of common English words. • identify internal and external inflections which may alter meaning and pronunciation. • recognize the relationships commonly used to create analogies. • recognize that many words have multiple meanings and that context and dictionaries are both supportive in determining which meaning is most appropriate. • recognize that figurative language enriches text.	**To be successful with this standard, students are expected to** • use common Greek or Latin affixes and roots as clues to the meaning of a word (e.g., aud – hearing, listening, or sound *audience, auditory, audible.* • identify Latin and Greek roots of common English words as clues to the meaning. • separate and recombine known word parts to predict the meaning of unfamiliar words, such as separating *poly* from *polygon* and *phone* from *telephone* to predict the meaning of *polyphony.* • recognize common antonyms and synonyms. • notice relationships among inflected words, such as *proceed* and *procession* or *internal* and *internalization.* • use context (e.g., the overall meaning of a sentence or paragraph; a word's function in a sentence) as a clue to the meaning. • recognize relationships common to analogy construction, such as: ◦ synonyms – small: little; ◦ antonyms – up: down; ◦ object/action – ear: hear; ◦ source/product – tree: lumber; ◦ part/whole – paw: dog; and ◦ animal/habitat – bee: hive. • use context clues to determine meanings of unfamiliar words in text, such as:

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
as they are used as figurative language. • Students will develop independence with reference books to determine meaning, pronunciation, and origin of words.		◦ examples; ◦ restatements; and ◦ contrast. • identify figurative language in text, including: ◦ **simile** – figures of speech that use the words *like* or *as* to make ◦ comparisons; ◦ **hyperbole** – intentionally exaggerated figures of speech; and ◦ **metaphor** – a comparison equating two or more unlike things ◦ without using "like" or "as." • consult ~~use~~ word reference materials (e.g., dictionaries, glossaries, thesauruses, both print and online) to find the pronunciation of a word or determine or clarify its meaning. ~~including~~ ◦ ~~dictionaries~~ ◦ ~~thesauruses~~ ◦ ~~glossaries~~ ◦ ~~online sources~~ • determine or clarify the meaning of unknown and multiple-meaning words and phrases based on reading and content.

6.5 The student will read and demonstrate comprehension of a variety of fictional texts, narrative nonfiction, and poetry.

a) Identify the elements of narrative structure, including setting, character, plot, conflict, and theme.
b) Make, confirm, and revise predictions.
c) Describe how word choice and imagery contribute to the meaning of a text.
d) Describe cause and effect relationships and their impact on plot.
e) Use prior and background knowledge as context for new learning.
f) Use information in the text to draw conclusions and make inferences.
g) Explain how character and plot development are used in a selection to support a central conflict or story line.
h) Identify the main idea.
i) Identify and summarize supporting details.
j) Identify and analyze the author's use of figurative language.
k) Identify transitional words and phrases that signal an author's organizational pattern.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will read at and beyond the literal level in a variety of genres, including fiction, narrative nonfiction, and poetry, and understand the structures and characteristics of stories and poems. • Teachers will model higher-order thinking processes with materials at the students' instructional reading level and move students gradually to collaborative and independent comprehension of age-appropriate materials at the independent reading level. • Students will become independent readers of age-appropriate text and will activate background knowledge and summarize or paraphrase text to demonstrate understanding. • **Imagery** is the use of words to recreate sensory impressions. Verbal imagery is most often visual, but imagery may also be words that recreate sound, smell, taste, or touch	**All students should** • recognize an author's choice of words and images. • describe how the author uses keywords and images to craft a message and create characters. • identify and define the elements of narrative structure. • understand that fiction includes a variety of genres, including short story, novel, ~~folk literature,~~ and drama. • understand that narrative nonfiction includes biography, autobiography, and personal essay.	**To be successful with this standard, students are expected to** • understand setting as time~~,~~ and place~~, and duration in a story~~. • understand plot as: ° the development of the central conflict and resolution; ° the sequence of events in the story; and ° the writer's map for what happens, how it happens, to whom it happens, and when it happens. • understand that character traits are revealed by: ° what a character says; ° what a character thinks; ° what a character does; and ° how other characters respond to the character. • determine a central idea or theme of a fictional text and how it is developed through specific details. • understand internal and external conflicts in stories, including: ° internal conflicts within characters; ° external conflicts between characters; and ° changes in characters as a result of conflicts and resolutions in the plot.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
impressions. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.	• understand that poetry can be rhymed, unrhymed, and/or patterned. • differentiate between narrative and poetic forms. • understand that imagery and figurative language enrich texts. • recognize an author's craft as the purposeful choice of vocabulary, sentence formation, voice, and tone. • recognize an author's theme(s). • recognize that prior or background knowledge assists in making connections to the text.	• describe how a fictional plot is often episodic, and how characters develop as the plot moves toward a resolution. • notice an author's craft, including use of : ◦ language patterns; ◦ sentence variety; ◦ vocabulary; ◦ imagery; and ◦ figurative language. • recognize an author's use of: ◦ **simile** – figures of speech that use the words *like* or *as* to make comparisons; ◦ **hyperbole** – intentionally exaggerated figures of speech; and ◦ **metaphor** – a figure of speech that makes a comparison equating two or more unlike things without using "like" or "as." • recognize poetic forms, including: ◦ **haiku** – a 17-syllable, delicate, unrhymed Japanese verse, usually about nature; ◦ **limerick** – a 5-line, rhymed, rhythmic verse, usually humorous; ◦ **ballad** – a songlike narrative poem, usually featuring rhyme, rhythm,

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		and refrain; and ◦ **free verse –** poetry with neither regular meter nor rhyme scheme. • recognize poetic elements in prose and poetry, including: ◦ **rhyme** – recurring identical or similar final word sounds within or at the ends of lines of verse, e.g., *farm/harm*; ◦ **rhythm** – the recurring pattern of strong and weak syllabic stresses; ◦ **repetition** – repeated use of sounds, words, or ideas for effect and emphasis; ◦ **alliteration** – repetition of initial sounds, e.g., *picked a peck of pickled peppers*; and ◦ **onomatopoeia** – the use of a word whose sound suggests its meaning, e.g., *buzz*. • recognize an author's tone including serious, humorous, objective, and personal. • use strategies for summarizing, such as graphic organizers. ◦ ~~story maps~~ ◦ ~~Somebody…Wanted…But…So~~ • use graphic organizers~~, such as flow charts or story maps,~~ to record plot elements that illustrate cause and effect relationships and plot development.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use graphic organizers~~, such as two-column notes and Venn diagrams,~~ to record changes in characters as a result of incidents in the plot. • use graphic organizers~~, such as "It says…I say,"~~ to record clues in the text and inferences or conclusions made by the reader as a result of those clues. • analyze author's use of figurative language. • identify how transitional words signal an author's organization such as words indicating time, cause and effect, or indicating more information.

6.6 The student will read and demonstrate comprehension of a variety of nonfiction texts.

a) Use text structures such as type, headings, and graphics to predict and categorize information in both print and digital texts.
b) Use prior knowledge and build additional background knowledge as context for new learning.
c) Identify questions to be answered.
d) Make, confirm, or revise predictions.
e) Draw conclusions and make inferences based on explicit and implied information.
f) Differentiate between fact and opinion.
g) Identify main idea.
h) Summarize supporting details.
i) Compare and contrast information about one topic, which may be contained in different selections.
j) Identify the author's organizational pattern.
k) Identify cause and effect relationships.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will read and comprehend at and beyond the literal level in a variety of ~~informational~~ nonfiction texts. • Teachers will model higher-order thinking processes with materials at ~~or below~~ the students' instructional reading level and move students gradually to collaborative and independent comprehension of age-appropriate materials at the independent reading level. • Students will become independent and knowledgeable about the use of libraries and technology for doing research. • Teachers will collaborate to help students apply reading skills in a variety of content texts. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.	**All students should** • activate prior knowledge before reading. • be strategic before, during, and after reading. • recognize an author's patterns of organization. • recognize an author's use and clarification of technical vocabulary. • use graphic organizers to organize and summarize text. • read beyond the printed text to understand the message stated or implied by an author. • select appropriate sources of information based on the purpose for reading.	**To be successful with this standard, students are expected to** • activate prior knowledge before reading by use of, but not limited to: ◦ small-group or whole-class discussion; ◦ anticipation guides; ◦ preview of key vocabulary; and ◦ ~~use of probable passage,~~ preview guides. • pose questions prior to and during the reading process based on text ~~features~~ structures, such as: ◦ boldface and/or italics type; ◦ type set in color; ◦ vocabulary; ◦ graphics or photographs; and ◦ headings and subheadings. • use specific and helpful clues in the context, including: ◦ **definitions** – which define words within the text; ◦ **signal words** – which alert readers that explanations or examples follow; ◦ **direct explanations** – which explain terms as they are introduced; ◦ **synonyms** – which provide a more commonly used term;

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d) Make, confirm, or revise predictions.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
	• use a variety of strategies, including context, structural analysis, and reference sources, for determining the meaning of unfamiliar and technical vocabulary. • read in order to gather, organize, and ~~restate~~ synthesize information for written and oral presentations. • recognize an author's purpose, including: ◦ to entertain; ◦ to inform; and ◦ to persuade.	◦ **antonyms** – which contrast words with their opposites; and ◦ **inferences** – which imply meaning and help readers deduce meaning. • give evidence from the text to support conclusions. • ~~recognize~~ identify common patterns of organizing text including: ◦ chronological or sequential; ◦ comparison/contrast; ◦ cause and effect; ◦ problem-solution; and ◦ generalization or principle. • predict and then read to validate or revise the prediction(s). • identify clue words and phrases that help unlock meaning of unfamiliar and technical terms. • comprehend~~, and remember~~ and record details and/or facts in order to arrive at a conclusion, inference, or generalization. • recognize that a fact is something that can be proven, while an opinion is a personal feeling. • determine a central idea of a text and recognize how details support that

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		idea. • use graphic organizers to show similarities and differences in the information found in several sources about the same topic. • use strategies and rules for summarizing, such as the following: ° delete trivia and redundancy; ° substitute a general term for a list; and ° find or create a main idea statement. • summarize the text without providing a personal opinion. • compare and contrast similar information across several texts.

At the sixth-grade level, students will plan, draft, revise, and edit narrative~~s~~, descriptive, ~~descriptions,~~ ~~and explanations~~ expository, and persuasive writing with attention to composition and written expression as well as sentence formation, usage, and mechanics. They will use writing as a tool for learning academic concepts as well as for expressive purposes. They will use technology as available and appropriate.

6.7 The student will write narration, description, exposition, and persuasion.

a) Identify audience and purpose.
b) Use a variety of prewriting strategies including graphic organizers to generate and organize ideas.
c) Organize writing structure to fit mode or topic.
d) Establish a central idea and organization.
e) Compose a topic sentence or thesis statement if appropriate.
f) Write multiparagraph compositions with elaboration and unity.
g) Select vocabulary and information to enhance the central idea, tone, and voice.
h) Expand and embed ideas by using modifiers, standard coordination, and subordination in complete sentences.
i) Revise sentences for clarity of content including specific vocabulary and information.
j) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will demonstrate an awareness of audience and use a process for writing as they produce narrative, descriptive, ~~and explanatory~~ expository, and persuasive pieces. • Teachers will focus direct instruction on all three domains of writing: ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers; ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers; and ◦ **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse. • Students will apply a process for writing, including planning, drafting, revising, proofreading, editing, and publishing. • Good writing includes elaboration, i.e., use of descriptive details and examples, within	**All students should** • use prewriting strategies to select and narrow topics. • compose with attention to: ◦ central idea; ◦ unity; ◦ elaboration; and ◦ organization. • craft writing purposefully with attention to: ◦ deliberate word choice; ◦ precise information and vocabulary; ◦ sentence variety; and ◦ tone and voice. • elaborate writing to continue the flow from idea to idea without interruption. • use appropriate transitions to clarify	**To be successful with this standard, students are expected to** • write informative/explanatory texts to examine a topic and convey ideas, concepts, and information. • write using strategies such as definition, classification comparison/contrast, and cause/effect. • include formatting (e.g., headings), graphics (e.g., charts, tables), and multimedia when appropriate. • develop the topic using relevant facts, definitions, details, quotations, and/or examples. • use transitional words or phrases to connect parts of sentences in order to: ◦ show relationships between ideas; ◦ signal a shift or change in the writer's thoughts; ◦ signal levels of importance; ◦ suggest a pattern of organization; and ◦ make sentences clearer. • establish and maintain a formal style of writing when appropriate.

6.7 The student will write narration, description, exposition, and persuasion.

a) Identify audience and purpose.
b) Use a variety of prewriting strategies including graphic organizers to generate and organize ideas.
c) Organize writing structure to fit mode or topic.
d) Establish a central idea and organization.
e) Compose a topic sentence or thesis statement if appropriate.
f) Write multiparagraph compositions with elaboration and unity.
g) Select vocabulary and information to enhance the central idea, tone, and voice.
h) Expand and embed ideas by using modifiers, standard coordination, and subordination in complete sentences.
i) Revise sentences for clarity of content including specific vocabulary and information.
j) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
sentences to give detail and depth to an idea and across paragraphs to continue the flow of an idea throughout a piece. • **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing. • **Tone** is used to express an author's attitude toward the topic. • ~~A~~The writing process is nonlinear: returning to prewriting strategies or drafting at any point in the process may help the writer clarify and elaborate a drafted piece. • Students should have practice writing on demand, for shorter time frames, and over extended periods of time.	the relationships among ideas and concepts. • select vocabulary and tone with awareness of audience and purpose. • revise drafts for improvement, using teacher assistance, peer collaboration, and growing independence. • recognize that a thesis statement is not an announcement of the subject, but rather a unified, and specific statement.	• provide an appropriate conclusion for the purpose and mode of writing. • identify audience and purpose for any piece of writing. • use selected prewriting techniques, such as: ◦ brainstorming; ◦ webbing; ◦ mapping; ◦ clustering; ◦ listing; ◦ organizing graphically; ◦ questioning; and ◦ outlining. • write using descriptive details. • elaborate to: ◦ give detail; ◦ add depth; and ◦ continue the flow of an idea. • write an effective thesis statement focusing, limiting, or narrowing the topic.

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a) Identify audience and purpose.
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i) Revise sentences for clarity of content including specific vocabulary and information.
j) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• differentiate between a thesis statement and a topic sentence. • write more than one paragraph on any central theme or topic demonstrating elaboration, coherence, and unity. • incorporate variety into sentences, using appropriate: ◦ **modifier** – an adjective, an adverb, or a phrase or clause acting as an adjective or adverb; ◦ **coordination** – joining words, phrases, clauses, or sentences by using appropriate coordinating conjunctions; and ◦ **subordination** – establishing the relationship between an independent and a dependent clause by using appropriate subordinate conjunctions. • understand that revising to improve a draft includes: ◦ rereading; ◦ reflecting; ◦ rethinking; and ◦ rewriting. • use available computer technology to enhance the writing process.

6.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Use subject-verb agreement with intervening phrases and clauses.
c) Use pronoun-antecedent agreement to include indefinite pronouns.
d) Maintain consistent verb tense across paragraphs.
e) Eliminate double negatives.
f) Use quotation marks with dialogue.
g) Choose adverbs to describe verbs, adjectives, and other adverbs.
h) Use correct spelling for frequently used words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand and apply all the conventions of language learned at the elementary school level. • Students will maintain correct use of language to enhance writing and to avoid confusing or distracting the reader. • Students will understand that the conventions of correct language are an integral part of the writing process and their proper use is a courtesy to the reader. • **Indefinite pronouns** refer to a person(s) or thing(s) not specifically named and include *all, any, anyone, both, each, either, everybody, many, none, nothing*. • A diagram of a sentence is a tool used to increase the understanding of the structure of a sentence.	**All students should** • proofread and edit drafts with teacher assistance, peer collaboration, and growing independence. • differentiate between subjects and objects when choosing pronouns. • understand that pronouns need to have recognizable antecedents that agree in number and gender. • use reference sources to differentiate among homophones and easily confused words,(e.g., *a lot/allot, effect/affect, bored/board*). • replace colloquial expressions with correct usage (e.g., *I could of rode my bike* becomes *I could have ridden my bike.)*.	**To be successful with this standard, students are expected to** • use complete sentences with appropriate punctuation. • avoid comma splices and fused sentences. • avoid using coordinating conjunctions at the beginning of a sentence (e.g., *and, so*). • diagram ~~simple~~ sentences with ~~prepositional~~ phrases and clauses. • use singular verbs with singular subjects and plural verbs with plural subjects (e.g., *The driver of the bus ~~full~~ aware of children* drives *very carefully. The students in the class* discuss *many topics*). • use reference sources to select the correct spelling and usage of ~~such~~ words such as *their, there,* and *they're*. • use first person pronouns appropriately in compound subjects and objects (e.g., *John and I went to the store. Mother gave presents to Jim and me.*). • choose adjectives and adverbs appropriately (e.g., *He is a good student. He does really well in all his studies*). • capitalize language classes or classes followed by a number (e.g., *French, Algebra II*). • capitalize *mom* and *dad* only when those titles replace names or are used as proper nouns (e.g., *My mom told me to go to bed, and I replied, "No,*

6.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• *Mom, I don't want to."*). • punctuate and format dialogue. • ~~hyphenate words between syllables when they must be split at the ends of lines.~~ • ~~understand the use of~~ correctly use the apostrophe for contractions and possessives. • maintain a consistent verb tense within sentences and throughout and across paragraphs. • eliminate double negatives. • correctly use quotation marks in dialogue.

At the sixth-grade level, students will find, evaluate, and select appropriate resources or a research product. They will evaluate the validity and authenticity of texts, and they will use technology to research, organize, evaluate, and communicate information. In addition, they will learn to cite sources, define the meaning and consequences of plagiarism, and follow ethical and legal guidelines for gathering and using information.

6.9 The student will find, evaluate, and select appropriate resources for a research product.

a) Collect information from multiple sources including online, print, and media.
b) Evaluate the validity and authenticity of texts.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Cite primary and secondary sources.
e) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students must realize in order to avoid plagiarism, credit must be given when using: another person's idea, opinion, or theory; facts, statistics, graphs, drawings, etc., quotations of another person's actual spoken or written words; or paraphrase of another person's spoken or written words. • Teachers should assist students in determining the authenticity and validity of sources. • Teachers should make students aware of possible consequences of plagiarism.	**All students should** • understand that a **primary source** is an original document or a firsthand or eyewitness account of an event. • understand that a **secondary source** discusses information originally presented somewhere else. Secondary sources provide analysis, interpretation, or evaluation of the original information.	**To be successful with this standard, students are expected to** • understand and use the online, print, and media references available in the classroom, school, and public libraries, including: ◦ general and specialized dictionaries; ◦ thesauruses and glossaries; ◦ ~~atlases and globes~~ ◦ general and specialized encyclopedias; ◦ directories; ◦ general and specialized (or subject-specific) databases; and ◦ Internet resources, as appropriate for school use. • evaluate the validity and authenticity of texts, using questions, such as: ◦ Does the source appear in a reputable publication? ◦ Is the source free from bias? ◦ Does the writer have something to gain from his opinion? ◦ Does the information contain facts for support? ◦ Is the same information found in more than one source? • prevent plagiarism and its consequences by giving credit to authors when idea and/or words are used in research. • differentiate between a primary and secondary source. • provide a list of sources using a standard form for documenting primary and secondary sources.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Seven

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the seventh-grade level, students will continue to develop oral communication skills and will become more aware of the effects of verbal and nonverbal behaviors in oral communications. ~~Knowledge of the media and its impact on public opinion will be introduced.~~ Students will also demonstrate knowledge and understanding of persuasive/informative techniques used in media messages, including viewpoints expressed in nonprint media.

7.1 The student will participate in and contribute to conversations, group discussions, and oral presentations.

a) Communicate ideas and information orally in an organized and succinct manner.
b) Ask probing questions to seek elaboration and clarification of ideas.
c) Make statements to communicate agreement or tactful disagreement with others' ideas.
d) Use language and style appropriate to audience, topic, and purpose.
e) Use a variety of strategies to listen actively.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will participate effectively in formal and informal classroom conversations and understand the requirements and uses of standard social conventions in conversations and presentations. • Students will express opinions forthrightly yet respectfully, demonstrating interest in and respect for the opinions of others. • Students will use grammatically correct language. • Teachers should model active listening strategies.	**All students should** • understand and demonstrate appropriate audience behavior. • prepare and deliver oral presentations. • participate effectively in group discussions and presentations. • show awareness of audience, topic, and purpose.	**To be successful with this standard, students are expected to** • contribute relevant ideas, opinions, and feelings in large and small diverse groups. • offer and seek summary statements of their own ideas and the ideas of others. • select vocabulary, tone, and style with audience and purpose in mind. • state points clearly and directly. • include multimedia in presentations. • maintain a focused discussion. • ask clarifying questions and respond appropriately to others' questions in order to encourage discussion, foster understanding, and bring the discussion back to the topic when needed. • provide feedback to other group members, acknowledge new insights expressed by others, and when justified, modify their own views. • use a variety of strategies to actively listen, including: ° give speaker undivided attention; ° use body language and gestures to show they are listening; ° provide feedback or paraphrase; ° allow the speaker to finish without interruptions; and ° respond appropriately.

7.2 The student will identify and demonstrate the relationship between a speaker's verbal and nonverbal messages.

a) Use verbal communication skills, such as word choice, pitch, feeling, tone, and voice appropriate for the intended audience.

b) Use nonverbal communication skills, such as eye contact, posture, and gestures to enhance verbal communication skills.

c) Compare/contrast a speaker's verbal and nonverbal messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use verbal and nonverbal communication to contribute to discussions. • Students will support other members of the group in making contributions in order to facilitate group interaction.	**All students should** • exhibit confidence when speaking. • exhibit courtesy when listening. • use appropriate facial expressions, posture, and gestures to indicate active listening.	**To be successful with this standard, students are expected to** • use appropriate facial expressions and gestures or motions to add to what is being said. • use proper posture and stance when speaking. • identify whether or not a nonverbal message complements the spoken message. • match vocabulary, tone, and volume to the audience, purpose, and topic of the message.

7.3 The student will understand the elements of media literacy.

a) Identify persuasive/informative techniques used in nonprint media including television, radio, video, and Internet.
b) Distinguish between fact and opinion, and between evidence and inference.
c) Describe how word choice and visual images convey a viewpoint.
d) Compare and contrast the techniques in auditory, visual, and written media messages.
e) Craft and publish audience-specific media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will identify and evaluate a variety of media elements and persuasive techniques used in the media. They will recognize that all media messages are constructed and that to understand the whole meaning of the message they can *deconstruct* it, looking at the following attributes: ◦ **Authorship** (Who constructed the message?) ◦ **Format** (This is not just the medium being used but also how the creators used specific elements for effect, i.e., color, sound, emphasis on certain words, amateur video, kids' voices.) ◦ **Audience** (Who is the person or persons meant to receive the message? How will different people receive the message?) ◦ **Content** (This is not just the visible content but the embedded content as well, which includes underlying assumptions of values or points of view; facts and opinions may be intermixed.) ◦ **Purpose** (Why is the message being sent—is it meant to persuade, inform, entertain,	**All students should** • understand that facts can be verified and opinions cannot. • distinguish fact from opinion. • identify the effect of persuasive messages on the audience. • notice use of persuasive language and connotations to convey viewpoint. • recognize that each medium creates meaning differently using visual or verbal techniques. For example, a dissolving picture indicates the passing of time, as do transitional words and phrases in verbal presentations. • analyze a media text considering what techniques have been used and their purpose.	**To be successful with this standard, students are expected to** • deconstruct and analyze the elements of a variety of media including layout, pictures, and text features in print media, and camera shots, angles, lighting, editing and sound in TV, radio, and film. • recognize that production elements in media are composed based on audience and purpose to create specific effects. • identify persuasive techniques in the media including: ◦ **name calling** or **innuendo** – creating a negative attitude; hinting or implying; using loaded, emotional, or slanted language; ◦ **glittering generalities** or **card stacking** – telling only part of the truth; generalizing from a shred of evidence; ◦ **bandwagon** – creating a desire to join a large group satisfied with the idea; making one feel left out if not with the crowd; ◦ **testimonials** – using the declaration of a famous person or authoritative expert to give heightened credibility; ◦ **appeal to prestige, snobbery**, or **plain folks** – using a spokesperson who appeals to the audience: a well-known or appealing person the audience wants to emulate, a person like the audience members with whom they can identify, a person whose lifestyle appeals to the audience; and ◦ **appeal to emotions** – connecting with emotions: loyalty, pity, or fear; love of family, peace, or justice. • recognize three most common camera angles/ shots are: ◦ the **close-up** shows part of a subject usually in great detail; ◦ the **long shot** often establishes the scene (car driving up to a hotel or

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
sell, or a combination of these?) • **Auditory media** can be heard (e.g., music, radio shows, podcasts). • **Visual media** can be viewed (e.g., television, video, Web-based materials, print ads). • **Written media** includes text (e.g., newspapers, magazines, books, blogs). • There are a variety of camera angles, which can add perspective or point of view of what is being pictured. Sometimes the camera angle can greatly influence the audience. • Students should recognize that media messages vary depending on the medium. A strictly auditory message is more dependent on sound than a visual message. Each message uses a variety of techniques.		an overview of a city) ;and ° the **medium shot** shows the whole subject (a person, car etc.). • subject (a person, car, etc.). • recognize and identify opinions in the media. • recognize and identify facts in the media. • recognize that evidence is fact and a valid inference is the interpretation of fact. • recognize that the effectiveness of any media message is determined by the impact on the intended audience. For example, the *Don't Drink and Drive* campaign has been an effective campaign because the number of traffic accidents due to drunk driving has been reduced. • describe the effect on the audience of persuasive messages in the media. • identify effective word choice in the media. • identify and analyze a variety of viewpoints expressed in the media. • create and publish age-appropriate media messages, such as public service announcements aimed at a variety of audiences with different purposes; include multimedia components in presentations to emphasize points.

At the seventh-grade level, students will continue the study of roots and affixes for vocabulary development and ~~begin~~ continue to ~~a~~ study ~~of~~ figurative language. Connotations ~~and analogies~~ will be introduced. They will read and understand information from various sources including a variety of fiction, nonfiction, and poetry. They will continue to read for appreciation and comprehension in both classic and recent works. Students will apply critical reading and reasoning skills across the content areas, including history and social science, science, and mathematics. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity.

7.4 The student will read to determine the meanings and pronunciations of unfamiliar words and phrases within authentic texts.

a) Identify word origins and derivations.
b) Use roots, cognates, affixes, synonyms, and antonyms to expand vocabulary.
c) Identify and analyze figurative language.
d) Identify connotations.
e) Use context and sentence structure to determine meanings and differentiate among multiple meanings of words.
f) Extend general and specialized vocabulary through speaking, listening, reading, and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will become independent learners of vocabulary by choosing from a variety of strategies to determine or clarify the meaning of unknown and multiple-meaning words.
 	
• Students come to understand affixes, including prefixes and suffixes, roots, derivations, and inflections of polysyllabic words and understand that words with similar parts may be related to each other in meaning and origin.
 	
• Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish).
 	
• Students will continue ~~begin~~ the study of figurative language ~~and analogies,~~ and ~~continue to~~ use ~~the~~ context to help determine the meaning of words.
 	
• Students will begin to notice connotations of
	All students should
	
	• use word structure to analyze and find relationships among words.
	
	• recognize internal and external inflections that change meaning and pronunciation.
	
	• recognize relationships used to create analogies.
	
	• recognize that figurative language and analogy enrich text.
		To be successful with this standard, students are expected to
		
		• use common Greek or Latin affixes and roots to predict the meaning of unfamiliar words and make connections with word families (e.g. –phobia, and –ology).
		
		• separate and recombine known word parts to predict the meaning of unfamiliar words, such as separating *dent* from *dentist* and *fric* from *friction* to predict the meaning of *dentifrice.*
		
		• use synonyms and antonyms to determine the meaning of unfamiliar words.
		
		• use the relationship between particular words (e.g., synonym/antonym, cause/effect, degree, etc.) to better understand words.
		
		• recognize that words have nuances of meaning (figurative, connotative, and technical), which help determine the appropriate meaning.
		
		• ~~recognize and apply relationships common to analogy construction~~
		  ° ~~purpose – chair: sit~~
		  ° ~~cause/effect – sun: burn~~
		  ° ~~sequence – day: week~~
		  ° ~~characteristic – snow: cold~~
		  ° ~~product – tree: lumber~~
		  ° ~~degree – warm: hot~~
		
		• recognize, understand, and use figurative language ~~figures of speech~~, including:

7.4 The student will read to determine the meanings and pronunciations of unfamiliar words and phrases within authentic texts.

a) Identify word origins and derivations.
b) Use roots, cognates, affixes, synonyms, and antonyms to expand vocabulary.
c) Identify and analyze figurative language.
d) Identify connotations.
e) Use context and sentence structure to determine meanings and differentiate among multiple meanings of words.
f) Extend general and specialized vocabulary through speaking, listening, reading, and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
words and use reference books and context to determine the nuances of connotative language.		◦ **simile** – figure of speech that uses the words *like* or *as* to make comparisons; ◦ **metaphor** – figure of speech that makes a comparison equating two or more unlike things without using *like* or *as*; ◦ **personification** – figure of speech that applies human characteristics to nonhuman objects; and ◦ **hyperbole** – intentionally exaggerated figure of speech. • distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., *refined*, *respectful*, *polite*, *diplomatic*, *condescending*), recognizing that some words have technical meanings based on context such as *stern*. • recognize that synonyms may have connotations (e.g., *elderly* and *mature*; *youthful* and *juvenile*). • use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. • consult ~~general and specialized~~ word reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital to find the pronunciation of a word or determine/clarify meanings.

7.5 The student will read and demonstrate comprehension of a variety of fictional texts, narrative nonfiction, and poetry.

a) Describe the elements of narrative structure including setting, character development, plot structure, theme, and conflict.
b) Compare and contrast various forms and genres of fictional text.
c) Identify conventional elements and characteristics of a variety of genres.
d) Describe the impact of word choice, imagery, and literary devices including figurative language.
e) Make, confirm, and revise predictions.
f) Use prior and background knowledge as a context for new learning.
g) Make inferences and draw conclusions based on the text.
h) Identify the main idea.
i) Summarize text relating supporting details.
j) Identify the author's organizational pattern.
k) Identify cause and effect relationships.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will begin to analyze text including fiction, narrative nonfiction, and poetry. • Students will understand the interrelationship of setting, plot, theme, style, and form and recognize how an author's craft makes an impact on readers. • Students will compare and contrast narrative and poetic forms and recognize poetic devices in prose and poetry. • Students will read at and beyond the literal level, including **making inferences** – making judgments or drawing conclusions based on what an author has implied. • The **initiating event** is the incident that introduces the central conflict in a story; it may have occurred before the opening of the story.	**All students should** • recognize that authors make deliberate choices to create ~~stories~~ literary works. • understand that language has an impact on readers. • make inferences and draw conclusions based on information supplied by an author combined with the reader's own background knowledge. • use strategies and graphic organizers to summarize and analyze text.	**To be successful with this standard, students are expected to** • ~~understand~~ recognize the elements of ~~story,~~ narrative structure including: ° setting – time, place, and duration; ° character(s); ° external conflicts, such as - individual vs. individual - individual vs. nature - individual vs. society - individual vs. supernatural - individual vs. technology ° internal conflict – individual vs. self; ° plot – development of the central conflict, including - initiating event - rising action - climax - falling action - resolution ° theme.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing. • **Mood** refers to the emotional atmosphere produced by an author's use of language. • **Tone** refers to an attitude a writer takes toward a subject. • Students will understand how authors use keywords and images to craft a message and establish tone. • Teachers will model higher-order thinking processes with materials at the students' instructional reading level and move students gradually to collaborative and independent comprehension of age-appropriate materials at the independent reading level. • Students will use a variety of reading strategies including text annotation, QAR (Question-		• ~~identify~~ distinguish between narrative prose and poetic forms, including: ◦ **haiku** – a 17-syllable, delicate, unrhymed Japanese verse, usually about nature; ◦ **limerick** – a 5-line, rhymed, rhythmic verse, usually humorous; ◦ **ballad** – a songlike narrative poem, usually featuring rhyme, rhythm, and refrain; ◦ **free verse –** poetry with neither regular meter nor rhyme scheme ◦ **couplet** – a pair of rhyming lines; and ◦ **quatrain** – a stanza containing four lines. • read, understand, ~~and differentiate,~~ and compare/contrast the characteristics and narrative structures of: ◦ short stories; ◦ novels (including historical fiction, biographies, and autobiographies); ◦ folk literature; - tales - myths - legends - fables

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l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
Answer Relationship), thinking aloud, etc.		◦ plays; ◦ narrative nonfiction (including personal essays); and ◦ biographies and autobiographies. • use graphic organizers~~, such as "It says…I say,"~~ to record ~~clues in the text and inferences or~~ important details for summarizing and drawing conclusions. • ~~understand~~ identify **characterization** as the way an author presents a character and reveals character traits by: ◦ what a character says; ◦ what a character thinks; ◦ what a character does; and ◦ how other characters respond to the character. • ~~understand~~ analyze an author's choice and use of literary devices, including: ◦ **foreshadowing** – the use of clues to hint at coming events in a story; and ◦ **irony –** the contrast between expectation and reality; between what is said and what is meant; between what appears to be true and what really is true.

7.5 The student will read and demonstrate comprehension of a variety of fictional texts, narrative nonfiction, and poetry.

a) Describe the elements of narrative structure including setting, character development, plot structure, theme, and conflict.
b) Compare and contrast various forms and genres of fictional text.
c) Identify conventional elements and characteristics of a variety of genres.
d) Describe the impact of word choice, imagery, and literary devices including figurative language.
e) Make, confirm, and revise predictions.
f) Use prior and background knowledge as a context for new learning.
g) Make inferences and draw conclusions based on the text.
h) Identify the main idea.
i) Summarize text relating supporting details.
j) Identify the author's organizational pattern.
k) Identify cause and effect relationships.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~understand and~~ analyze elements of an author's style, including: ◦ word choice; ◦ sentence structure and language patterns; ◦ imagery – the use of words to create sensory impressions — most often visual impressions but may be sound, smell, taste, or touch impressions; ◦ contrasting points of view; and ◦ figurative language – text enriched by word images and figures of speech. • define an author's tone including, but not limited to: serious, sarcastic, pobjective, humorous, disapproving, solemn, enthusiastic, and hostile. • ~~use strategies for summarizing, such as~~ ◦ ~~story maps~~ ◦ ~~Somebody…Wanted…But…So~~ • recognize and analyze the impact of an author's choice of poetic devices, including: ◦ **rhyme** – recurring identical or similar final word sounds within or at the ends of lines of verse; ◦ **rhythm** – the recurring pattern of strong and weak syllabic stresses;

7.5 The student will read and demonstrate comprehension of a variety of fictional texts, narrative nonfiction, and poetry.

a) Describe the elements of narrative structure including setting, character development, plot structure, theme, and conflict.
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h) Identify the main idea.
i) Summarize text relating supporting details.
j) Identify the author's organizational pattern.
k) Identify cause and effect relationships.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ **meter** – a fixed pattern of accented and unaccented syllables in lines of fixed length to create rhythm; ◦ **repetition** – repeated use of sounds, words, or ideas for effect and emphasis; ◦ **alliteration** – repetition of initial sounds, e.g., *picked a peck of pickled peppers*; and ◦ ~~**assonance** – repetition of vowel sounds, e.g., *mad hatter*~~ ◦ ~~**consonance** – repetition of final consonant sounds, e.g., *east/west*~~ ◦ **onomatopoeia** – the use of a word whose sound suggests its meaning, e.g., *clatter*. • explain how poetic devices of form, rhyme, rhythm, repetition, line structure, and punctuation convey the mood and meaning of a poem. • make predictions before, during, and after reading texts, connect to prior knowledge of a subject, visualize, and question a text while reading, draw inferences, and synthesize information.

7.6 The student will read and demonstrate comprehension of a variety of nonfiction texts.

a) Use prior and background knowledge as a context for new learning.
b) Use text structures to aid comprehension.
c) Identify an author's organizational pattern using textual clues, such as transitional words and phrases.
d) Draw conclusions and make inferences on explicit and implied information.
e) Differentiate between fact and opinion.
f) Identify the source, viewpoint, and purpose of texts.
g) Describe how word choice and language structure convey an author's viewpoint.
h) Identify the main idea.
i) Summarize text identifying supporting details.
j) Identify cause and effect relationships.
k) Organize and synthesize information for use in written formats.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will read and comprehend at and beyond the literal level in a variety of ~~informational sources~~ nonfiction texts. • Students will use and understand the internal and external text structures common to textbooks and other ~~informational~~ nonfiction text. • An author's **viewpoint** refers to his or her bias or subjectivity toward the subject. In general, a viewpoint can be positive or negative. • Teachers will model the higher-order thinking processes with materials ~~below~~ at the ~~independent reading level of~~ students' instructional reading level and move students gradually to collaborative and independent comprehension of age-appropriate materials at the independent reading level.	**All students should** • ~~activate prior knowledge before reading~~ • ~~make predictions prior to and during the reading process~~ • use the reading process to activate prior knowledge, predict, question, clarify, infer, organize, compare, summarize, and synthesize. • choose graphic organizers based on the internal text structure most prevalent in the text in order to track key points and summarize the text.	**To be successful with this standard, students are expected to** • activate prior knowledge before reading by use of, but not limited to: ◦ small-group or whole-class discussion; ◦ anticipation guides; and ◦ preview of key vocabulary. • use ~~external~~ textual ~~aids~~ features to make predictions and enhance comprehension, including: ◦ boldface and/or italics type; ◦ type set in color; ◦ underlining; ◦ indentation; ◦ sidebars; ◦ illustrations, graphics, and photographs; ◦ headings and subheadings; and ◦ footnotes and annotations. • recognize ~~internal text structures~~ organizational pattern to enhance

7.6 The student will read and demonstrate comprehension of a variety of nonfiction texts.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will work collaboratively and with teacher support to move toward higher-order thinking with instructional level materials. • **Synthesis** involves higher-order thinking and is a result of forming either a concrete or abstract whole from the logical relation of parts. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.	• recognize an author's purpose: ◦ to entertain; ◦ to inform; and ◦ to persuade. • notice use of connotations and persuasive language to convey viewpoint. • make inferences, which imply meaning, and draw conclusions based on both explicit and implied information. • ~~use graphic organizers and other strategies to organize and summarize text~~ • distinguish between a fact, which can be verified, and an opinion, which cannot.	comprehension, including: ◦ cause and effect; ◦ comparison/contrast; ◦ enumeration or listing; ◦ sequential or chronological; ◦ concept/definition; ◦ generalization; and ◦ process. • recognize ~~the~~ transitional words and phrases authors use to signal organizational patterns, including, but not limited to: ◦ *as a result of, consequently* for cause and effect; ◦ *similarly, on the other hand* for comparison/contrast; ◦ *first, three* for enumeration or listing; ◦ *today, meanwhile* for sequential or chronological; ◦ *refers to, thus* for concept/definition; ◦ *always, in fact* for generalization; and ◦ *begins with, in order to* for process. • provide an objective summary of the text by recording the development of the central ideas.

7.6 The student will read and demonstrate comprehension of a variety of nonfiction texts.

a) Use prior and background knowledge as a context for new learning.
b) Use text structures to aid comprehension.
c) Identify an author's organizational pattern using textual clues, such as transitional words and phrases.
d) Draw conclusions and make inferences on explicit and implied information.
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i) Summarize text identifying supporting details.
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k) Organize and synthesize information for use in written formats.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• analyze how two or more authors writing about the same topic shape their presentations or viewpoints of key information using facts, opinions, and reasoning.

At the seventh-grade level, students will plan, draft, revise, and edit ~~narratives~~ expository as well as ~~persuasive~~ narrative and ~~expository~~ persuasive pieces with attention to composition and written expression. Students will ~~begin the process of becoming independent~~ achieve greater independence with sentence formation, usage, and mechanics and understand that the conventions of language help convey the message from the writer to the reader. Students will use writing for expressive purposes and as a tool for learning academic concepts. They will use available and appropriate technology ~~as available and appropriate~~.

7.7 The student will write in a variety of forms with an emphasis on exposition, narration, and persuasion.

a) Identify intended audience.
b) Use a variety of prewriting strategies including graphic organizers to generate and organize ideas.
c) Organize writing structure to fit mode or topic.
d) Establish a central idea and organization.
e) Compose a topic sentence or thesis statement.
f) Write multiparagraph compositions with unity elaborating the central idea.
g) Select vocabulary and information to enhance the central idea, tone, and voice.
h) Expand and embed ideas by using modifiers, standard coordination, and subordination in complete sentences.
i) Use clauses and phrases for sentence variety.
j) Revise sentences for clarity of content including specific vocabulary and information.
k) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will become independent and proficient in composing a variety of types of writing. • Teachers will focus direct instruction on all three domains of writing: ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers; ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers; and ◦ **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse. • Students will gradually assume responsibility for revising, proofreading, and editing their own writing.	**All students should** • use a process for writing, including: ◦ planning; ◦ drafting; ◦ revising; ◦ proofreading; ◦ editing; and ◦ publishing. • understand that good writing ~~has been elaborated horizontally and vertically~~ includes elaboration. • recognize that a thesis statement is not an announcement of the subject, but rather a unified, and specific statement. • understand that good writing has	**To be successful with this standard, students are expected to** • identify intended audience and purpose. • use a variety of prewriting strategies including: ◦ brainstorming; ◦ webbing; ◦ mapping; ◦ outlining; ◦ clustering; ◦ listing; and ◦ using graphic organizers. • explain, analyze, or summarize a topic. • write an effective thesis statement focusing, limiting, or narrowing the topic. • differentiate between a thesis statement and a topic sentence. • choose an appropriate strategy for organizing ideas such as

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Elaboration** can occur by using descriptive details and examples ~~*horizontally*~~ within a sentence to give detail and depth to an idea, or ~~*vertically*~~ from paragraph to paragraph. • **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing. Voice is the imprint of the writer — the capacity to elicit a response from the reader. • **Tone** expresses an author's attitude toward the subject. • A writing process is nonlinear: returning to prewriting or drafting at any point in the process may help the writer clarify and elaborate the drafted piece. • Students should have practice writing on demand, for shorter time frames, and over	been improved through revision. • ~~use peer and individual revising and editing~~. • understand and apply the elements of composing: ◦ central idea; ◦ elaboration; ◦ unity; and ◦ organization. • ~~apply word processing skills to the writing process.~~	comparison/contrast, personal narrative, cause/effect, etc., and provide transitions between ideas. • create multiparagraph compositions focusing on a central idea and using elaborating details, reasons, or examples as appropriate for audience and purpose. • include an appropriate introduction and satisfying conclusion. • sustain a formal style. • use written expression to draft and revise compositions with attention to: ◦ voice; ◦ tone; ◦ selection of information; ◦ embedded phrases and clauses that clarify meaning; ◦ vivid and precise vocabulary; ◦ figurative language; and ◦ sentence variety. • recognize terms illustrative of tone, such as, but not limited to: ◦ serious; ◦ sarcastic;

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i) Use clauses and phrases for sentence variety.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
extended periods of time.		° objective; ° enthusiastic; ° solemn; ° humorous; ° hostile; ° personal; and ° impersonal. • apply revising procedures in peer and self-review, including: ° rereading; ° reflecting; ° rethinking; and ° rewriting. • vary sentence structure by using coordinating conjunctions: *for*, *and*, *nor*, *but*, *or*, *yet*, and *so*. • use subordinating conjunctions to form complex sentences: *after*, *although*, *as*, *as if*, *because*, *before*, *even if*, *even though*, *if*, *if only*, *rather than*, *since*, *that*, *though*, *unless*, *until*, *when*, *where*, *whereas*, *wherever*, *whether*, *which*, and *while*. • incorporate variety into sentences using simple, compound, and

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		compound-complex sentences, including, but not limited to: ° **coordination** – joining words, phrases, clauses, or sentences by using appropriate coordinating conjunctions; ° **subordination** – establishing the relationship between an independent and a dependent clause by using appropriate subordinate conjunctions; and ° **modifier** – an adjective, an adverb, or a phrase or clause acting as an adjective or adverb. • use available computer technology to assist throughout the writing process.

7.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Choose appropriate adjectives and adverbs to enhance writing.
c) Use pronoun-antecedent agreement to include indefinite pronouns.
d) Use subject-verb agreement with intervening phrases and clauses.
e) Edit for verb tense consistency and point of view.
f) Demonstrate understanding of sentence formation by identifying the eight parts of speech and their functions in sentences.
g) Use quotation marks with dialogue.
h) Use correct spelling for commonly used words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will understand and apply all the conventions of language learned at the elementary school level with increasing independence.
• Students will maintain correct use of language to enhance writing and to avoid confusing or distracting the reader.
• Students will understand that the conventions of correct language are an integral part of the writing process.
• A diagram of a sentence is a tool to increase understanding of its structure.
	All students should
	• proofread and edit drafts with teacher assistance, peer collaboration, and growing independence.
	• understand that pronouns need to agree with antecedents.
	• understand that verbs must agree with subjects.
	• become independent in checking spelling, using dictionaries and/or electronic tools.
	• examine sentences to identify eight parts of speech with the intent of improving sentence structure and variety, including:
	  ° noun;
	  ° verb;
		To be successful with this standard, students are expected to
		• use complete sentences with appropriate punctuation, including the punctuation of dialogue.
		• use a singular verb with a singular subject and a plural verb with a plural subject (e.g., *The students in the classroom* discuss *many topics. The driver of the bus full of children* drives *with extreme caution.*).
		• use a singular pronoun to refer to a singular antecedent and a plural pronoun to refer to a plural antecedent (e.g., *All students should bring* their *notebooks to class. Each student must provide* his *own pen.*)
		• diagram ~~compound sentences and simple~~ sentences with ~~compound elements~~ phrases and clauses.
		• ~~choose and~~ maintain verb tense (present, past, future) throughout an entire ~~paragraph~~ piece of writing.
		• maintain consistent point of view through a piece of writing.
		• use quotation marks to represent the exact language (either spoken or written) of another.

7.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Choose appropriate adjectives and adverbs to enhance writing.
c) Use pronoun-antecedent agreement to include indefinite pronouns.
d) Use subject-verb agreement with intervening phrases and clauses.
e) Edit for verb tense consistency and point of view.
f) Demonstrate understanding of sentence formation by identifying the eight parts of speech and their functions in sentences.
g) Use quotation marks with dialogue.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
	◦ pronoun; ◦ adjective; ◦ adverb; ◦ preposition; ◦ conjunction; and ◦ interjection.	

At the seventh-grade level, students will apply knowledge of appropriate reference material to produce a research product including the collection and organization of information from multiple online, print, and media sources. They will extend skills in the evaluation of sources and the use of technology to research, organize, evaluate, and communicate information. In addition, they will continue to cite sources skillfully and thereby avoid plagiarism.

7.9 The student will apply knowledge of appropriate reference materials to produce a research product.

a) Collect and organize information from multiple sources including online, print and media.
b) Evaluate the validity and authenticity of sources.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Cite primary and secondary sources.
e) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use both print and electronic sources to find, read, and organize information for presentations and papers. • Students will synthesize information from a variety of sources and will document sources, using a standard format. • Students will realize in order to avoid plagiarism, credit must be given when using: another person's idea, opinion, or theory; facts, statistics, graphs, drawings, etc. , quotations of another person's actual spoken or written words; or paraphrase of another person's spoken or written words. • Teachers should assist students in determining the authenticity and validity of sources. • Teachers should make students aware of possible consequences of plagiarism. • Teachers will collaborate with library media specialists to assist students as the students learn to become independent with research. • Students will have the opportunity to practice writing over shorter time frames as well as for	**All students should** • ~~use research tools available in school media centers and public libraries.~~ • ~~choose and use appropriate graphic organizers~~ • understand that research tools are available in school media centers and libraries. • understand that **a primary source** is an original document or a firsthand or eyewitness account of an event. • understand that a **secondary source** discusses information originally presented somewhere else. Secondary sources provide analysis, interpretation, or evaluation of the original information.	**To be successful with this standard, students are expected to** • ~~understand~~ use ~~the characteristics of~~ available resource tools, including: ◦ educational online resources; ◦ reference books; ◦ scholarly journals; ◦ magazines; ◦ the Internet, as appropriate for school use; and ◦ general and specialized (or subject-specific) databases. • organize and synthesize information with tools, including: ◦ ~~file cards~~ ◦ graphic organizers; ◦ ~~flow charts;~~ ◦ ~~Venn diagrams;~~ ◦ outlines; ◦ spreadsheets; ◦ databases; and ◦ presentation software. • create a "Works Cited" page using MLA format for oral and written presentations. • differentiate between a primary and a secondary source. • gather relevant information from multiple print and digital sources; assess the credibility and validity of each source;

7.9 The student will apply knowledge of appropriate reference materials to produce a research product.

a) Collect and organize information from multiple sources including online, print and media.
b) Evaluate the validity and authenticity of sources.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Cite primary and secondary sources.
e) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
extended ones.		• prevent plagiarism and its consequences by giving credit to authors when ideas and/or words are used in direct quotation or paraphrases. • evaluate the validity and authenticity of texts, using questions, such as: ° Does the source appear in a reputable publication? ° Is the source free from bias? ° Does the writer have something to gain from his opinion? ° Does the information contain facts for support? ° Is the same information found in more than one source? • summarize and cite specific evidence from the text to support conclusions.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Eight

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the eighth-grade level, students will learn to apply interviewing techniques. Preparation for and evaluation of the process of interviewing will be a part of student ~~the~~ learning. Interviewing skills will be added to the students' repertoire of oral language skills. In addition, students will analyze, develop, and produce creative and informational media messages.

8.1 The student will use interviewing techniques to gain information.

a) Prepare and ask relevant questions for the interview.
b) Make notes of responses.
c) Compile, accurately report, and publish responses.
d) Evaluate the effectiveness of the interview.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will use an interviewing process as a strategy for learning. • **Synthesis** involves higher-order thinking and is a result of forming either a concrete or abstract whole from the logical relation of parts.	**All students should** • synthesize information gathered in an interview. • organize information for written and oral presentations. • present findings in written and oral form.	**To be successful with this standard, students are expected to** • determine the purpose of the interview. • select a subject for the interview. • create and record questions that will elicit relevant responses. • apply effective note-taking strategies.~~, including the use of~~ ◦ ~~abbreviations~~ ◦ ~~graphic organizers~~ ◦ ~~key words~~ ◦ ~~file cards~~ ◦ ~~recording devices~~ • evaluate the effectiveness of their own and/or peer interviews, using rubrics or checklists.

8.2 The student will develop and deliver oral presentations in groups and individually.

a) Choose topic and purpose appropriate to the audience.
b) Choose vocabulary and tone appropriate to the audience, topic, and purpose.
c) Use appropriate verbal and nonverbal presentation skills.
d) Respond to audience questions and comments.
e) Differentiate between standard English and informal language.
f) Critique oral presentations.
g) Assume shared responsibility for collaborative work.
h) Use a variety of strategies to listen actively.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• The intent of this standard is that students will prepare and deliver oral presentations ~~on a regular basis~~ effectively.
• Students will deliver both group presentations and individual presentations to classmates and other audiences.
	All students should
	• rehearse presentations.
	• interact with poise with an audience.
	• evaluate presentations.
	• use grammatically correct language.
		To be successful with this standard, students are expected to
		• ~~understand~~ articulate the purpose of the presentation.
		• select and narrow the topic with attention to time limits and audience.
		• prepare the presentation, using strategies including, but not limited to:
		  ° note cards;
		  ° outlines;
		  ° formal written report; and
		  ° questions and answers.
		• select and use appropriate vocabulary for audience and purpose.
		• define technical terms.
		• include multimedia to clarify presentation information.
		• rehearse both alone and with a coach.
		• use a rubric or checklist to evaluate presentations.
		• answer questions and respond to comments politely and succinctly with relevant evidence, observations, and ideas.
		• work effectively with diverse groups.
		• exercise flexibility and work as a constructive team member to accomplish a common goal or reach consensus.

8.3 The student will analyze, develop, and produce creative or informational media messages.

a) Evaluate the persuasive/informational technique being used in nonprint media including television, radio, video, and Internet.

b) Examine how values and viewpoints are included or excluded and how the media can influence beliefs, behaviors, and interpretations.

c) Use media and visual literacy skills to create products that express new understandings.

d) Evaluate sources for relationships between intent and factual content.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will identify and analyze persuasive techniques used in the media. Students will also be able to identify elements of media literacy recognizing that elements of media literacy are based on audience and purpose. • Students will recognize that all media messages are constructed and that to understand the whole meaning of the message they can *deconstruct* it, looking at the following attributes: ◦ **Authorship** (Who constructed the message?) ◦ **Format** (This is not just the medium being used but also how the creators used specific elements for effect, i.e., color, sound, emphasis on certain words, amateur video, kids' voices.) ◦ **Audience** (Who is the person or persons meant to receive the message? How will different people receive the message?) ◦ **Content** (This is not just the visible content but the embedded content as well which includes underlying assumptions of values or points of view; facts and opinions may be intermixed.)	**All students should** • ~~identify~~ understand the effects of persuasive messages on the audience. • understand that facts can be verified and opinions cannot. • distinguish fact from opinion. • identify the effect of persuasive messages on the audience. • examine use of persuasive language and connotations to convey viewpoint. • recognize that each medium creates meaning differently using visual or verbal techniques. For example, a dissolving picture indicates the passing of time,as do transitional words and phrases in verbal presentations. • analyze a media text by considering what techniques have been used and their purpose.	**To be successful with this standard, students are expected to** • deconstruct and analyze the elements of a variety of media including layout, pictures, and text features in print media, and camera shots, angles, lighting, editing and sound in TV, radio, and film. • identify and analyze persuasive techniques used in the media, including: ◦ **name calling** or **innuendo –** creating a negative attitude; hinting or implying; using loaded, emotional, or slanted language; ◦ **glittering generalities** or **card stacking** – telling only part of the truth; generalizing from a shred of evidence; ◦ **bandwagon** – creating a desire to join a large group satisfied with the idea; making one feel left out if not with the crowd; ◦ **testimonials** – using the declaration of a famous person or authoritative expert to give heightened credibility; ◦ **appeal to prestige, snobbery,** or **plain folks** – using a spokesperson who appeals to the audience: a well-known or appealing person the audience wants to emulate, a person like the audience members with whom they can identify, a person whose lifestyle appeals to the audience; and ◦ **appeal to emotions** – connecting with emotions: loyalty, pity, or fear; love of family, peace, or justice. • describe the effect of persuasive messages in the media on the audience. • identify and evaluate effective word choice in the media. • identify and analyze choice of information in the media. • identify and analyze various viewpoints in the media.

8.3 The student will analyze, develop, and produce creative or informational media messages.

a) Evaluate the persuasive/informational technique being used in nonprint media including television, radio, video, and Internet.

b) Examine how values and viewpoints are included or excluded and how the media can influence beliefs, behaviors, and interpretations.

c) Use media and visual literacy skills to create products that express new understandings.

d) Evaluate sources for relationships between intent and factual content.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
◦ **Purpose** (Why is the message being sent—is it meant to persuade, inform, entertain, sell, or a combination of these?) • **Auditory media** can be heard (e.g., music, radio shows, podcasts). • **Visual media** can be viewed (e.g., television, video, Web-based materials, print ads). • **Written media** includes text (e.g., newspapers, magazines, books, blogs). • An author's **viewpoint** refers to his or her bias or subjectivity toward the subject. In general, a viewpoint can be positive or negative.	• recognize that a public service announcement (PSA) is an advertisement for the benefit of the public. The purpose of a public service announcement can be to raise awareness (e.g., advertisements targeting tobacco cessation).	• identify public opinion trends and possible causes. • identify the sources and viewpoint of publications. • identify the elements of a variety of media including layout, pictures, and text features in print media. Camera shots, angles, lighting, editing and sound in TV, radio, and film. The three most common camera angles/ shots are: ◦ the **close-up** shows part of a subject usually in great detail; ◦ the **long shot** often establishes the scene (car driving up to a hotel or an overview of a city) ;and ◦ the **medium shot** shows the whole subject (a person, car, etc.). • recognize that production elements in media are composed based on audience and purpose to create specific effects. • analyze the use of opinions in the media. • analyze the use of facts in the media. • describe the effect on the audience of persuasive messages in the media. • identify effective word choice and images in the media. • create and publish media messages, such as public service announcements aimed at a variety of audiences with different purposes. • evaluate the advantages and disadvantages of using different mediums (e.g., print or digital text, video, multimedia) to express new understandings. • identify and analyze the motives (social, commercial, political, etc.) and factual content of media messages including print and nonprint resources.

At the eighth-grade level, students will apply knowledge of word origins, analogies, and figurative language to understand unfamiliar or new words encountered in authentic texts. They will continue to develop appreciation of literature through the study of literary elements in classic and contemporary selections. They will describe themes and inferred main ideas, interpret cause-effect relationships, and draw conclusions from a variety of literary and informational selections. Students will build on the foundations for literacy developed in the previous grades. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity. Students will apply critical reading and reasoning skills across the content areas, including history and social science, science, and mathematics.

8.4 The student will apply knowledge of word origins, analogies, and figurative language to extend vocabulary development within authentic texts.

a) Identify and analyze an author's use of figurative language.
b) Use context, structure, and connotations to determine meaning and differentiate among multiple meanings of words and phrases.
c) Use roots, affixes, cognates, synonyms, and antonyms to determine the meaning of unfamiliar words and technical vocabulary.
d) Use dictionaries, thesauruses, and glossaries to determine definition, pronunciation, etymology, spelling, and usage of words.
e) Discriminate between connotative and denotative meanings and interpret the connotation.
f) Extend general and specialized vocabulary through speaking, listening, reading, and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will become independent learners of vocabulary by choosing from a variety of strategies to determine or clarify the meaning of unknown and multiple-meaning words. • Students will be exposed to affixes, including prefixes and suffixes, roots, derivations, and inflections of polysyllabic words and understand that words with similar parts may be related to each other in meaning and origin. • Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Students will evaluate the use of figurative language and analogies in text. • Students will use context and connotations to help determine the meaning of nearly	**All students should** • use word structure to analyze and relate words. • recognize internal and external inflections that change meaning and pronunciation. • recognize that words have nuances of meaning ~~and that understanding the connotations may be necessary to~~ (figurative, connotative, and technical), which help determine the appropriate meaning. • recognize that figurative language and analogy enrich text.	**To be successful with this standard, students are expected to** • use common roots to determine the meaning of unfamiliar words and make connections with word families (e.g.,-phobia~~,~~ and -ology). • recognize the relationships among words related by structure and derivation, such as *polygraph* and *graffiti* ~~or *carnival* and *valedictorian*~~. • distinguish among the connotations (associations) of words with similar denotations (definitions) (e.g., *refined, respectful, polite, diplomatic, condescending*), recognizing that some words have technical meanings based on context such as *stern.* • understand, evaluate, and use figurative language, including: ◦ **simile** – figure of speech that uses the words *like* or *as* to make comparisons; ◦ **metaphor** – figure of speech that *implies* comparisons; ◦ **personification** – figure of speech that applies human characteristics to nonhuman objects; ◦ **hyperbole** – intentionally exaggerated figure of speech; and ◦ **symbol** – word or object that stands for another word or object. The object or word is visible. For example, a dove stands for peace. **To be successful with this standard, students are expected to**

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
synonymous words and appreciate an author's choices of words and images.		• ~~apply and~~ analyze relationships common to analogy construction, including: ◦ type or example – cinnamon: spice; ◦ characteristics – glass: breakable; ◦ association – bow: arrow; ◦ operator – car: driver; ◦ degree – pleased: ecstatic; ◦ mathematical – three: six; ◦ number – louse: lice; ◦ synonyms and antonyms – hot:-cold; ◦ purpose – chair: sit; ◦ cause/effect – sun: burn; ◦ sequence – day: week; ◦ characteristic – snow: cold; ◦ product – tree: lumber; and ◦ degree – warm: hot. • consult reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine/clarify meaning. • recognize that synonyms may have connotations, e.g., *elderly* and *mature*; *youthful* and *juvenile* and describe the impact on text. • use context (e.g., the overall meaning of a sentence or paragraph; a word's position or function in a sentence) as a clue to the meaning of a word or phrase.

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e) Discriminate between connotative and denotative meanings and interpret the connotation.
f) Extend general and specialized vocabulary through speaking, listening, reading, and writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use both context and reference skills independently to determine the nuances and connotations of words.

8.5 The student will read and analyze a variety of fictional texts, narrative nonfiction, and poetry.

a) Explain the use of symbols and figurative language.
b) Make inferences and draw conclusions based on explicit and implied information using evidence from text as support.
c) Explain how authors use characters, conflict, point of view, voice, and tone to create meaning.
d) Understand the author's use of conventional elements and characteristics within a variety of genres.
e) Compare and contrast the author's use of word choice, dialogue, form, rhyme, rhythm, and voice in different texts.
f) Compare and contrast authors' styles.
g) Identify and ask questions that clarify various viewpoints.
h) Identify the main idea.
i) Summarize text relating supporting details.
j) Identify an author's organizational pattern using textual clues, such as transitional words and phrases.
k) Identify cause and effect relationships.
l) Use prior and background knowledge as a context for new learning.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will continue to develop an understanding of each literary form and its characteristics. • Students will understand that some literary characteristics are common to more than one form. • Students will read at and beyond the literal level, including making **inferences**, i.e., making judgments or drawing conclusions based on what an author has implied. • The **initiating event** is the incident that introduces the central conflict in a story; it may have occurred before the story opens. • **Tone** is used to express a writer's attitude toward the subject. • **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing. Voice	**All students should** • ~~analyze~~ understand that an author's ~~craft and style~~ voice and tone stem from the stylized use of literary devices. • compare and contrast the characteristics of literary forms, including: ° novel; ° short story; ° biography; ° essay; ° speech; ° poetry; and ° memoir. • understand **characterization** as the way that an author presents a character and	**To be successful with this standard, students are expected to** • ~~understand~~ identify the elements of ~~story~~ narrative structure, including: ° setting – time~~,~~ and place~~, and duration in a story;~~ ° character(s), either: - **static –** remaining the same during the course of the story, or - **dynamic** – changing during the course of and as a result of the story ° external conflicts, such as: - individual vs. individual - individual vs. nature - individual vs. society - individual vs. supernatural - individual vs. technology ° internal conflict – individual vs. self ° plot - initiating event - rising action - climax - falling action - resolution

8.5 The student will read and analyze a variety of fictional texts, narrative nonfiction, and poetry.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
is the imprint of the writer — the capacity to elicit a response from the reader. • **Mood** refers to the emotional atmosphere produced by an author's use of language. • **Point of view** is the way an author reveals events and ideas in a story. With an omniscient or "all knowing" point of view, a narrator sees all, hears all, and knows all. By contrast, a limited point of view depicts only what one character or narrator sees, hears, and feels. The point of view may be first person, narrated by someone outside the story or a character within the story. The point of view may also be third person, limited or omniscient, depending on what is known of the story. • A **symbol** is anything that represents something else, often by indirect association or by the convention of an emblem, token, or word. In both prose and poetry, concrete objects used as	reveals character traits. • understand that poetic devices are used in prose and poetry. • identify author's voice. • make inferences, draw conclusions, and point to an author's implications in the text. • understand the relationship between causes and effects. • understand that a cause may have multiple effects. • understand that an effect may have multiple causes. • understand and use the reading process to facilitate comprehension.	° theme • recognize different plot patterns including subplots. • understand and analyze elements of an author's style, including: ° dialogue; ° sentence structure; ° language patterns; ° tone, including - serious - solemn - sarcastic - objective - enthusiastic - humorous - hostile - disapproving - personal - impersonal ° voice. • differentiate among points of view in stories, including:

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
symbols stand for larger ideas or feelings. The general characteristic of poetry, i.e., its suggestiveness, makes possible the expression of complex feelings and experiences in a few words. Symbolism, like metaphor, imagery, and allusion, is a powerful instrument for the expression of large worlds of meaning in a few words. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.	• read several texts on a similar topic and synthesize what is read ~~in writing to be presented orally~~.	◦ first person; ◦ third person limited to a character or narrator; and ◦ third person omniscient. • analyze how differences in points of view can create such effects as suspense or humor. • ~~understand~~ analyze an author's use of literary devices, including: ◦ **foreshadowing** – the giving of clues to hint at coming events in a story; ◦ **irony –** the implication, through plot or character, that the actual situation is quite different from that presented; ◦ **flashback –** a return to an earlier time in the course of a narrative to introduce prior information; and ◦ **symbolism –** the use of concrete and recognizable things to represent ideas. • analyze poetic devices in prose and poetry, including: ◦ word choice; ◦ figurative language; ◦ symbolism; ◦ imagery;

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ rhyme; ◦ rhythm; ◦ repetition; and ◦ sound elements. ◦ ~~pun~~ ◦ ~~oxymoron~~ • evaluate an author's choice of words and images. • identify poetic forms, including: ◦ **haiku** – a 17-syllable, delicate, unrhymed Japanese verse, usually about nature; ◦ **limerick** – a 5-line, rhymed, rhythmic verse, usually humorous; ◦ **ballad** – a songlike narrative poem, usually featuring rhyme, rhythm, and refrain; ◦ **free verse –** poetry with neither regular meter nor rhyme scheme; ◦ **couplet** – a pair of rhyming lines; and ◦ **quatrain** – a stanza containing four lines. • compare and contrast an author's choice of sound elements in prose and poetry, including: ◦ **rhyme** – recurring identical or similar final word sounds within or at

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		the ends of lines of verse; ◦ **rhythm** – the recurring pattern of strong and weak syllabic stresses; ◦ **meter** – a fixed pattern of accented and unaccented syllables in lines of fixed length to create rhythm; ◦ **repetition –** repeated use of sounds, words, or ideas for effect and emphasis; ◦ **alliteration** – repetition of initial sounds, e.g., *picked a peck of pickled peppers*; and ◦ ~~**assonance** – repetition of vowel sounds, e.g., *mad hatter*~~ ◦ ~~**consonance** – repetition of final consonant sounds, e.g., *east/west*~~ ◦ **onomatopoeia** – the use of a word whose sound suggests its meaning (e.g., *buzz*.). • determine a theme of a text and analyze its development over the course of the text. • analyze how differences in points of view can create such effects as suspense or humor. • use graphic organizers ~~and/or rules~~ to analyze and summarize text. • recognize an author's use of connotations and persuasive

8.5 The student will read and analyze a variety of fictional texts, narrative nonfiction, and poetry.

a) Explain the use of symbols and figurative language.
b) Make inferences and draw conclusions based on explicit and implied information using evidence from text as support.
c) Explain how authors use characters, conflict, point of view, voice, and tone to create meaning.
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k) Identify cause and effect relationships.
l) Use prior and background knowledge as a context for new learning.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		language, ~~and craftsmanship~~ to convey a viewpoint.

8.6 The student will read, comprehend, and analyze a variety of nonfiction texts.

a) Draw on background knowledge and knowledge of text structure to understand selections.
b) Make inferences and draw conclusions based on explicit and implied information using evidence from text as support.
c) Analyze the author's qualifications, viewpoint, and impact.
d) Analyze the author's use of text structure and word choice.
e) Analyze details for relevance and accuracy.
f) Differentiate between fact and opinion.
g) Identify the main idea.
h) Summarize the text identifying supporting details.
i) Identify an author's organizational pattern using textual clues, such as transitional words and phrases.
j) Identify cause and effect relationships.
k) Evaluate, organize, and synthesize information for use in written and oral formats.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will analyze a variety of ~~informational~~ nonfiction sources and teachers will model the higher-order thinking processes with materials ~~below~~ at the students' independent reading level and move students gradually to collaborative and independent comprehension of age-appropriate materials at the independent reading level. • Teachers will collaborate with students to help ~~students~~ them apply reading skills in a variety of content texts. • ~~Students will use internal and external text structures as an aid to comprehension.~~ • Students will read at and beyond the literal level, using the reading process to predict, question, clarify, infer, organize, compare, summarize, and synthesize. • An author's **viewpoint** refers to his or her bias or subjectivity toward the subject. • Students will work collaboratively and with teacher support to move toward higher-order thinking, using instructional-level reading materials. • **Synthesis** involves higher-order thinking and is a result of forming either a concrete or abstract whole from the logical relation of parts. • Students will use evaluation and conclusion to make reasonable inferences about what has been read by combining new information with what was known prior to reading. • Students will understand that an author's credentials and experiences contribute to his/her viewpoint.	**All students should** • activate prior knowledge before reading. • make predictions prior to and during the reading process. • recognize an author's viewpoint and use of persuasive language. • read and analyze writing critically. • choose graphic organizers based on the internal text structure most prevalent in the text. • use graphic organizers and/or rules to analyze and summarize text. • read several texts on a similar topic and synthesize what is read ~~in writing to be presented orally~~. • evaluate an author's choice of words and images. • recognize an author's use of connotations~~,~~ and persuasive language~~, and craftsmanship~~ to convey viewpoint. • understand that the writer **implies** and the reader **infers.**	**To be successful with this standard, students are expected to** • activate prior knowledge before reading by use of: ◦ small-group or whole-class discussion; ◦ anticipation guides; and ◦ preview of key vocabulary. • recognize an author's use of connotations and persuasive language, ~~and craftsmanship~~ to convey a viewpoint. • analyze and record information, using internal text structures (organizational patterns), including: ◦ cause-and-effect; ◦ comparison/contrast; ◦ enumeration or listing; ◦ sequential or chronological; ◦ concept/definition; ◦ generalization; and ◦ process. • use ~~rules and~~ strategies for summarizing, such as the following: ◦ delete trivia and redundancy; ◦ substitute a general term for a list; and ◦ find or create a main idea statement. • read and follow directions.~~, including:~~ ◦ ~~constructing a structure~~ ◦ ~~completing a recipe~~ ◦ ~~assembling a model~~ ◦ ~~participating in a game~~ ◦ ~~arriving at a destination~~ ◦ ~~completing a form~~ ◦ ~~programming an electronic device~~ • use ~~external~~ text structures such as the following to enhance comprehension and note taking: ◦ boldface and/or italics type; ◦ type set in color; ◦ underlining; ◦ indentation;

8.6 The student will read, comprehend, and analyze a variety of nonfiction texts.

a) Draw on background knowledge and knowledge of text structure to understand selections.
b) Make inferences and draw conclusions based on explicit and implied information using evidence from text as support.
c) Analyze the author's qualifications, viewpoint, and impact.
d) Analyze the author's use of text structure and word choice.
e) Analyze details for relevance and accuracy.
f) Differentiate between fact and opinion.
g) Identify the main idea.
h) Summarize the text identifying supporting details.
i) Identify an author's organizational pattern using textual clues, such as transitional words and phrases.
j) Identify cause and effect relationships.
k) Evaluate, organize, and synthesize information for use in written and oral formats.
l) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• To **critique** text requires that a critical (but not necessarily negative) judgment be made. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.		◦ sidebars; ◦ illustrations, graphics, and photographs; ◦ headings and subheadings; and ◦ footnotes and annotations. • analyze an author's choice of details by examining: ◦ accuracy; ◦ placement; ◦ thoroughness; ◦ relevance; and ◦ effectiveness. • distinguish between subjective and objective writing. • use graphic organizers~~, such as "It says…I say,"~~ to record clues in the text and inferences or conclusions made by the reader as a result of those clues. • analyze two or more texts with conflicting information on the same topic and identify how the texts disagree.

At the eighth-grade level, students will plan, draft, revise, and edit narratives as well as ~~informational~~ expository, persuasive, and ~~expository~~ informational pieces with attention to composition and written expression. Students will continue the process of becoming independent with sentence formation, usage, and mechanics and understand that the conventions of language help convey the message from the writer to the reader. Students will use writing for expressive purposes and as a tool for learning academic concepts. They will use available and appropriate technology ~~as available and appropriate~~.

8.7 The student will write in a variety of forms, including narration, exposition, persuasion, and informational.

a) Identify intended audience.
b) Use prewriting strategies to generate and organize ideas.
c) Distinguish between a thesis statement and a topic sentence.
d) Organize details to elaborate the central idea and provide unity.
e) Select specific vocabulary and information for audience and purpose.
f) Use interview quotations as evidence.
g) Revise writing for clarity of content, word choice, sentence variety, and transitions among paragraphs.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will become independent and proficient in composing a variety of types of writing. • Teachers will focus direct instruction on all three domains of writing: ◦ **composing** – the structuring and elaborating a writer does to construct an effective message for readers; ◦ **written expression** – those features that show the writer purposefully shaping and controlling language to affect readers; and ◦ **usage/mechanics** – the features that cause written language to be acceptable and effective for standard discourse. • **Elaboration** can occur by using descriptive details and examples ~~*horizontally*~~ within a sentence to give detail and depth to an idea, or ~~*vertically*~~ from paragraph to paragraph chronologically. • **Voice** shows an author's personality, awareness of audience, and passion for his or her subject. It adds liveliness and energy to writing and allows the reader to know the writer's ideas. Voice is the imprint of the writer — the capacity to elicit a response from the reader.	**All students should** • use a process for writing, including: ◦ planning; ◦ drafting; ◦ revising; ◦ proofreading; ◦ editing; and ◦ publishing. • understand that good writing has been elaborated ~~horizontally and vertically~~. • use peer and individual revising and editing. • understand that good writing has been improved through revision. • use ~~word processing tools~~ keyboarding, including spell checkers and grammar checkers when available. • understand and apply the elements of composing:	**To be successful with this standard, students are expected to** • write in a variety of forms, including: ◦ **narrative –** writing to tell a story; ◦ **persuasive –** writing to influence the reader or listener to believe or do as the author or speaker suggests; ◦ **expository –** writing to explain and build a body of well-organized and understandable information; and ◦ **informational –** writing to put forth information, frequently used in textbooks and the news media. • use a variety of prewriting strategies, ~~including~~ for example: ◦ brainstorming; ◦ webbing; ◦ mapping; ◦ outlining; ◦ clustering; ◦ listing; and ◦ using graphic organizers. • use written expression to ~~draft and revise compositions~~ explain, analyze, or summarize a topic with attention to: ◦ purpose and audience; ◦ a central or controlling idea; ◦ voice; tone (such as serious, sarcastic, objective, enthusiastic, solemn,

8.7 The student will write in a variety of forms, including narration, exposition, persuasion, and informational.

a) Identify intended audience.
b) Use prewriting strategies to generate and organize ideas.
c) Distinguish between a thesis statement and a topic sentence.
d) Organize details to elaborate the central idea and provide unity.
e) Select specific vocabulary and information for audience and purpose.
f) Use interview quotations as evidence.
g) Revise writing for clarity of content, word choice, sentence variety, and transitions among paragraphs.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Tone** expresses an author's attitude toward the subject. • **Coherence** means that each part of the writing appears to be 'connected' and heading towards a single conclusion or theme in the text. • ~~A~~ The writing process is nonlinear; returning to prewriting or drafting at any point in the process may help the writer clarify and elaborate the drafted piece. • Students will begin to assume responsibility for revising, proofreading, and editing their own writing. • Students should have practice writing on demand, for shorter time frames, and over extended periods of time.	◦ central idea; ◦ elaboration; ◦ unity; and ◦ organization. • understand that a topic sentence supports an essay's thesis statement; it unifies a paragraph and directs the order of the sentences.	humorous, hostile, personal, impersonal); ◦ coherent selection of information and details; ◦ embedded phrases and clauses that clarify meaning and increase variety; ◦ vivid and precise vocabulary; ◦ figurative language; ◦ sentence variety; and ◦ transitional words and phrases. • apply revising procedures, including: ◦ rereading; ◦ reflecting; ◦ rethinking; ◦ rewriting; ◦ including vivid vocabulary; ◦ combining sentences for variety and rhythm; and ◦ providing transitions between ideas and paragraphs. • create a thesis statement that focuses the essay, expresses the writer's position in an argument, or explains the purpose of the essay, and is usually found in the first paragraph. • elaborate the central idea providing sustained unity throughout the writing. • use appropriate and varied transitions to create cohesion and clarify the

8.7 The student will write in a variety of forms, including narration, exposition, persuasion, and informational.

a) Identify intended audience.
b) Use prewriting strategies to generate and organize ideas.
c) Distinguish between a thesis statement and a topic sentence.
d) Organize details to elaborate the central idea and provide unity.
e) Select specific vocabulary and information for audience and purpose.
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g) Revise writing for clarity of content, word choice, sentence variety, and transitions among paragraphs.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		relationships among ideas and concepts. • sustain a formal style. • develop a conclusion.

8.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Use and punctuate correctly varied sentence structures to include conjunctions and transition words.
c) Choose the correct case and number for pronouns in prepositional phrases with compound objects.
d) Maintain consistent verb tense across paragraphs.
e) Use comparative and superlative degrees in adverbs and adjectives.
f) Use quotation marks with dialogue and direct quotations.
g) Use correct spelling for frequently used words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will understand and apply all the conventions of language learned at the elementary and middle school levels. • Students will maintain correct use of language to enhance writing and to avoid confusing or distracting the reader. • The conventions of correct language are an integral part of the writing process. • ~~A d~~Diagramming ~~of a~~ sentences is a ~~tool~~ strategy to increase understanding of ~~its~~ their structure.	**All students should** • proofread and edit drafts with teacher assistance, peer collaboration, and growing independence. • understand that pronouns need to agree with antecedents in gender, number, and person. • understand that verbs must agree with subjects.	**To be successful with this standard, students are expected to** • use complete sentences with appropriate punctuation, including the punctuation of dialogue and the punctuation between dependent and independent clauses. • diagram ~~complex~~ sentences with phrases and clauses. • use a singular verb with a singular subject and a plural verb with a plural subject. ~~, e.g., *John* buys *lunch, but most of his friends* bring *lunches from home.*~~ • use a singular pronoun to refer to a singular antecedent and a plural pronoun to refer to a plural antecedent. ~~, e.g., *All students should bring* their *notebooks to class. Each student must provide* his *own pen.*~~ • use objective pronouns in prepositional phrases with compound objects. ~~, e.g., *Grandma gave cookies to Peter and* me.~~ • choose and maintain tense (present, past, future) ~~and~~ throughout an entire paragraph or text. • use comparative and superlative adjectives. ~~, e.g., *Jim was the* brightest *student in the middle school. He was even* brighter *than some of the students in the high school.*~~ • use comparative and superlative adverbs. ~~, e.g., The second time she read aloud, she read more fluently than the first time. After much practice, she read most fluently of all her classmates.~~

8.8 The student will edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a variety of graphic organizers, including sentence diagrams, to analyze and improve sentence formation and paragraph structure.
b) Use and punctuate correctly varied sentence structures to include conjunctions and transition words.
c) Choose the correct case and number for pronouns in prepositional phrases with compound objects.
d) Maintain consistent verb tense across paragraphs.
e) Use comparative and superlative degrees in adverbs and adjectives.
f) Use quotation marks with dialogue and direct quotations.
g) Use correct spelling for frequently used words.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use and correctly punctuate transitional words, such as *furthermore, however, since*, and *next*. • use ~~and~~ correct~~ly punctuate~~ conjunctions, such as *either/or* and *neither/nor*. • embed quotations from other sources with skill and accuracy. • use quotation marks correctly with dialogue.

At the eighth-grade level, students will apply knowledge of appropriate reference material to produce a research product including the collection and organization of information from multiple online, print, and media sources. They will extend skills in the evaluation of sources and the use of technology to research, organize, evaluate, and communicate information. In addition, they will continue to cite sources and avoid plagiarism by using Modern Language Association (MLA) or American Psychological Association (APA) style guidelines.

8.9 The student will apply knowledge of appropriate reference materials to produce a research product.

a) Collect and synthesize information from multiple sources including online, print and media.
b) Evaluate the validity and authenticity of texts.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
e) Cite primary and secondary sources using Modern Language Association (MLA) or American Psychological Association (APA) style.
f) Publish findings and respond to feedback.
g) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will collect resources, evaluate their usefulness, conduct research, and appropriately cite reliable sources of information. • Students will evaluate the accuracy and authenticity of multiple sources. • Students will evaluate the intent of the author, which may include misinformation, bias, and unsupported assertions.	**All students should** • determine if a source is trustworthy and accurate. • understand that using multiple sources of information produces a more complete understanding of a topic.	**To be successful with this standard, students are expected to** • understand that a **primary source** is an original document or a firsthand or eyewitness account of an event. • understand that a **secondary source** discusses information originally presented somewhere else. Secondary sources provide analysis, interpretation, or evaluation of the original information. • use a variety of strategies to generate notes, and determine the central ideas of a primary or secondary source, synthesize information, and provide an accurate summary. • embed quotations from other sources with skill and accuracy. • evaluate the validity and authenticity of texts, using questions such as: ° Does the source appear in a reputable publication? ° Is the source free from bias? Does the writer have something to gain from his opinion? ° Does the information contain facts for support? ° Is the same information found in more than one source? • conduct short research projects to answer a question drawing on several sources and generating questions.

8.9 The student will apply knowledge of appropriate reference materials to produce a research product.

a) Collect and synthesize information from multiple sources including online, print and media.
b) Evaluate the validity and authenticity of texts.
c) Use technology as a tool to research, organize, evaluate, and communicate information.
d) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
e) Cite primary and secondary sources using Modern Language Association (MLA) or American Psychological Association (APA) style.
f) Publish findings and respond to feedback.
g) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use computer technology to research, organize, evaluate, and communicate information. • document using a standard form such as MLA or APA. • avoid plagiarism, give credit whenever using another person's idea or opinion, facts, statistics, graphs, drawings, quotations, or paraphrases of another person's words.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Nine

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the ninth-grade level, students will develop interpersonal communication skills as well as those skills required for more formal public speaking opportunities. They ~~will present and critique dramatic readings of literary selections and~~ will continue to develop proficiency in making planned oral presentations independently and in small groups. ~~Students will apply grammatical conventions in writing and speaking~~ They will continue to develop media literacy by producing, analyzing, and evaluating auditory, visual, and written media messages.

9.1 The student will make planned oral presentations independently and in small groups.

a) Include definitions to increase clarity.
b) Use relevant details to support main ideas.
c) Illustrate main ideas through anecdotes and examples.
d) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
e) Use verbal and nonverbal techniques for presentation.
f) Evaluate impact and purpose of presentation.
g) Credit information sources.
h) Give impromptu responses to questions about presentation.
i) Give and follow spoken directions to perform specific tasks, answer questions, or solve problems.
j) Use a variety of strategies to listen actively.
k) Summarize and evaluate information presented orally by others.
l) Assume shared responsibility for collaborative work.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~Students should select, plan, make, and critique dramatic readings of literary selections.~~ • ~~Students may develop characters by using appropriate dialects.~~ • ~~Students may use costumes and props to enhance dramatic scenes.~~	**All students should**	**To be successful with this standard, students are expected to** • ~~choose and participate in dialogue scenes from plays, dramatic readings from short stories and/or novels, and interpreted performances of poetry~~ • ~~adapt presentation techniques to fit a literary form~~

9.1 The student will make planned oral presentations independently and in small groups.

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will make planned oral presentations that are three to five minutes in duration. • Students should cite sources according to proper MLA or APA format.	**All students should** • ~~define~~ understand that technical and specialized language ~~to~~ helps the audience ~~understand~~ comprehend the content of ~~their~~ oral presentations. • understand that verbal techniques ~~include but are not limited to appropriate tone, diction, articulation, clarity, type and rate of delivery, and the use of pauses for emphasis~~ are important for effective communication. • ~~understand that nonverbal techniques include but are not limited to eye contact, facial expressions, gestures, and stance~~	**To be successful with this standard, students are expected to** • define technical and specialized language ~~include definitions~~ to increase clarity of their oral presentations. • include details, such as facts, statistics, quotations, information from interviews and surveys, and pertinent information discovered during research, to support the main ideas of their oral presentations. • organize presentation in a structure appropriate to the audience, topic, and purpose (problem-solution, comparison-contrast, cause-effect, etc.). • use examples from their knowledge and experience to support the main ideas of their oral presentation. • use grammar and vocabulary appropriate for situation, audience, topic, and purpose. • use nonverbal techniques including, but not limited, to eye contact, facial expressions, gestures, and stance. • use verbal techniques including, but not limited to, appropriate tone, diction, articulation, clarity, type, and rate. • keep eye contact with audience, adjust volume, tone, and rate, be aware of postures and gestures, use natural tone.

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b) Use relevant details to support main ideas.
c) Illustrate main ideas through anecdotes and examples.
d) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
e) Use verbal and nonverbal techniques for presentation.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

	• ~~cite information sources~~
	• understand that crediting sources is important to prevent plagiarism and establish credibility.
	• ~~respond clearly and informatively with poise to the audience's questions about their oral presentations~~
	• demonstrate the ability to work effectively with diverse groups, including:
	  • exercising flexibility in making necessary compromises to accomplish a common goal.
	  • understanding the purpose for working as a team and working toward that purpose.
	  • maintaining collaboration
		• analyze and critique the relationship among purpose, audience, and content of presentations.
		• evaluate the impact of presentations, including the effectiveness of verbal and nonverbal techniques using a rubric or checklist.
		• give credit in their oral presentations to authors, researchers, and interviewers by citing titles of articles, magazines, newspapers, books, documents, and other reference materials used in the presentations.
		• respond to questions about their oral presentations.
		• work with peers to set rules for group presentations and discussions, set clear goals and deadlines, and define individual roles as needed.
		• move conversations ahead by asking and responding to questions actively, and involving others in the discussion.
		• use active listening skills by looking at the speaker, using body language to indicate attentiveness, and give appropriate feedback.
		• summarize or paraphrase what others have said to show attentiveness: "It sounds like you were saying. . ." and provide an evaluation of others' information.
		• ~~use verbal and nonverbal techniques~~
		• analyze and critique the effectiveness of a speaker's or group's demeanor,

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
	by ensuring that all ideas are treated respectfully and acknowledged. • coming to agreement by seeking consensus.	voice, language, gestures, clarity of thought, organization of evidence, relevance of information, and delivery. • analyze and critique the relationship among purpose, audience, and content of presentations.

9.2 The student will produce, analyze, and evaluate auditory, visual, and written media messages.

a) Analyze and interpret special effects used in media messages including television, film, and Internet.
b) Determine the purpose of the media message and its effect on the audience.
c) Describe possible cause and effect relationships between mass media coverage and public opinion trends.
d) Evaluate sources including advertisements, editorial, and feature stories for relationships between intent and factual content.
e) Monitor, analyze, and use multiple streams of simultaneous information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will develop media literacy by studying various media components and messages. • Students will also recognize that all media messages are constructed and that to understand the whole meaning of the message they can *deconstruct* it, looking at the following attributes: ◦ **Authorship** (Who constructed the message?) ◦ **Format** (This is not just the medium being used but also how the creators used specific elements for effect, i.e., color, sound, emphasis on certain words, amateur video, kids' voices.) ◦ **Audience** (Who is the person or persons meant to see the message? How will different people *see* the message?) ◦ **Content** (This is not just the visible content but the embedded content as well which includes underlying assumptions of values or points of view; facts and opinions may be intermixed.) ◦ **Purpose** (Why is the message being sent—is it meant to persuade, inform, entertain, sell, or a combination of these?)	**All students should** • understand that an awareness of special effects and persuasive techniques aids in the interpretation of media messages. • understand persuasive language and word connotations to convey viewpoint and bias.	**To be successful with this standard, students are expected to** • create and publish media messages, such as public service announcements aimed at a variety of audiences and with different purposes. • recognize that persuasive techniques are used to convince viewers to make decisions, change their minds, take a stand on an issue, or predict a certain outcome, such as: ◦ ad hominem – means "to the man" does not argue the issue, instead it argues the person; ◦ red herring – is a deliberate attempt to divert attention; ◦ straw man – creates the illusion of having refuted a proposition by substituting a similar yet weaker proposition (the "straw man"); ◦ begging the question – assumes the conclusion is true without proving it; circular argument; ◦ testimonial – uses famous people to endorse the product or idea; ◦ ethical appeal – establishes the writer as knowledgeable; ◦ emotional appeal – appeals strictly to emotions often used with strong visuals; and ◦ logical appeal – is the strategic use of logic, claims, and evidence. • identify and evaluate word choice in the media. • investigate the use of bias and viewpoints in media. • describe the effect of persuasive messages in the media on the audience. • identify public opinion trends and possible causes. • identify and analyze choice of information in the media and distinguish between fact and opinion.

9.2 The student will produce, analyze, and evaluate auditory, visual, and written media messages.

a) Analyze and interpret special effects used in media messages including television, film, and Internet.
b) Determine the purpose of the media message and its effect on the audience.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		identify and analyze sources and viewpoints in the media.
		
		analyze information from many different print and electronic sources.
		
		• identify basic principles of media literacy:
		  ◦ media messages are constructed;
		  ◦ messages are representations of reality with values and viewpoints;
		  ◦ each form of media uses a unique set of rules to construct messages;
		  ◦ individuals interpret based on personal experience; and
		  ◦ media are driven to gain profit or power.
		
		• identify key questions of media literacy:
		  ◦ Who created the message?
		  ◦ What techniques are used to attract attention?
		  ◦ How might different people react differently to this message?
		  ◦ What values, lifestyles and points of view are represented in, or omitted from, this message?
		  ◦ What is the purpose of this message?

At the ninth-grade level, students will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts. They will be introduced to literary works from a variety of cultures and eras, and they will apply knowledge of literary terms and forms to their reading and writing and to analyses of literature and other printed materials. Students will continue to develop their reading comprehension skills through utilizing strategies to identify formats, text structures, and main ideas. They will apply these skills across the content areas, including history and social science, science, and mathematics. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity.

9.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms.
e) Identify literary and classical allusions and figurative language in text.
f) Extend general and specialized vocabulary through speaking, reading, and writing.
g) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will increase their independence as learners of vocabulary. • Students will use prefixes, suffixes, roots, derivations, and inflections of polysyllabic words to determine meaning and relationships among related words. • Teachers should use a study of cognates (words from the same linguistic family) to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Students will evaluate the use of figurative language and analogies in text. • Students will use context and connotations to help determine the meaning of nearly synonymous words and appreciate an author's choices of words and images.	**All students should** • recognize internal and external inflections that change meaning and pronunciation. • recognize that figurative language enriches text. • understand that word structure aids comprehension of unfamiliar and complex words.	**To be successful with this standard, students are expected to** • use word structure to analyze and relate words. • use roots or affixes to determine or clarify the meaning of words. • recognize that words have nuances of meaning and that understanding the connotations may be necessary to determine the appropriate meaning. • demonstrate an understanding of idioms. • use prior reading knowledge and other study to identify the meaning of literary and classical allusions. • interpret figures of speech (e.g., euphemism, oxymoron) in context and analyze their role in the text. • analyze connotations of words with similar denotations. • use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. • identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive*, *conception*, *conceivable*). • consult general and specialized reference materials (e.g., dictionaries, thesaurus). • demonstrate understanding of figurative language, word relationships, and

9.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms.
e) Identify literary and classical allusions and figurative language in text.
f) Extend general and specialized vocabulary through speaking, reading, and writing.
g) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Connotation** is subjective, cultural and emotional. A stubborn person may be described as being either *strong-willed* or *pig-headed*. They have the same literal meaning (i.e., *stubborn*), *strong-willed* connotes admiration for the level of someone's will, while *pig-headed* **connotes** frustration in dealing with someone. • **Denotation** is a dictionary definition of a word. • **Idiom** relates to a natural way of using language: the way of using a language that comes naturally to its native speakers,(e.g., blessing in disguise, chip on your shoulder). • An **allusion** is an indirect reference to a person, place, event or thing-- real or fictional. J.D. Salinger's "The Catcher in the Rye" is an allusion to a poem by Robert Burns. Stephen Vincent Benet's story "By the Waters of Babylon" alludes to Psalm 137 in the Bible.		connotations in word meanings.

9.4 The student will read, comprehend, and analyze a variety of literary texts including narratives, narrative nonfiction, poetry, and drama.

a) Identify author's main idea and purpose.
b) Summarize text relating the supporting details.
c) Identify the characteristics that distinguish literary forms.
d) Use literary terms in describing and analyzing selections.
e) Explain the relationships between and among elements of literature: characters, plot, setting, tone, point of view, and theme.
f) Compare and contrast the use of rhyme, rhythm, sound, imagery, and other literary devices to convey a message and elicit the reader's emotion.
g) Analyze the cultural or social function of a literary text.
h) Explain the relationship between the author's style and literary effect.
i) Explain the influence of historical context on the form, style, and point of view of a written work.
j) Compare and contrast author's use of literary elements within a variety of genres.
k) Analyze how an author's specific word choices and syntax achieve special effects and support the author's purpose.
l) Make predictions, inferences, draw conclusions, and connect prior knowledge to support reading comprehension.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Strategies for reading should be used to develop reading comprehension skills. Students will apply a process for reading as they analyze a variety of literature. They will study classical and contemporary selections that represent literary forms. • Students will enhance their understanding of the characteristics of various literary forms through the reading and analysis of a variety of genres, such as poetry, prose, essays, short stories, historical fiction, and narrative nonfiction. • Students will understand that literary texts can fulfill a social or cultural function depending on the time, location, and purpose of the author. For example, *The Grapes of Wrath*, which	**All students should** • ~~understand the relationships between and among the elements of literature and the ways these elements work together to create effective literary selections.~~ • understand the relationship between an author's style and literary effect. • understand an author's use of figurative language to create images, sounds, and effects. • understand an author's use of structuring techniques to	**To be successful with this standard, students are expected to** • identify main idea, purpose, and supporting details. • provide a summary of the text. • identify the differing characteristics that distinguish the literary forms ~~of~~, including: ◦ narrative – short story, anecdote, character sketch, fable, legend, myth, tall tale, allegory; ~~, biography, autobiography, novel~~ ◦ poetry – epic, ballad, sonnet, lyric, elegy, ode; ◦ drama – comedy, tragedy; ◦ essay – editorial, journal/diary entry, informative/explanatory essay, analytical essay, speech; and ◦ narrative nonfiction – biographies, autobiographies, personal essays. • identify ~~the components of scripting~~ and analyze elements of dramatic literature :

9.4 The student will read, comprehend, and analyze a variety of literary texts including narratives, narrative nonfiction, poetry, and drama.

a) Identify author's main idea and purpose.
b) Summarize text relating the supporting details.
c) Identify the characteristics that distinguish literary forms.
d) Use literary terms in describing and analyzing selections.
e) Explain the relationships between and among elements of literature: characters, plot, setting, tone, point of view, and theme.
f) Compare and contrast the use of rhyme, rhythm, sound, imagery, and other literary devices to convey a message and elicit the reader's emotion.
g) Analyze the cultural or social function of a literary text.
h) Explain the relationship between the author's style and literary effect.
i) Explain the influence of historical context on the form, style, and point of view of a written work.
j) Compare and contrast author's use of literary elements within a variety of genres.
k) Analyze how an author's specific word choices and syntax achieve special effects and support the author's purpose.
l) Make predictions, inferences, draw conclusions, and connect prior knowledge to support reading comprehension.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
focuses on the plight of migrant farmers, affected the conscience of a nation and helped laws to change. • Students will understand that parallel plots are plots in which each main character has a separate but related story line that merges together (e.g., *A Tale of Two Cities*). • Students will read one-act and full-length plays. • Students will analyze various dramatic works. • Students will understand how stage directions enhance the impact of dramatic works in reading and in performance. • Students will use a variety of reading strategies including text annotation, QAR (Question-, Answer Relationships), thinking aloud, etc.	present literary content. • understand the techniques an author uses to convey information about a character. • understand character types. • understand a character's development throughout a text. • understand how authors are often influenced either consciously or unconsciously by the ideas, ~~and~~ values, and location ~~of the times~~ in which they live. • understand that in dramatic works, setting, mood,	◦ dramatic structure: exposition/initiating event, rising action, complication/conflict, climax, falling action, resolution/denouement (conclusion/resolution); ◦ monologue; ◦ soliloquy; ◦ dialogue; ◦ aside; ◦ dialect; and ◦ stage directions. • describe how stage directions help the reader understand a play's setting, mood, characters, plot, and theme. • compare and contrast the representation of a subject or a key scene in two different media and analyze what is emphasized in each. • identify ~~the components of scripting~~ and analyze elements of dramatic literature :

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
	characters, plot, and theme are often revealed through staging as well as through narration and dialogue~~, which are used in short stories and novels to create these elements~~.	◦ dramatic structure: exposition/initiating event, rising action, complication/conflict, climax, falling action, resolution/denouement (conclusion/resolution); ◦ monologue; ◦ soliloquy; ◦ dialogue; ◦ aside; ◦ dialect; and ◦ stage directions. • explain the relationships ~~between and~~ among the elements of literature, such as: ◦ protagonist and other characters; ◦ plot; ◦ setting; ◦ tone; ◦ point of view – first person, third person limited, third person

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		omniscient; ◦ theme; ◦ speaker; and ◦ narrator. • analyze the techniques used by an author to convey information about a character.~~, such as:~~ ◦ ~~direct exposition – what is said about the character;~~ ◦ ~~character's actions – what the character does; and~~ ◦ ~~character's thoughts – what the character thinks.~~ • analyze character types, including: ◦ dynamic/round character; ◦ static/flat character; and ◦ stereotype and caricature. • analyze how authors create multilayered characters through the use of literary devices: indirect and direct methods of characterization, character's

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		actions, interactions with other characters, dialogue, physical appearance, and thoughts. • analyze how characters with multiple or conflicting motivations develop over the course of a text, interact with other characters, and advance the plot or develop theme. • analyze how the plot structures (conflict, resolution, climax, and subplots) advance the action in literature, • determine a theme of a text and analyze its development over the course of the text. • compare and contrast ~~identify~~ types of figurative language and other literary devices, ~~including images and sounds,~~ such as: ° simile; ° metaphor; ° personification; ° analogy;

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		◦ symbolism; ◦ apostrophe; ◦ allusion; ◦ imagery; ◦ paradox; and ◦ oxymoron. • identify sound devices, including: ◦ rhyme (approximate, end, slant) ◦ rhythm; ◦ repetition; ◦ alliteration; ◦ assonance; ◦ consonance; ◦ onomatopoeia; and ◦ parallelism.

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		• identify and analyze an author's presentation of literary content by the use of structuring techniques, such as: ° dialogue; ° foreshadowing; ° <u>parallel plots;</u> ° <u>subplots and multiple story lines;</u> ° flashback; ° soliloquy; ° verse; ° <u>refrain; and</u> ° stanza forms - couplet - quatrain - sestet - octet (octave).

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• identify and analyze an author's use of diction (word choice) <u>and syntax</u> to convey ideas and content, including: ◦ rhetorical question; ◦ cliché; ◦ connotation; ◦ denotation; ◦ hyperbole; ◦ understatement; ◦ irony; - dramatic - situational - verbal ◦ dialect; and ◦ pun. • ~~identify the components of staging:~~ ◦ ~~lighting design and cues~~

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ ~~costume design~~ ◦ ~~set design~~ ◦ ~~set decoration: props~~ ◦ ~~stage movement (blocking)~~ ◦ ~~voice: tone, pitch, inflection, emotion~~ ◦ ~~facial expressions~~ ◦ ~~make-up~~ ◦ ~~curtain cues~~ ◦ ~~music/sound effects~~ • ~~identify the components of scripting:~~ ◦ ~~dramatic structure: exposition/initiating event, rising action, complication/conflict, climax, falling action, resolution/denouement (conclusion/resolution)~~ ◦ ~~monologue~~ ◦ ~~soliloquy~~ ◦ ~~dialogue~~

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ ~~aside~~ ◦ ~~dialect~~ • ~~compare and contrast the elements of character, setting, and plot in or among one-act plays and full-length plays~~ • ~~identify the components of staging:~~ ◦ ~~lighting design and cues~~ ◦ ~~costume design~~ ◦ ~~set design~~ ◦ ~~set decoration: props~~ ◦ ~~stage movement (blocking)~~ ◦ ~~voice: tone, pitch, inflection, emotion~~ ◦ ~~facial expressions~~ ◦ ~~make-up~~ ◦ ~~curtain cues~~ ◦ ~~music/sound effects~~

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~compare and contrast the elements of character, setting, and plot in or among one-act plays and full-length plays~~

9.5 The student will read and analyze a variety of nonfiction texts.

a) Recognize an author's intended purpose for writing and identify the main idea.
b) Summarize text relating supporting details.
c) Understand the purpose of text structures and use those features to locate information and gain meaning from texts.
d) Identify characteristics of expository, technical, and persuasive texts.
e) Identify a position/argument to be confirmed, disproved, or modified.
f) Evaluate clarity and accuracy of information.
g) Analyze and synthesize information in order to solve problems, answer questions, or complete a task.
h) Draw conclusions and make inferences on explicit and implied information using textual support as evidence.
i) Differentiate between fact and opinion.
j) Organize and synthesize information from sources for use in written and oral presentations.
k) Use the reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

• ~~This standard encourages the implementation and use of activities that support a process for reading.~~
• The intent of this standard is that students will read and analyze a variety of nonfiction, i.e., informational/factual prose materials.
• Students will understand the purpose of text structures and use those features to locate information, such as: problem-solution, cause and effect, ordered sequence, definition or description with a list.
• Students will understand before-, during-, and after-reading strategies.
• Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.
	All students should
	• ~~employ activities that support the reading process~~
	• understand that specialized vocabulary is vocabulary that is unique to a specific content, topic, or discipline.
		To be successful with this standard, students are expected to
		• ~~use before, during-, and after-reading strategies~~
		• identify and infer the main idea from a variety of complex informational text.
		• explain author's purpose in informational text.
		• identify and summarize essential details that support the main idea of informational text.
		• understand and use text features to locate information, such as:
		  ◦ title page;
		  ◦ bolded or highlighted words;
		  ◦ index;
		  ◦ graphics;
		  ◦ charts; and
		  ◦ headings.
		• analyze text structures (organizational pattern), including:
		  ◦ cause and effect;
		  ◦ comparison/contrast;
		  ◦ enumeration or listing;

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b) Summarize text relating supporting details.
c) Understand the purpose of text structures and use those features to locate information and gain meaning from texts.
d) Identify characteristics of expository, technical, and persuasive texts.
e) Identify a position/argument to be confirmed, disproved, or modified.
f) Evaluate clarity and accuracy of information.
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h) Draw conclusions and make inferences on explicit and implied information using textual support as evidence.
i) Differentiate between fact and opinion.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ sequential or chronological; ◦ concept/definition; ◦ generalization; and ◦ process. • identify an author's position/argument within informational text. • evaluate the clarity and accuracy of information found in informational texts, such as manuals, textbooks, business letters, newspapers, etc. ◦ ~~manuals~~ ◦ ~~textbooks~~ ◦ ~~business letters~~ ◦ ~~newspapers~~ ◦ ~~brochures~~ ◦ ~~reports~~ ◦ ~~catalogs~~ ◦ ~~journals~~ ◦ ~~essays~~ ◦ ~~speeches~~ ◦ ~~biographies~~ ◦ ~~autobiographies~~ • ~~apply information gained from sources to complete an assigned task.~~

9.5 The student will read and analyze a variety of nonfiction texts.

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c) Understand the purpose of text structures and use those features to locate information and gain meaning from texts.
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h) Draw conclusions and make inferences on explicit and implied information using textual support as evidence.
i) Differentiate between fact and opinion.
j) Organize and synthesize information from sources for use in written and oral presentations.
k) Use the reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• make inferences and draw conclusions from complex informational text. • use a variety of reading strategies to self-monitor the reading process. • ~~increase general and specialized vocabulary~~ • examine text structures to aid comprehension and analysis of complex, informational texts. • ~~identify information not answered by a selected text~~

At the ninth-grade level, students will write narrative, ~~literary,~~ expository, and ~~informational~~ persuasive forms with an emphasis on analysis. As in every grade, daily writing experiences are essential for all ninth-grade students, and they will demonstrate their understanding through written products. They will develop as writers by participating in a process for writing, including prewriting, organizing, composing, revising, editing, and publishing. Students will edit writings for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

9.6 The student will develop narrative, expository, and persuasive writings for a variety of audiences and purposes.

a) Generate, gather, and organize ideas for writing.
b) Plan and organize writing to address a specific audience and purpose.
c) Communicate clearly the purpose of the writing using a thesis statement where appropriate.
d) Write clear, varied sentences using specific vocabulary and information.
e) Elaborate ideas clearly through word choice and vivid description.
f) Arrange paragraphs into a logical progression.
g) Use transitions between paragraphs and ideas.
h) Revise writing for clarity of content, accuracy and depth of information.
i) Use computer technology to plan, draft, revise, edit, and publish writing

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will plan, compose, revise, and edit writing in a variety of forms and for a variety of audiences and purposes. • Writing will encompass narrative, expository, persuasive, and ~~informational~~ analytical forms. • Students develop as writers by participating in a process for writing — prewriting, organizing, composing, revising, editing, and publishing. • Students should have practice writing for shorter time frames as well as extended time frames.	**All students should** • understand ~~a~~ that writing is a process. • understand the importance of audience and purpose when writing. • understand that the function of a thesis statement is to focus on the purpose of writing.	**To be successful with this standard, students are expected to** • use prewriting strategies and organize ~~their~~ writing. • plan and develop organized and focused written products that demonstrate their understanding of composing, written expression, and usage/mechanics and that reflect an appropriate audience and purpose. • write using a clear, focused thesis that addresses the purpose for writing. • provide an engaging introduction and a clear thesis statement that introduces the information presented. • ~~communicate~~ demonstrate the purpose of ~~their~~ writing as narrative, persuasive, expository, or analytical. • write clear, varied sentences, and increase the use of embedded clauses. • use specific vocabulary and information. • use precise language to convey a vivid picture. • develop the topic with appropriate information, details, and examples. • arrange paragraphs into a logical progression using appropriate words or phrases to signal organizational pattern and transitions between ideas. • revise ~~their~~ writing for clarity, content, depth of information, and intended audience and purpose.

9.6 The student will develop narrative, expository, and persuasive writings for a variety of audiences and purposes.

a) Generate, gather, and organize ideas for writing.
b) Plan and organize writing to address a specific audience and purpose.
c) Communicate clearly the purpose of the writing using a thesis statement where appropriate.
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f) Arrange paragraphs into a logical progression.
g) Use transitions between paragraphs and ideas.
h) Revise writing for clarity of content, accuracy and depth of information.
i) Use computer technology to plan, draft, revise, edit, and publish writing

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~proofread materials for intended audience and purpose~~ • use computer technology to assist in the writing process.

9.7 The student will self- and peer-edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use and apply rules for the parts of a sentence, including subject/verb, direct/indirect object, and predicate nominative/predicate adjective, and coordinating conjunctions.
b) Use parallel structures across sentences and paragraphs.
c) Use appositives, main clauses, and subordinate clauses.
d) Use commas and semicolons to distinguish and divide main and subordinate clauses.
e) Distinguish between active and passive voice.
f) Proofread and edit writing for intended audience and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will focus on editing and the application of grammatical conventions in writing. • Students will understand that parallel structure means using the same grammatical form to express equal or parallel ideas. • Students will understand that a **main clause** is an **independent clause** that expresses a complete thought and can stand alone as a sentence. • Students will understand that a **subordinate clause** is a **dependent clause** and does not express a complete thought. • Students will understand rules for **commas** and **semicolons** when dividing main and subordinate clauses.	**All students should** • ~~know the rules for the parts of a sentence.~~ • understand that grammatical and syntactical choices convey a writer's message. • understand that active voice means that the subject of a verb *performs* the action and passive voice means that the subject of a verb *receives* the action.	**To be successful with this standard, students are expected to** • apply rules for sentence development, including: ° subject/verb; ° direct object; ° indirect object; ° predicate nominative; and ° predicate adjective. • identify and appropriately use coordinating conjunctions: for, and, nor, but, or, yet, and so (FANBOYS). • use parallel structure when: ° linking coordinate ideas; ° comparing or contrasting ideas; and ° linking ideas with correlative conjunctions: - *both…and* - *either…or* - *neither…nor* - *not only…but also*. • use appositives. • distinguish and divide main and subordinate clauses, using commas and semicolons. • use a semicolon, or a conjunctive adverb to link two or more closely related independent clauses.

9.7 The student will self- and peer-edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use and apply rules for the parts of a sentence, including subject/verb, direct/indirect object, and predicate nominative/predicate adjective, and coordinating conjunctions.
b) Use parallel structures across sentences and paragraphs.
c) Use appositives, main clauses, and subordinate clauses.
d) Use commas and semicolons to distinguish and divide main and subordinate clauses.
e) Distinguish between active and passive voice.
f) Proofread and edit writing for intended audience and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• differentiate between active and passive voice to create a desired effect. • proofread and edit writing.

At the ninth-grade level, students will develop skills in using print, electronic databases, ~~and~~ online resources, and other media to access information and create a research product. Students will verify the validity of all information and follow ethical and legal guidelines for using and gathering information. ~~Students~~ They will ~~also~~ use a standard style method to credit sources of ideas used ~~in research writing~~. ~~Students~~ and will demonstrate clear understanding of grammatical conventions through the application of rules for correct use of language, spelling, and mechanics.

9.8 The student will use print, electronic databases, online resources, and other media to access information to create a research product.

a) Use technology as a tool for research to organize, evaluate, and communicate information.
b) Narrow the focus of a search.
c) Find, evaluate, and select appropriate sources to access information and answer questions.
d) Verify the validity and accuracy of all information.
e) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
f) Credit the sources of quoted, paraphrased, and summarized ideas.
g) Cite sources of information using a standard method of documentation such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
h) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~Students will recognize that Internet resources and electronic databases complement books and the traditional library as key avenues for accessing, organizing, and presenting information.~~ • Students will acquire skills in evaluating ~~resources, both print and electronic~~ both print and electronic resources. • Students will become adept at embedding information accessed electronically in a research document. • Students will differentiate their original thoughts and ideas from the thoughts and ideas of others. • Students will distinguish common knowledge from information that is unique to a source or author. • Students will use a standard style method, such as that of the Modern Language Association	**All students should** • ~~understand the definition of plagiarism.~~ • ~~understand the consequences of plagiarism.~~ • understand the format for citing sources of information. • understand that using a standard form of documentation legally protects the intellectual property of writers.	**To be successful with this standard, students are expected to** • use Internet resources, electronic databases, and other technology to access, organize, and present information. • focus the ~~search~~ topic by : ◦ identifying audience; ◦ identifying purpose; ◦ identifying useful search terms; and ◦ combining search terms effectively. • ~~identify and use key terms, such as~~ ◦ ~~electronic database~~ ◦ ~~search engine~~ ◦ ~~electronic mail~~ ◦ ~~World Wide Web~~ ◦ ~~Web browser~~ ◦ ~~online services~~ ◦ ~~hotlinks~~ • scan research information and select resources based upon reliability, accuracy, and relevance to the purpose of the research.

9.8 The student will use print, electronic databases, online resources, and other media to access information to create a research product.

a) Use technology as a tool for research to organize, evaluate, and communicate information.
b) Narrow the focus of a search.
c) Find, evaluate, and select appropriate sources to access information and answer questions.
d) Verify the validity and accuracy of all information.
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f) Credit the sources of quoted, paraphrased, and summarized ideas.
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h) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
(MLA) or the American Psychological Association (APA), to cite sources.		• ~~evaluate resources, both print and electronic, differentiating between Internet sources that are questionable and those that are reliable~~ • ~~apply the rules for responsible use of technology.~~ • differentiate between reliable and unreliable resources. • question the validity and accuracy of information: ° Who is the author or sponsor of the page? ° Are there obvious reasons for bias? ° Is contact information provided? ° Is there a copyright symbol on the page? ° What is the purpose of the page? ° Is the information on the page *primary* or *secondary*? ° Is the information current? ° Can the information on the Web page be verified? • avoid plagiarism by: ° understanding that *plagiarism* is ~~an~~ the act of presenting someone else's ideas as one's own; ° recognizing that one must correctly cite sources to give credit to the author of an original work; ° recognizing that sources of information must be cited even when the

9.8 The student will use print, electronic databases, online resources, and other media to access information to create a research product.

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b) Narrow the focus of a search.
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d) Verify the validity and accuracy of all information.
e) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
f) Credit the sources of quoted, paraphrased, and summarized ideas.
g) Cite sources of information using a standard method of documentation such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
h) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		information has been paraphrased; and ° using quotation marks when someone else's exact words are quoted. • distinguish one's own ideas from information created or discovered by others. • use a style sheet, such as MLA or APA, to cite sources.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Ten

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the tenth-grade level, students will become skilled communicators in small-group learning activities. ~~They will assume and evaluate individual roles in presenting oral reports.~~ Students will participate in, collaborate in, and report on small-group learning activities. They will also examine and critique the overall effectiveness of the group process. They will use grammatically correct language that is appropriate to the topic, audience, and purpose. In addition, students will analyze, produce, and examine similarities and differences between visual and verbal media messages.

10.1 The student will participate in, collaborate in, and report on small-group learning activities.

a) Assume responsibility for specific group tasks.
b) Collaborate in the preparation or summary of the group activity.
c) Include all group members in oral presentation.
d) Choose vocabulary, language, and tone appropriate to the topic, audience, and purpose.
e) Demonstrate the ability to work effectively with diverse teams to accomplish a common goal.
f) Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems.
g) Access, critically evaluate, and use information accurately to solve problems.
h) Evaluate one's own role in preparation and delivery of oral reports.
i) Use a variety of strategies to listen actively.
j) Analyze and interpret other's presentations.
k) Evaluate effectiveness of group process in preparation and delivery of oral reports.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Individual students will actively contribute to group activities and participate in small-group oral presentations. • Students will evaluate their strengths and weaknesses when participating in small-group oral presentations. • Students will examine their preparation, interaction, and performances as group members. In addition, students will evaluate the overall effectiveness of their group's preparation and presentation.	**All students should** • ~~assume responsibility for specific tasks~~ • ~~make an effort to include all group members in the discussions and presentations~~ • ~~periodically reflect on their own role during the process and at the conclusion of the activity~~ • understand that small group collaboration exists beyond the classroom and their ability to effectively participate is an essential skill.	**To be successful with this standard, students are expected to** • assume shared responsibility for collaborative work. • ~~participate in the preparation of an outline or summary of the group activity, including the preparation of their individual roles in the group presentation~~ • ~~assume responsibility for and participate in small-group learning activities by contributing ideas and respectfully listening to and considering the views of the other group members~~. • work with peers to set rules for group presentations and discussions, set clear goals and deadlines, and define individual roles as needed. • respond thoughtfully by summarizing points of agreement and disagreement, qualifying views and understanding. • use appropriate facial expressions, posture, and gestures to indicate active listening. • move conversations ahead by posing and responding to questions, actively involve others in the discussion, and challenge ideas. • exercise flexibility and willingness in making compromises to accomplish a common goal.

10.1 The student will participate in, collaborate in, and report on small-group learning activities.

a) Assume responsibility for specific group tasks.
b) Collaborate in the preparation or summary of the group activity.
c) Include all group members in oral presentation.
d) Choose vocabulary, language, and tone appropriate to the topic, audience, and purpose.
e) Demonstrate the ability to work effectively with diverse teams to accomplish a common goal.
f) Collaborate with others to exchange ideas, develop new understandings, make decisions, and solve problems.
g) Access, critically evaluate, and use information accurately to solve problems.
h) Evaluate one's own role in preparation and delivery of oral reports.
i) Use a variety of strategies to listen actively.
j) Analyze and interpret other's presentations.
k) Evaluate effectiveness of group process in preparation and delivery of oral reports.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• use grammatically correct language. • ~~evaluate their own roles in the preparation and delivery of oral reports~~ • ~~evaluate the effectiveness of the group process in preparation and delivery of oral reports~~ • ~~critique and offer suggestions for improving their own group's presentations and their classmates' group presentations~~ • ~~define a specific role as a group member~~ • ~~access and organize information as part of a group project~~ • ~~evaluate their own roles in the preparation and delivery of oral reports~~ • ~~evaluate the effectiveness of the group process in preparation and delivery of oral reports~~ • ~~critique and offer suggestions for improving their own group's presentations and their classmates' group presentations~~

10.2 The student will analyze, produce, and examine similarities and differences between visual and verbal media messages.

a) Use media, visual literacy, and technology skills to create products.

b) Evaluate sources including advertisements, editorials, blogs, Web sites, and other media for relationships between intent, factual content, and opinion.

c) Determine the author's purpose and intended effect on the audience for media messages.

d) Identify the tools and techniques used to achieve the intended focus.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will continue to develop media literacy by comparing and contrasting visual and verbal media messages. • Students will continue to create products that reflect their expanding knowledge of media and visual literacy.	**All students should** • recognize that media messages express a viewpoint and contain values. • understand that there is a relationship between the author's intent, the factual content, and opinion expressed in media messages. • understand the purposeful use of persuasive language and word connotations convey viewpoint and bias.	**To be successful with this standard, students are expected to** • identify and analyze the sources and viewpoint of publications. • analyze, compare, and contrast visual and verbal media messages for content (word choice and choice of information), intent (persuasive techniques), impact (public opinion trends), and effectiveness (effect on the audience). • determine author's purpose, factual content, opinion, and/or possible bias as presented in media messages.

At the tenth-grade level, students will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts. They will read, comprehend, critique, and analyze a variety of literary works from various cultures and eras. They will interpret ~~a variety of~~ nonfiction ~~informational~~ materials~~, such as labels, manuals, warranties, directions, applications, technical descriptions, contracts, and forms to complete specific tasks~~. They will apply critical reading skills across the content areas, including history and social science, science, and mathematics. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity.

10.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms.
e) Identify literary and classical allusions and figurative language in text.
f) Extend general and specialized vocabulary through speaking, reading, and writing.
g) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will increase their independence as learners of vocabulary. • Students will use prefixes, suffixes, roots, derivations, and inflections of polysyllabic words to determine meaning and relationships among related words. • Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Students will evaluate the use of figurative language and analogies in text. • Students will use context and connotations to help determine the meaning of nearly synonymous words and appreciate an author's choices of words and images.	**All students should** • use word structure to analyze and relate words. • recognize internal and external inflections that change meaning and pronunciation. • recognize that words have nuances of meaning and that understanding the connotations may be necessary to determine the appropriate meaning. • recognize that figurative language enriches text.	**To be successful with this standard, students are expected to** • use roots or affixes to determine or clarify the meaning of words. • demonstrate an understanding of idioms. • use prior reading knowledge and other study to identify the meaning of literary and classical allusions. • interpret figures of speech (e.g., *euphemism*, *oxymoron*) in context and analyze their role in the text. • analyze connotations of words with similar denotations. • use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. • identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive*, *conception*, *conceivable*). • consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses, both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage. • demonstrate understanding of figurative language, word relationships, and connotations in word meanings.

10.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
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d) Identify the meaning of common idioms.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• **Connotation** is subjective cultural and emotional. A stubborn person may be described as being either *strong-willed* or *pig-headed*. They have the same literal meaning (i.e., *stubborn*). *Strong-willed* connotes admiration for the level of someone's will, while *pig-headed* **connotes** frustration in dealing with someone. • **Denotation** is a dictionary definition of a word. • **Idiom** relates to a natural way of using language: the way of using a language that comes naturally to its native speakers (e.g., blessing in disguise, chip on your shoulder). • An **allusion** is an indirect reference to a person, place, event or thing – real or fictional. J.D. Salinger's "The Catcher in the Rye" is an allusion to a poem by Robert Burns. Stephen Vincent Benet's story "By the Waters of Babylon" alludes to Psalm 137 in the Bible.		

10.4 The student will read, comprehend, and analyze literary texts of different cultures and eras.

a) Identify main and supporting ideas.
b) Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
c) Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
d) Analyze the cultural or social function of literature.
e) Identify universal themes prevalent in the literature of different cultures.
f) Examine a literary selection from several critical perspectives.
g) Explain the influence of historical context on the form, style, and point of view of a literary text.
h) Evaluate how an author's specific word choices, syntax, tone, and voice shape the intended meaning of the text, achieve specific effects and support the author's purpose.
i) Compare and contrast literature from different cultures and eras.
j) Distinguish between a critique and a summary.
k) Compare and contrast how rhyme, rhythm, sound, imagery, style, form, and other literary devices convey a message and elicit a reader's emotions.
l) Compare and contrast character development in a play to characterization in other literary forms.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will know the ways that literature is defined by a variety of literary works, themes, and universal themes. They will read a wide range of literary genres from different cultures and time periods in order to gain an appreciation of various cultural histories and recognize similarities in images and themes that connect all peoples. • Students will read and analyze poetry, focusing on rhyme, rhythm, and sound. • Students will compare and contrast poetic elements that poets use to evoke an emotional response. • Students will interpret and paraphrase the meanings of poems to demonstrate	**All students should** • ~~understand how literary works are constructed by identifying text organization and structure~~ • ~~understand rhyme, rhythm, and sound elements~~ • understand that poets use techniques ~~poets use~~ to evoke emotion in the reader. • ~~demonstrate understanding of selected poems~~ • understand that literature is universal and influenced by	**To be successful with this standard, students are expected to** • construct meaning from text by making connections between what they already know and the new information they read. • use reading strategies to improve comprehension and to achieve the purposes for reading: predicting and adjusting predictions; questioning the text; restating main ideas and summarizing supporting details; and close reading. • ~~identify the text organization pattern and text structure of literary works~~ • ~~make predictions, draw inferences, and connect prior knowledge to support reading comprehension~~ • compare and contrast ~~read and understand~~ a variety of literary works from different cultures and eras, including: ° short stories; ° poems;

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
understanding of the poems. • Students should understand the difference between a critique and a summary: ◦ A **summary** restates what one just read in one's own words, and presents only main details, and maintains an objective voice. ◦ A **critique** analyzes what was read, offers interpretations, judgments, and evidence for support. • Students will explain ways that characterization in drama differs from that in other literary forms. • Students will read and analyze poetry, focusing on rhyme, rhythm, and sound.	different cultures and eras. • analyze how an author achieves specific effects and purposes using literary devices and figurative	◦ plays; ◦ novels; ◦ essays; and ◦ narrative nonfiction. • explain similarities and differences among literary genres from different cultures, such as: ◦ haikus; ◦ sonnets; ◦ fables; ◦ myths; ◦ graphic novels; and ◦ short stories. • analyze the different functions that characters play in a literary text (e.g., antagonist, protagonist, foil, tragic hero). • analyze how relationships among a character's actions, dialogue, physical

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m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will compare and contrast poetic elements that poets use to evoke an emotional response. • Students will interpret and paraphrase the meanings of poems to demonstrate understanding of the poems. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc. • **Close reading** entails close observation of the text, including annotating, determining all word meanings including connotations, syntax, and structure. It also involves paying close attention to figures of speech, and other	language (e.g., understatement, mood, allusion, allegory, paradox, irony, tone). • analyze a case in which a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, irony, sarcasm, understatement). • ~~understand that~~ evaluate how asides, monologues, and soliloquies focus on single characters, giving insight into their thinking and providing	attributes, thoughts, feelings, and other characters reveal nuances of character (e.g., beliefs, values, social class, and gender roles) and advance the plot. • identify ~~recurring cultural~~ universal themes, such as: ◦ struggle with nature; ◦ survival of the fittest; ◦ coming of age; ◦ power of love; ◦ loss of innocence; ◦ struggle with self; ◦ disillusionment with life; ◦ the effects of scientific progress; ◦ power of nature; ◦ alienation and isolation; ◦ honoring the historical past; ◦ good overcoming evil;

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c) Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
features that contribute to a writer's style. Close reading also involves reflecting on deeper meanings of text including considering relationships to other texts or social or cultural history. • A complete list of literary devices is included under SOL 9.4 • Students will read and analyze poetry, focusing on rhyme, rhythm, and sound. • Students will compare and contrast poetic elements that poets use to evoke an emotional response. • Students will interpret and paraphrase the meanings of poems to demonstrate understanding of the poems.	the audience with a deeper understanding of the play. • ~~understand dramatic conventions~~. • understand rhyme, rhythm, and sound elements. • understand techniques poets use to evoke emotion in the reader. • demonstrate understanding of selected poems.	◦ tolerance of the atypical; ◦ the great journey; ◦ noble sacrifice; ◦ the great battle; ◦ love and friendship; and ◦ revenge. • analyze works of literature for historical information about the period in which they were written. • describe common ~~cultural~~ archetypes that pervade literature, such as the: ◦ hero/heroine; ◦ trickster; ◦ faithful companion; ◦ outsider/outcast; ◦ rugged individualist; ◦ shrew;

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b) Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
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m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ innocent; ◦ villain; ◦ caretaker; ◦ Earth mother; ◦ rebel; ◦ misfit; ◦ mother/father figure; ◦ monster/villain; ◦ scapegoat; and ◦ lonely orphan looking for a home. • examine a literary selection from several different critical perspectives. • analyze a particular point of view or cultural experience reflected in a literary work. • analyze the representation of a subject or a key scene in two different mediums.

10.4 The student will read, comprehend, and analyze literary texts of different cultures and eras.

a) Identify main and supporting ideas.
b) Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
c) Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
d) Analyze the cultural or social function of literature.
e) Identify universal themes prevalent in the literature of different cultures.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• compare and contrast ~~rhyme, rhythm, and sound elements~~ literary devices in order to ~~aid in understanding a poem's~~ convey a poem's message and elicit a reader's emotions. ◦ ~~rhyme~~; – ~~approximate (slant)~~ – ~~end;~~ – ~~internal~~ ◦ ~~alliteration;~~ ◦ ~~assonance;~~ ◦ ~~consonance;~~ ◦ ~~onomatopoeia;~~ ◦ ~~blank verse;~~ ◦ ~~iambic pentameter;~~ ◦ ~~free verse;~~ ◦ ~~repetition;~~ ◦ ~~refrain;~~

10.4 The student will read, comprehend, and analyze literary texts of different cultures and eras.

a) Identify main and supporting ideas.
b) Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
c) Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
d) Analyze the cultural or social function of literature.
e) Identify universal themes prevalent in the literature of different cultures.
f) Examine a literary selection from several critical perspectives.
g) Explain the influence of historical context on the form, style, and point of view of a literary text.
h) Evaluate how an author's specific word choices, syntax, tone, and voice shape the intended meaning of the text, achieve specific effects and support the author's purpose.
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k) Compare and contrast how rhyme, rhythm, sound, imagery, style, form, and other literary devices convey a message and elicit a reader's emotions.
l) Compare and contrast character development in a play to characterization in other literary forms.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ ~~stanza forms;~~ – ~~couplet~~ – ~~quatrain~~ – ~~sestet~~ – ~~octet (octave)~~ • ~~compare and contrast the ways in which poets use techniques to evoke emotion in the reader, including such techniques as~~ ◦ ~~rhyme~~ ◦ ~~rhythm~~ ◦ ~~meter~~ ◦ ~~figurative language~~ – ~~metaphor~~ – ~~simile~~ ◦ ~~diction~~ ◦ ~~tone~~

10.4 The student will read, comprehend, and analyze literary texts of different cultures and eras.

a) Identify main and supporting ideas.
b) Make predictions, draw inferences, and connect prior knowledge to support reading comprehension.
c) Explain similarities and differences of techniques and literary forms represented in the literature of different cultures and eras.
d) Analyze the cultural or social function of literature.
e) Identify universal themes prevalent in the literature of different cultures.
f) Examine a literary selection from several critical perspectives.
g) Explain the influence of historical context on the form, style, and point of view of a literary text.
h) Evaluate how an author's specific word choices, syntax, tone, and voice shape the intended meaning of the text, achieve specific effects and support the author's purpose.
i) Compare and contrast literature from different cultures and eras.
j) Distinguish between a critique and a summary.
k) Compare and contrast how rhyme, rhythm, sound, imagery, style, form, and other literary devices convey a message and elicit a reader's emotions.
l) Compare and contrast character development in a play to characterization in other literary forms.
m) Use reading strategies to monitor comprehension throughout the reading process.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		• interpret and paraphrase the meanings of selected poems.
		• analyze the use of dialogue, special effects, music, and set to interpret characters.
		• ~~compare and contrast character development in a play as compared to that in other literary forms, such as a short story or novel~~
		• identify and describe dramatic conventions~~, such as:~~
		  ◦ ~~aside;~~
		  ◦ ~~monologue, including soliloquy; and~~
		  ◦ ~~irony;~~
		  – ~~dramatic~~
		  – ~~verbal~~
		  – ~~situational.~~

10.5 The student will read, interpret, analyze, and evaluate nonfiction texts.

a) Identify text organization and structure.
b) Recognize an author's intended audience and purpose for writing.
c) Skim manuals or informational sources to locate information.
d) Compare and contrast informational texts.
e) Interpret and use data and information in maps, charts, graphs, timelines, tables, and diagrams.
f) Draw conclusions and make inferences on explicit and implied information using textual support as evidence.
g) Analyze and synthesize information in order to solve problems, answer questions, and generate new knowledge.
h) Use reading strategies throughout the reading process to monitor comprehension.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• ~~Students will understand that reading informational texts is fundamental to being a literate person in today's society.~~ • Students need to be skilled readers of ~~informational~~ nonfictional texts and technical manuals and have the ability to apply different reading strategies when engaging with a variety of such materials. • Students will use a variety of reading strategies including text annotation, QAR (Question Answer Relationship), thinking aloud, etc.	**All students should** • ~~recognize~~ understand that background knowledge may be necessary to understand handbooks and manuals. • ~~read carefully the information in labels, warnings, directions, applications, and forms~~. • know that informational and technical writing is often non-linear, fragmented, and graphic-supported. • understand how format and style in informational text differ from those in narrative and expository texts. • understand reading strategies and in particular, how they are used to locate specific information in ~~print materials~~ informational text.	**To be successful with this standard, students are expected to** • ~~understand~~ identify the different formats and purposes of informational and technical texts. • analyze how authors use rhetoric to advance their point of view. • identify the main idea(s) in informational text. • identify essential details in complex informational passages. • locate specific information in manuals or other informational sources by using strategies such as skimming, summarizing, and highlighting. • interpret and understand information presented in maps, charts, timelines, tables, and diagrams. • make inferences and draw conclusions from informational text. • synthesize information across multiple informational texts. • ~~identify how format and style in consumer materials are different from those in narrative and expository text~~. • ~~compare and contrast product information contained in advertisements with that found in instruction manuals and warranties~~ • ~~demonstrate an understanding of information read by successfully completing simulated or actual tasks.~~

At the tenth-grade level, students will develop their persuasive, expository, and analytical writing skills ~~by analyzing and critiquing peer and professional writing~~. They will synthesize information to support a thesis, provide elaboration, and organize ideas logically. ~~They will learn effective techniques of organization and development by analyzing, revising, and evaluating various written forms and ideas.~~ They will demonstrate understanding by applying a writing process in developing written products. They will revise writing for clarity of content and edit ~~writing~~ for correct use of language, sentence formation, punctuation, capitalization, and spelling as part of the writing process.

10.6 The student will develop a variety of writing to persuade, interpret, analyze, and evaluate with an emphasis on exposition and analysis.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Synthesize information to support the thesis.
c) Elaborate ideas clearly through word choice and vivid description.
d) Write clear and varied sentences, clarifying ideas with precise and relevant evidence.
e) Organize ideas into a logical sequence using transitions.
f) Revise writing for clarity of content, accuracy, and depth of information.
g) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will know how to move through the stages of a writing process, from planning to drafting, revising, editing, and proofreading~~, in order to produce expository writing~~. • Students will understand that expository writing is prose that explains ideas through the use of a clear general statement of the writer's point (thesis) and through the development of ideas, using specific evidence and illustrations for support. • Analytical writing uses precise language and often divides the subject into parts and provides evidence on each part. • ~~Through reader response and critical analysis, students will understand their reactions to writings and respond through formal critiques, paraphrasing ideas they have read into more concise form. In addition, they will make connections between literature and other disciplines~~. • ~~Students will collect, organize, and evaluate materials to write a documented paper.~~ • Students should have practice writing for shorter time frames as well as extended time	**All students should** • understand ~~a~~ that writing is a process. • understand expository and analytical texts and develop products that reflect that understanding. • understand effective organizational patterns. • ~~respond to literature they read~~. • ~~understand the connections between literature and other disciplines~~.	**To be successful with this standard, students are expected to** • write expository texts that: ◦ explain a process; ◦ compare and contrast ideas; ◦ show cause and effect; ◦ enumerate details; and ◦ define ideas and concepts. • ~~respond to what they read by writing summaries, interpretations, and comparisons of literary, informational, and technical texts~~ • ~~use paraphrasing to summarize and synthesize ideas in both literature and content-area texts~~. • develop written products that demonstrate their understanding of composing, written expression, and usage/mechanics. • write persuasively and analytically on a variety of literary and nonliterary subjects. • develop writing that analyzes complex issues. • plan and organize their ideas for writing. • state a thesis and support it. • elaborate ideas in order to provide support for the thesis. • ~~elaborate ideas clearly through word choice and vivid description~~

10.6 The student will develop a variety of writing to persuade, interpret, analyze, and evaluate with an emphasis on exposition and analysis.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Synthesize information to support the thesis.
c) Elaborate ideas clearly through word choice and vivid description.
d) Write clear and varied sentences, clarifying ideas with precise and relevant evidence.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
frames .		• use visual and sensory language as needed for effect. • vary sentence structures for effect. • identify and apply features of the writing domains, including ◦ effective organization; ◦ clear structure; ◦ sentence variety; ◦ unity and coherence; ◦ tone and voice; ◦ effective word choice; ◦ clear purpose; ◦ appropriate mechanics and usage; and ◦ accurate and valuable information. • develop ideas deductively and inductively and organize ideas into a logical sequence, applying effective organizational patterns/techniques, such as: ◦ comparison/contrast; ◦ chronological order; ◦ spatial layout; ◦ cause and effect; ◦ definition; ◦ order of importance; ◦ explanation; ◦ generalization; ◦ classification; ◦ enumeration; and

10.6 The student will develop a variety of writing to persuade, interpret, analyze, and evaluate with an emphasis on exposition and analysis.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Synthesize information to support the thesis.
c) Elaborate ideas clearly through word choice and vivid description.
d) Write clear and varied sentences, clarifying ideas with precise and relevant evidence.
e) Organize ideas into a logical sequence using transitions.
f) Revise writing for clarity of content, accuracy, and depth of information.
g) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		° problem/solution. • evaluate analytical writing by examining and understanding how individual parts of the text relate to the whole, including the writing's purpose and structure. • revise writing for clarity of content and presentation. • use peer- and self-evaluation to review and revise writing. • <u>use computer technology to assist in the writing process.</u> • ~~proofread and prepare final product for intended audience and purpose~~

10.7 The student will self- and peer-edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Distinguish between active and passive voice.
b) Apply rules governing use of the colon.
c) Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), to apply rules for punctuation and formatting of direct quotations.
d) Differentiate between in-text citations and works cited on the bibliography page.
e) Analyze the writing of others.
f) Describe how the author accomplishes the intended purpose of a piece of writing.
g) Suggest how writing might be improved.
h) Proofread and edit final product for intended audience and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will continue to build knowledge of grammar through the application of rules for parts of a sentence and text. • Students will use a style manual, such as MLA or APA, to punctuate and format sentences and text. • Students will analyze writings critically, using knowledge of composition, written expression, sentence formation, and usage/mechanics. They will also suggest ways that writings can be improved. • Students will describe how writers accomplish their intended purpose.	**All students should** • understand that active voice means that the subject of a verb *performs* the action and passive voice means that the subject of a verb *receives* the action. • use colons according to rules governing their use. • ~~use a style manual to apply rules for punctuation and formatting of direct quotations.~~ • ~~recognize and understand in what they read the specific writing domains of composing, written expression, and usage/mechanics~~ • understand how writers use organization and details to	**To be successful with this standard, students are expected to** • distinguish between active voice and passive voice to convey a desired effect. • know and apply the rules for the use of a colon: ° before a list of items; ° before a long, formal statement or quotation; and ° after the salutation of a business letter. • use direct quotations in their writing, applying MLA or APA style for punctuation and formatting. • ~~suggest how writing might be improved~~. • use peer- and self-evaluation to edit writing. • proofread and prepare final product for intended audience and purpose. • use a handbook to correct grammatical or usage errors.

10.7 The student will self- and peer-edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Distinguish between active and passive voice.
b) Apply rules governing use of the colon.
c) Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), to apply rules for punctuation and formatting of direct quotations.
d) Differentiate between in-text citations and works cited on the bibliography page.
e) Analyze the writing of others.
f) Describe how the author accomplishes the intended purpose of a piece of writing.
g) Suggest how writing might be improved.
h) Proofread and edit final product for intended audience and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
	communicate their purposes.	

At the tenth-grade level, students will develop skills in accessing, evaluating, organizing, and presenting information in the research process. Students will verify the validity of all information and follow ethical and legal guidelines for using and gathering information. They will also credit sources for quoted and paraphrased information, using a standard method of documentation. Students will present writing in a format appropriate for audience and purpose.

10.8 The student will collect, evaluate, organize, and present information to create a research product.

a) Use technology as a tool to research, organize, evaluate, synthesize, and communicate information.
b) Develop the central idea or focus.
c) Verify the accuracy, validity, and usefulness of information.
d) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
e) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
f) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will utilize a variety of sources to access ideas, evaluate the information for accuracy and relevance, and organize the facts into an oral presentation, a written report, or a visual product. • Students will provide documentation to support their research product. • Students will understand that there are consequences of plagiarism according to the guidelines established by local school divisions and the law. • Students will understand that plagiarism is the theft of intellectual property.	**All students should** • understand the steps involved in organizing information gathered from research. • verify the accuracy and usefulness of information. • ~~understand the use of in-text citations and works-cited pages in crediting sources of information.~~ • understand the format for citing sources of information. • understand that using standard methods of documentation is one way to protect the intellectual property of writers.	**To be successful with this standard, students are expected to** • use technology, along with other resources, to gather information from various sources by summarizing, paraphrasing, and supporting a thesis. • organize information ~~coherently~~ and maintain coherence throughout the writing based on the topic, purpose, and audience. • use organizational patterns/techniques, such as: ◦ comparison/contrast; ◦ chronological order; ◦ spatial layout; ◦ cause and effect; ◦ definition; ◦ order of importance; ◦ explanation; ◦ enumeration; and ◦ problem/solution. • ~~present information in an appropriate format~~. • evaluate sources for their credibility, reliability, strengths, and limitations. • demonstrate ability to distinguish between reliable and unreliable sources. • distinguish one's own ideas from information created or discovered by others.

10.8 The student will collect, evaluate, organize, and present information to create a research product.

a) Use technology as a tool to research, organize, evaluate, synthesize, and communicate information.
b) Develop the central idea or focus.
c) Verify the accuracy, validity, and usefulness of information.
d) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
e) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
f) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		• cite primary and secondary sources of information, using the MLA or APA method of documentation for in-text citations and works-cited pages.
		• avoid plagiarism by:
		  ◦ understanding that *plagiarism* is an act of presenting someone else's ideas as one's own;
		  ◦ citing correctly sources to give credit to the author of an original work;
		  ◦ recognizing that sources of information must be cited even when the information has been paraphrased; and
		  ◦ using quotation marks when someone else's exact words are quoted.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Eleven

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the eleventh-grade level, students will use a variety of oral-communication skills and provide accurate evidence to give informative and persuasive oral presentations. They will also critique and assess the effectiveness of persuasive presentations by others. In addition, students will examine how persuasive media messages influence audiences' beliefs and behaviors.

11.1 The student will make informative and persuasive presentations.

a) Gather and organize evidence to support a position.
b) Present evidence clearly and convincingly.
c) Address counterclaims.
d) Support and defend ideas in public forums.
e) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
f) Monitor listening and use a variety of active listening strategies to make evaluations.
g) Use presentation technology.
h) Collaborate and report on small-group learning activities.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will give effective informative and persuasive presentations, using appropriate oral-communication skills. • Students will use grammatically correct language in preparation and presentation of ideas and thoughts. • Students will become critical listeners by assessing the effectiveness of oral presentations.	**All students should** • understand how reading, writing, and discussion can be used to generate ideas and plan presentations. • understand how to support and defend their ideas. • understand rhetorical devices and techniques. • identify speech appropriate for audience, topic, and situation. • understand effective oral-delivery techniques. • evaluate and critique content and delivery of oral presentations.	**To be successful with this standard, students are expected to** • define a position and select evidence to support that position through reading, writing, and discussion. • establish a purpose. • develop well organized presentations to defend a position or present information. • apply and evaluate persuasive rhetorical devices and techniques including rhetorical questioning, parallel structuring, metaphor, imagery, figures of speech, alliterative expressions, etc. • use effective evidence and oral-delivery skills to convince an audience. • make oral-language choices based on predictions of target audience response. • listen actively by asking clarifying and elaborating questions. • develop effective multi-media presentations. • define group goals and work together to report on learning.

11.1 The student will make informative and persuasive presentations.

a) Gather and organize evidence to support a position.
b) Present evidence clearly and convincingly.
c) Address counterclaims.
d) Support and defend ideas in public forums.
e) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
f) Monitor listening and use a variety of active listening strategies to make evaluations.
g) Use presentation technology.
h) Collaborate and report on small-group learning activities.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
.	**All students should** • understand effective oral-delivery techniques. • evaluate and critique content and delivery of oral presentations.	**To be successful with this standard, students are expected to** • maintain appropriate eye contact. • address an audience with appropriate: ° volume; ° enunciation; ° language choices; and ° poise. • adopt appropriate tone. • maintain appropriate rhythm. • evaluate the use of persuasive techniques, such as: ° introduction (for securing interest and establishing unity); ° organization; ° proof/support; ° logic; ° loaded language; ° rhetorical devices, such as: – call to action – elevated language – rhetorical question – appeals to emotion – repetition – figurative language – <u>addressing counterclaims</u> ° conclusion.

11.1 The student will make informative and persuasive presentations.

a) Gather and organize evidence to support a position.
b) Present evidence clearly and convincingly.
c) Address counterclaims.
d) Support and defend ideas in public forums.
e) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
f) Monitor listening and use a variety of active listening strategies to make evaluations.
g) Use presentation technology.
h) Collaborate and report on small-group learning activities.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• critique the accuracy, relevance, and organization of evidence. • critique the clarity and effectiveness of delivery.

11.2 The student will examine how values and points of view are included or excluded and how media influences beliefs and behaviors.

a) Use technology and other information tools to organize and display knowledge in ways others can view, use, and assess.
b) Use media, visual literacy, and technology skills to create products.
c) Evaluate sources including advertisements, editorials, blogs, Web sites, and other media for relationships between intent, factual content, and opinion.
d) Determine the author's purpose and intended effect on the audience for media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will continue to develop media literacy by examining how media messages influence people's beliefs and behaviors.	**All students should** • recognize that media messages express viewpoints and contain values to influence the beliefs and behaviors of the intended audience. • understand the difference between ***objectivity,*** or fact, and ***subjectivity,*** or bias, in media messages. • realize the purposeful use of persuasive language and word connotations to convey viewpoint and bias.	**To be successful with this standard, students are expected to** • organize knowledge and display learning using visual images, text, graphics, and/or music to create media messages with visual, audio, and graphic effects. • demonstrate an awareness of the transactional and interactive nature of media by considering audience, context, and purpose in all stages of media production. • evaluate visual and verbal media messages for content (word choice and choice of information), intent (persuasive techniques), impact (public opinion trends), and effectiveness (effect on the audience). • determine author's purpose and distinguish factual content from opinion and possible bias. • analyze and critique how media reach the targeted audience for specific purposes (to persuade, to entertain, to provoke to action, to appeal to ethics or beliefs, etc.).

At the eleventh-grade level, students will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts. Students will enhance their appreciation for literature by studying both classic and contemporary American literature. They will read a variety of literary genres and informational texts to identify the prevalent themes in American literature that are reflective of American history and culture. They will continue to develop vocabulary and reading comprehension skills and will apply those skills in other content areas, including history and social science, science, and mathematics. In addition, students will identify the contributions of other cultures to the development of American literature. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity.

11.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms.
e) Identify literary and classical allusions and figurative language in text.
f) Extend general and specialized vocabulary through speaking, reading, and writing.
g) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will increase their independence as learners of vocabulary. • Students will use prefixes, suffixes, roots, derivations, and inflections of polysyllabic words to determine meaning and relationships among related words. • Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Students will evaluate the use of figurative language and analogies in text. • Students will use context and connotations to help determine the meaning of nearly synonymous words and appreciate an author's choices of words and images. • **Connotation** is subjective, cultural, and emotional. A stubborn person may be	**All students should** • use word structure to analyze and relate words. • recognize internal and external inflections that change meaning and pronunciation. • recognize that words have nuances of meaning and that understanding the connotations may be necessary to determine the appropriate meaning. • recognize that figurative language enriches text.	**To be successful with this standard, students are expected to** • use roots or affixes to determine or clarify the meaning of words. • demonstrate an understanding of idioms. • use prior reading knowledge and other study to identify the meaning of literary and classical allusions. • interpret figures of speech (e.g., euphemism, oxymoron, hyperbole, paradox) in context and analyze their roles in the text. • analyze the connotation of words with similar denotations. • use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. • identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive, conception, conceivable*). • consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage. • demonstrate understanding of figurative language, word relationships, and connotations in word meanings.

11.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms.
e) Identify literary and classical allusions and figurative language in text.
f) Extend general and specialized vocabulary through speaking, reading, and writing.
g) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
described as being either *strong-willed* or *pig-headed*. They have the same literal meaning (i.e., *stubborn*). *Strong-willed* connotes admiration for the level of someone's will, while *pig-headed* **connotes** frustration in dealing with someone. • **Denotation** is a dictionary definition of a word. • **Idiom** relates to a natural way of using language: the way of using language that comes naturally to its native speakers (e.g., blessing in disguise, chip on your shoulder). • An **allusion** is an indirect reference to a person, place, event, or thing – real or fictional. J.D. Salinger's "The Catcher in the Rye" is an allusion to a poem by Robert Burns. Stephen Vincent Benet's story "By the Waters of Babylon" alludes to Psalm 137 in the Bible.		

11.4 The student will read, comprehend, and analyze relationships among American literature, history, and culture.

a) Describe contributions of different cultures to the development of American literature.
b) Compare and contrast the development of American literature in its historical context.
c) Discuss American literature as it reflects traditional and contemporary themes, motifs, universal characters, and genres.
d) Analyze the social or cultural function of American literature.
e) Analyze how context and language structures convey an author's intent and viewpoint.
f) Explain how the sound of a poem (rhyme, rhythm, onomatopoeia, repetition, alliteration, assonance, and parallelism) supports the subject, mood, and theme.
g) Explain how imagery and figures of speech appeal to the reader's senses and experience.
h) Explain how an author's specific word choices, syntax, tone, and voice support the author's purpose.
i) Read and analyze a variety of American dramatic selections.
j) Analyze the use of literary elements and dramatic conventions including verbal, situational and dramatic irony used in American literature.
k) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will understand literature as it relates to the cultural and historical period in which it was written. More specifically, students will recognize how authors are influenced by the ideas and values of their times. For this reason, literary selections typically reflect not only the values and ideas of the authors who wrote them but also the values and ideas of the times in which they were written. Students will also learn how the ideas presented in literary works may influence the values or conditions of the society in which the works were written. • Students will read, analyze, critique, and compare a variety of contemporary and traditional poetry. • A list of poetic elements and techniques is included in the "Essential Knowledge, Skills,	**All students should** • understand characteristics and cultures of historical periods and literary movements associated with each century. • recognize and understand universal characters, themes, and motifs in American literature. • understand how an author's intent is achieved by the use of context and language. • understand dramatic conventions and devices ~~used by playwrights to present ideas~~.	**To be successful with this standard, students are expected to** • use reading strategies to improve comprehension and to achieve the purposes for reading: predicting and adjusting predictions; questioning the text; restating main ideas and summarizing supporting details; and close reading. • discuss how the subject matter, style, literary type, theme, and purpose of literary works often reflect the culture and events of the times in which the works were written. • analyze how connections among motifs, setting, character traits, character development, and plot suggest multiple levels of themes. • analyze and critique themes across texts and within various social, cultural, and historical contexts. • ~~describe and contrast historical periods from which particular literary pieces derive and the cultures that they portray~~. • describe and contrast literary movements and representative texts associated with each ~~century~~ literary movement, including how two or more texts from

11.4 The student will read, comprehend, and analyze relationships among American literature, history, and culture.

a) Describe contributions of different cultures to the development of American literature.
b) Compare and contrast the development of American literature in its historical context.
c) Discuss American literature as it reflects traditional and contemporary themes, motifs, universal characters, and genres.
d) Analyze the social or cultural function of American literature.
e) Analyze how context and language structures convey an author's intent and viewpoint.
f) Explain how the sound of a poem (rhyme, rhythm, onomatopoeia, repetition, alliteration, assonance, and parallelism) supports the subject, mood, and theme.
g) Explain how imagery and figures of speech appeal to the reader's senses and experience.
h) Explain how an author's specific word choices, syntax, tone, and voice support the author's purpose.
i) Read and analyze a variety of American dramatic selections.
j) Analyze the use of literary elements and dramatic conventions including verbal, situational and dramatic irony used in American literature.
k) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
and Processes" column for English SOL ~~10.5~~ 10.4. • Students will read and critique a variety of dramatic selections. • ~~Students will identify and explain specific dramatic conventions or devices used by playwrights to present ideas.~~ • ~~Lists of staging components and scripting components are included in the "Essential Knowledge, Skills, and Processes" column for English SOL 9.5.~~ • A complete list of literary devices is found in Essential Knowledge, Skills, and Processes column for SOL 9.4. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking	• ~~understand verbal, situational, and dramatic irony~~	the same period treat similar themes or topics. Literary movements include: ◦ Colonialism/Puritanism (17th century); ◦ Revolutionary movement/Rationalism (18th century); ◦ Romanticism, Transcendentalism, Regionalism, Realism, ◦ Naturalism (19th century); ◦ Symbolism/Modernism, Harlem Renaissance, Postmodernism (20th century); and ◦ Contemporary poetry (21st Century) • differentiate among ~~universal~~ archetypal characters in American literature, such as the: ◦ hero/heroine; ◦ trickster; ◦ faithful companion; ◦ outsider/outcast; ◦ rugged individualist; ◦ innocent; ◦ villain; ◦ caretaker;

11.4 The student will read, comprehend, and analyze relationships among American literature, history, and culture.

a) Describe contributions of different cultures to the development of American literature.
b) Compare and contrast the development of American literature in its historical context.
c) Discuss American literature as it reflects traditional and contemporary themes, motifs, universal characters, and genres.
d) Analyze the social or cultural function of American literature.
e) Analyze how context and language structures convey an author's intent and viewpoint.
f) Explain how the sound of a poem (rhyme, rhythm, onomatopoeia, repetition, alliteration, assonance, and parallelism) supports the subject, mood, and theme.
g) Explain how imagery and figures of speech appeal to the reader's senses and experience.
h) Explain how an author's specific word choices, syntax, tone, and voice support the author's purpose.
i) Read and analyze a variety of American dramatic selections.
j) Analyze the use of literary elements and dramatic conventions including verbal, situational and dramatic irony used in American literature.
k) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
aloud, etc. • **Close reading** entails close observation of the text, including annotating, determining all word meanings including connotations, syntax, and structure. It also involves paying close attention to figures of speech, and other features that contribute to a writer's style. Close reading also involves reflecting on deeper meanings of text, including considering relationships to other texts or social or cultural history.		◦ Earth mother; ◦ rebel; ◦ misfit; ◦ lonely orphan looking for a home; ◦ shrew; ◦ mother/father figure; ◦ monster/villain; and ◦ scapegoat. • identify major themes in American literature, such as: ◦ the American Dream; ◦ loss of innocence; ◦ coming of age; ◦ relationship with nature; ◦ relationship with society; ◦ relationship with science; ◦ alienation and isolation; ◦ survival of the fittest; ◦ disillusionment; and

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		° rebellion and protest. • analyze texts to identify the author's attitudes, viewpoints, and beliefs and critique how these relate to larger historical, social, and cultural contexts. • analyze the representation of a subject or a key scene in two different media. • describe how the use of context and language structures conveys an author's intent and viewpoint. • analyze the impact of the author's choices in developing the elements of a story or drama (e.g., setting, plot structure, and character development). • demonstrate knowledge of eighteenth-, nineteenth- and early-twentieth-century foundational works of American literature, including how two or more texts from the same period treat similar themes or topics. • analyze a case in which a point of view requires distinguishing what is directly stated in a text from what is really meant (e.g., satire, irony, sarcasm, understatement).

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~read works by significant and representative poets from each literary movement associated with each century, such as:~~ ◦ ~~Colonialism/Puritanism (17th century);~~ ◦ ~~Revolutionary movement/Rationalism (18th century);~~ ◦ ~~Romanticism, Transcendentalism, Regionalism, Realism, Naturalism (19th century);~~ ◦ ~~Symbolism/Modernism, Harlem Renaissance, Postmodernism (20th century); and~~ ◦ ~~Contemporary poetry (21st century).~~ • ~~identify and understand the elements of classic poetry:~~ ◦ ~~elevated language/style;~~ ◦ ~~figurative language;~~ ◦ ~~rhyme; and~~ ◦ ~~strong regularity in metrical patterns.~~ • use poetic elements to explain, analyze, and evaluate poetry. • compare and contrast the subject matter, theme, form, language, development, and purpose of works of classic poets with those of

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		contemporary poets. • compare how poems of the same form use elements - sound, figurative language, imagery, symbols, and allusions - differently to convey meaning. • identify and discuss the elements and techniques that poets use to achieve a desired result, such as: ◦ imagery; ◦ precise word choice; ◦ sound devices; ◦ metrical patterns; and ◦ metaphorical/figurative language. • describe the language choices and devices that authors use, such as: ◦ rhetorical question; ◦ sarcasm; ◦ satire; ◦ parallelism; ◦ connotation/denotation;

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		◦ pun; ◦ irony; ◦ tone; ◦ dialect; ◦ diction; and ◦ figurative language. • ~~describe the language choices and devices that authors use~~ • identify and describe dramatic conventions. ◦ ~~stage directions;~~ ◦ ~~soliloquy;~~ ◦ ~~monologue;~~ ◦ ~~aside; and~~ ◦ ~~irony~~ ◦ ~~verbal~~ ◦ ~~situational~~ ◦ ~~dramatic.~~ • compare and evaluate adaptations and interpretations of a script for stage,

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		film, ~~or~~ television or other media.

11.5 The student will read and analyze a variety of nonfiction texts.

a) Use information from texts to clarify understanding of concepts.
b) Read and follow directions to complete an application for college admission, for a scholarship, or for employment.
c) Generalize ideas from selections to make predictions about other texts.
d) Draw conclusions and make inferences on explicit and implied information using textual support.
e) Analyze two or more texts addressing the same topic to identify authors' purpose and determine how authors reach similar or different conclusions.
f) Identify false premises in persuasive writing.
g) Recognize and analyze use of ambiguity, contradiction, paradox, irony, overstatement, and understatement in text.
h) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will read, understand, and use a variety of informational texts. They will develop specific reading skills in order to generalize ideas, make predictions, and follow directions. They will identify and analyze the steps in their own reading process in order to broaden their critical understanding. • Students should recognize persuasive techniques such as: ◦ ad hominem – means "to the man" does not argue the issue, instead it argues the person; ◦ red herring – is a deliberate attempt to divert attention; ◦ straw man – creates the illusion of having refuted a proposition by substituting a similar yet weaker proposition (the "straw man"); and ◦ begging the question – assumes the conclusion is true without proving it; circular argument. • Students will use a variety of reading	**All students should** • understand how to analyze informational material. • understand reading strategies and use those strategies to analyze text.	**To be successful with this standard, students are expected to** • analyze ~~and use~~ the ~~basic~~ vocabulary (jargon, technical terminology, and content-specific) and ~~concepts~~ ideas of informational texts ~~in all~~ from various academic disciplines in order to clarify understandings of concepts. • ~~analyze key vocabulary, such as jargon, technical terms, and content-specific vocabulary~~ • know the purpose of the text they are to read and their own purpose in reading it. • use format (page design and layout), text structures, and features to aid in understanding of text. • understand how an organizational pattern enhances the meaning of a text. • complete employment forms through simulations and real-life opportunities. • complete applications, essays, and résumés for college admission through simulations and real-life opportunities. • ~~develop effective applications, essays, résumés, and employment forms through simulations and real-life opportunities~~ • ~~identify~~ distinguish main ideas ~~and~~ from supporting details in complex

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.		informational text to generalize ideas and make predictions about other texts • ~~apply their knowledge of specific genres and forms to other texts~~ • ~~make predictions about other texts~~ • analyze information from a text to make inferences and draw conclusions. • analyze a complex set of ideas or sequence of events and explain how specific individuals, ideas, or events interact and develop over the course of the text. • compare and contrast how two or more texts treat two or more of the same ideas and analyze the development of those ideas including how they interact and build on one another to provide a complex analysis. • provide an objective summary of the text. • analyze how a variety of logical arguments could reach conflicting conclusions. • evaluate the relevance and quality of evidence used to support a claim. • analyze and identify false premises that intentionally manipulate audiences. • determine an author's point of view or purpose in a rhetorically rich text, analyzing how ambiguity, contradiction, paradox, irony, hyperbole,

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		overstatement, and understatement contribute to text. • before, during, and after reading texts, generate and respond to a variety of critical thinking questions to activate prior knowledge, engage actively with learning new information, and reflect on new learning or fresh insights.

At the eleventh-grade level, students will write in a variety of forms with an emphasis on persuasion~~ve essays and professional correspondence~~. They will produce arguments in writing that demonstrate knowledgeable judgments and address counterclaims. Students will use their knowledge of genres, formats, purposes, audiences, and situations to produce clear and effective products that reflect use of all stages of a writing process.

11.6 The student will write in a variety of forms, with an emphasis on persuasion.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis that demonstrates knowledgeable judgments, addresses counterclaims, and provides effective conclusions.
c) Organize ideas in a sustained and logical manner.
d) Clarify and defend position with precise and relevant evidence elaborating ideas clearly and accurately.
e) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
f) Revise writing for clarity of content, accuracy and depth of information.
g) Use computer technology to plan, draft, revise, edit, and publish writing.
h) Write and revise correspondence to a standard acceptable both in the workplace and in postsecondary education.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will use a process for writing to communicate clearly and persuasively. • Students will support a position by selecting valid information and amplifying their text logically. • Students will understand that active constructions are preferred. • Students will avoid false premises in writing including, but not limited to those listed under SOL 11.5. • ~~Students will collect, organize, and evaluate information to produce a documented research product.~~ • Students will write clear and accurate personal, professional, and informational correspondence. They will use a writing process to develop real-world, practical products. • Students should have practice writing for shorter time frames as well as extended time frames.	**All students should** • understand that ~~a~~ writing is a process. • locate and select appropriate information that clearly supports a definite purpose and position. • understand that vocabulary is used to develop voice and tone for a specific audience, purpose, or situation. • understand revision strategies. • ~~understand how to adapt models of professional and personal correspondence for their own purposes~~ • ~~understand how technology can be used to access, develop, and modify documents.~~	**To be successful with this standard, students are expected to** • ~~plan and organize ideas for writing~~. • apply a variety of planning strategies to generate and organize ideas. • ~~develop a clear focus for writing~~ • present a thesis that focuses on the problem or argument to be solved. • anticipate and address the counterevidence, counterclaims, and counterarguments. • use effective rhetorical appeals, to establish credibility and persuade intended audience. • refine the thesis by considering whether the claim is relevant, interesting, logical, and meaningful. • understand a variety of organizational patterns. • ~~present information in a logical manner~~. • use appropriate and varied transitions to link sentences and paragraphs. • elaborate ideas clearly and accurately. • show how evidence supports each main point of the argument and justify why the evidence credibly supports the claims.

11.6 The student will write in a variety of forms, with an emphasis on persuasion.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis that demonstrates knowledgeable judgments, addresses counterclaims, and provides effective conclusions.
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d) Clarify and defend position with precise and relevant evidence elaborating ideas clearly and accurately.
e) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
f) Revise writing for clarity of content, accuracy and depth of information.
g) Use computer technology to plan, draft, revise, edit, and publish writing.
h) Write and revise correspondence to a standard acceptable both in the workplace and in postsecondary education.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		• use specific revision strategies and adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
		• select an appropriate audience by analyzing assumptions, values, and background knowledge.
		• develop the topic thoroughly by selecting facts, details, quotations, and appropriate examples for the audience and purpose.
		• ~~revise writing for accuracy and depth of information~~.
		• ~~use available technology to plan, draft, revise, edit, and publish writing including correspondence for academic and professional purposes~~.
		• use MLA (Modern Language Association) or APA (American Psychological Association) style for formatting rules and documentation.
		• ~~revise writing for style and language~~.
		• ~~understand and use models of professional, personal, and informational correspondence and other writings, such as~~
		  ◦ ~~business letters, including~~
		  ◦ ~~letters of recommendation~~
		  ◦ ~~cover letters for résumés~~
		  ◦ ~~personal letters~~
		  ◦ ~~memos~~
		  ◦ ~~proposals~~
		  ◦ ~~résumés~~

11.6 The student will write in a variety of forms, with an emphasis on persuasion.

a) Generate, gather, plan, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis that demonstrates knowledgeable judgments, addresses counterclaims, and provides effective conclusions.
c) Organize ideas in a sustained and logical manner.
d) Clarify and defend position with precise and relevant evidence elaborating ideas clearly and accurately.
e) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
f) Revise writing for clarity of content, accuracy and depth of information.
g) Use computer technology to plan, draft, revise, edit, and publish writing.
h) Write and revise correspondence to a standard acceptable both in the workplace and in postsecondary education.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~use technology to access, develop, and modify documents for professional and informational purposes.~~

11.7 The student will self- and peer-edit writing for correct grammar, capitalization, punctuation, spelling, sentence structure, and paragraphing.

a) Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), to apply rules for punctuation and formatting of direct quotations.
b) Use verbals and verbal phrases to achieve sentence conciseness and variety.
c) Distinguish between active and passive voice.
d) Differentiate between in-text citations and works cited on the bibliography page.
e) Adjust sentence and paragraph structures for a variety of purposes and audiences.
f) Proofread and edit writing for intended audience and purpose.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will use a style manual, such as MLA or APA, in producing research projects. • Students will understand and apply rules for the use of verbals and verbal phrases. • Students will understand active voice is preferable to passive voice.	**All students should** • understand and apply the rules of the MLA, APA, or other style manual in producing research projects. • understand verbals and verbal phrases and use them appropriately in writing. • use grammatical conventions to adjust sentence and paragraph structures for a variety of purposes and audiences.	**To be successful with this standard, students are expected to** • apply MLA or APA style for punctuation conventions and formatting direct quotations. • apply rules for the following verbals: ◦ gerund; ◦ infinitive; and ◦ participle. • apply rules for the following verbal phrases: ◦ gerund phrase; ◦ infinitive phrase; ◦ participial phrase; and ◦ absolute phrase. • place main subjects of sentences in front of strong, active verbs and avoid forms of the verb "to be" [The baseball was thrown by the pitcher (passive construction); better: The pitcher threw the baseball (active construction).] • use in-text citations including parenthetical references and a corresponding list of works cited at the end of the paper. • use clauses and phrases for sentence variety. • revise and edit writing for appropriate style and language in informal and formal contexts.

At the eleventh-grade level, students will engage in research that requires the selection, evaluation, use, and documentation of a variety of sources. Students will verify the validity of all information and follow ethical and legal guidelines for using and gathering information. Each student will present a research product that is clearly written and accurately documented according to a standard form of documentation.

11.8 The student will analyze, evaluate, synthesize, and organize information from a variety of sources to produce a research product.

a) Use technology as a tool to research, organize, evaluate, and communicate information.
b) Narrow a topic and develop a plan for research.
c) Collect information to support a thesis.
d) Critically evaluate quality, accuracy, and validity of information.
e) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
f) Synthesize and present information in a logical sequence.
g) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
h) Revise writing for clarity of content, accuracy, and depth of information.
i) Edit writing for grammatically correct use of language, spelling, punctuation, capitalization, and sentence/paragraph structure.
j) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will compose a documented research product that is based on valid resources and procedures. • Students will collect, organize, and evaluate the quality and accuracy of information to ensure that it is ~~up-to-date~~ current, factual, and reliable. • Students will recognize consequences of plagiarism according to the guidelines established by ~~local~~ school divisions.	**All students should** • understand how to evaluate sources of information to determine reliability. • understand how to develop a plan and collect information. • understand how to use technology to access, organize, and develop writing. • understand plagiarism has meaningful consequences.	**To be successful with this standard, students are expected to** • utilize technology to conduct research, organize information, and develop writing. • identify and narrow a topic for research through a variety of strategies, such as mapping, listing, brainstorming, ~~and~~ webbing, and using an Internet search engine. • develop a plan to locate and collect relevant information about the chosen topic. • identify a variety of primary and secondary sources of information. • generate notes while following a logical note-taking system. • preview resource materials to aid in selection of a suitable topic. • identify valid main and supporting ideas in various sources and distinguish them from misconceptions and biased points of view when information conflicts. • synthesize information in a logical sequence.

11.8 The student will analyze, evaluate, synthesize, and organize information from a variety of sources to produce a research product.

a) Use technology as a tool to research, organize, evaluate, and communicate information.
b) Narrow a topic and develop a plan for research.
c) Collect information to support a thesis.
d) Critically evaluate quality, accuracy, and validity of information.
e) Make sense of information gathered from diverse sources by identifying misconceptions, main and supporting ideas, conflicting information, point of view or bias.
f) Synthesize and present information in a logical sequence.
g) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
h) Revise writing for clarity of content, accuracy, and depth of information.
i) Edit writing for grammatically correct use of language, spelling, punctuation, capitalization, and sentence/paragraph structure.
j) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES

		• document print and electronic sources using MLA or APA style, including in-text citation and corresponding works-cited list.
		• incorporate ideas and quotations skillfully by directly quoting, paraphrasing, or summarizing text from reliable sources and citing them appropriately.
		• revise writing for effect, clarity, accuracy, and depth of information.
		• follow style manual conventions to ~~ensure~~ edit materials for correct grammar, spelling, punctuation, and capitalization~~, and for clarity of content and effect~~.
		• avoid plagiarism by:
		  ° understanding that *plagiarism* is the act of presenting someone else's ideas as one's own;
		  ° recognizing that one must correctly cite sources to give credit to the author of an original work;
		  ° recognizing that sources of information must be cited even when the information has been paraphrased; and
		  ° using quotation marks when someone else's exact words are quoted.

ENGLISH STANDARDS OF LEARNING CURRICULUM FRAMEWORK

Grade Twelve

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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At the twelfth-grade level, students will use organizational skills, audience awareness, appropriate vocabulary and grammar, and verbal and nonverbal presentation skills to plan and deliver an effective ~~5 to 10 minute~~ formal oral presentation. Students will use a variety of listening skills to evaluate oral presentations. In addition, students will examine media messages for their objectivity, subjectivity, and effects on the audience.

12.1 The student will make a formal oral presentation in a group or individually.

a) Choose the purpose of the presentation.
b) Choose vocabulary, language, and tone appropriate to the audience, topic, and purpose.
c) Use details, illustrations, statistics, comparisons, and analogies to support the presentation.
d) Use media, visual literacy, and technology skills to create and support the presentation.
e) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
f) Collaborate and report on small group learning activities.
g) Evaluate formal presentations including personal, digital, visual, textual, and technological.
h) Use a variety of listening strategies to analyze relationships among purpose, audience, and content of presentations.
i) Critique effectiveness of presentations.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will develop skills in preparing and delivering formal oral presentations. To this end, they will develop skills in identifying a purpose, researching topics, developing content, and delivering presentations. • ~~Students will learn to evaluate the effectiveness of speeches and to develop critiques of presentations~~.	**All students should** • recognize that the major purposes of speeches include exposition, persuasion, inspiration, entertainment, or recognition of special occasions (e.g., acceptance, welcome, or thank-you speeches). • understand that semantics involves words and word order specifically chosen for the meaning intended. • recognize rhetoric as the art of persuasion, especially using devices such as repetition, parallelism, and rhetorical question. • ~~understand the components of effective presentations~~.	**To be successful with this standard, students are expected to** • make a 5-10 minute oral presentation alone and as part of a group. • organize and develop a speech, using ~~an order~~ steps in the process such as: ◦ selection of a topic related to audience and situation; ◦ determination of purpose; ◦ research; ◦ development of an outline, including introduction, body, and conclusion; ◦ practice; and ◦ presentation. • choose appropriate vocabulary, language, and tone for the selected topic, purpose, context, and audience. • develop content through inclusion of: ◦ a combination of facts and/or statistics; ◦ examples; ◦ illustrations; ◦ anecdotes and narratives; ◦ reference to experts; ◦ quotations; ◦ analogies and comparisons; and ◦ logical argumentation of their reasoning. • use effective delivery created through a combination of: ◦ clear purpose;

12.1 The student will make a formal oral presentation in a group or individually.

a) Choose the purpose of the presentation.
b) Choose vocabulary, language, and tone appropriate to the audience, topic, and purpose.
c) Use details, illustrations, statistics, comparisons, and analogies to support the presentation.
d) Use media, visual literacy, and technology skills to create and support the presentation.
e) Use grammatically correct language, including vocabulary appropriate to the topic, audience, and purpose.
f) Collaborate and report on small group learning activities.
g) Evaluate formal presentations including personal, digital, visual, textual, and technological.
h) Use a variety of listening strategies to analyze relationships among purpose, audience, and content of presentations.
i) Critique effectiveness of presentations.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ organization and development of content; ◦ semantics; ◦ rhetoric; ◦ visual aids; ◦ voice modulation and strength; ◦ gestures, stance, and eye contact; and ◦ sufficient practice of delivery. • use appropriate and effective visual aids and/or technology to support presentations. • use grammatically correct language and appropriate vocabulary. • work together to establish group goals, define individual roles, and report on learning activities. • evaluate a formal presentation by analyzing and critiquing the effectiveness of the speaker's demeanor, voice, language, gestures, clarity of thought, organization of evidence, relevance, and delivery. • monitor audience feedback, engagement, understanding, and agreement to adjust delivery and content. • ~~analyze and critique the relationships among purpose, audience, and content of a presentation.~~ • analyze and critique the effectiveness of purpose and content of a presentation with respect to how the audience responds.

12.2 The student will examine how values and points of view are included or excluded and how media influences beliefs and behaviors.

a) Evaluate sources including advertisements, editorials, blogs, Web sites, and other media for relationships between intent, factual content, and opinion.

b) Determine the author's purpose and intended effect on the audience for media messages.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will continue to develop media literacy by examining how media messages influence people's beliefs and behaviors.	**All students should** • recognize that media messages express points of view and contain values to influence the beliefs and behaviors of the intended audience. • understand the difference between ***objectivity,*** or fact, and ***subjectivity,*** or bias, in media messages. • realize the purposeful use of persuasive language and word connotations to convey viewpoint and bias.	**To be successful with this standard, students are expected to** • organize knowledge and display learning using visual images, text, graphics, and/or music to create media messages with visual, audio, and graphic effects. • evaluate visual and verbal media messages for content (word choice and choice of information), intent (persuasive techniques), impact (public opinion trends), and effectiveness (effect on the audience). • determine author's purpose and distinguish factual content from opinion and possible bias. • analyze and critique how media reach the targeted audience for specific purposes (to persuade, to entertain, to push to action, to appeal to ethics or beliefs, etc.). • identify fact and opinion in media messages and how those elements relate to purpose and audience.

At the twelfth-grade level, students will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts. They will analyze British literature and literature of other cultures with emphasis on the many classic works that may be studied. In addition, students will read ~~informational~~ nonfiction and technical texts and continue to develop their own reading-process skills. Students will apply these reading skills in other content areas, including history and social science, science, and mathematics. When selecting texts, teachers will consider appropriateness of subject and theme as well as text complexity.

12.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms, literary and classical allusions in text.
e) Expand general and specialized vocabulary through speaking, reading, and writing.
f) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will increase their independence as learners of vocabulary. • Students will be exposed to affixes, including prefixes and suffixes, roots, derivations, and inflections of polysyllabic words and understand that words with similar parts may be related to each other in meaning and origin. • Teachers should use a study of cognates, words from the same linguistic family, to enhance vocabulary instruction. Cognates can occur within the same language or across languages *night* (English), *nuit* (French), *Nacht* (German), *nacht* (Dutch), *nicht* (Scots), *natt* (Swedish, Norwegian), *nat* (Danish), *raat* (Urdu), *nátt* (Faroese), *nótt* (Icelandic), *noc* (Czech, Slovak, Polish). • Students will evaluate the use of figurative language and analogies in text. • Students will use context and connotations to help determine the meaning of nearly synonymous words and appreciate an author's choices of words and images. • **Connotation** is subjective, cultural, and emotional. A stubborn person may be described	**All students should** • use word structure to analyze and relate words. • recognize internal and external inflections that change meaning and pronunciation. • recognize that words have nuances of meaning and that understanding the connotations may be necessary to determine the appropriate meaning. • recognize that figurative language enriches text.	**To be successful with this standard, students are expected to** • use roots or affixes to determine or clarify the meaning of words. • demonstrate an understanding of idioms. • use prior reading knowledge and other study to identify the meaning of literary and classical allusions. • interpret figures of speech (e.g., euphemism, oxymoron, hyperbole, paradox) in context and analyze their role in the text. • analyze connotations of words with similar denotations. • use context (e.g., the overall meaning of a sentence, paragraph, or text; a word's position or function in a sentence) as a clue to the meaning of a word or phrase. • identify and correctly use patterns of word changes that indicate different meanings or parts of speech (e.g., *conceive, conception, conceivable*). • consult general and specialized reference materials (e.g., dictionaries, glossaries, thesauruses), both print and digital, to find the pronunciation of a word or determine or clarify its precise meaning, its part of speech, its etymology, or its standard usage. • demonstrate understanding of figurative language, word relationships, and connotations in word meanings.

12.3 The student will apply knowledge of word origins, derivations, and figurative language to extend vocabulary development in authentic texts.

a) Use structural analysis of roots, affixes, synonyms, antonyms, and cognates to understand complex words.
b) Use context, structure, and connotations to determine meanings of words and phrases.
c) Discriminate between connotative and denotative meanings and interpret the connotation.
d) Identify the meaning of common idioms, literary and classical allusions in text.
e) Expand general and specialized vocabulary through speaking, reading, and writing.
f) Use knowledge of the evolution, diversity, and effects of language to comprehend and elaborate the meaning of texts.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
as being either *strong-willed* or *pig-headed*. They have the same literal meaning (i.e., *stubborn*). *Strong-willed* connotes admiration for the level of someone's will, while *pig-headed* **connotes** frustration in dealing with someone. • **Denotation** is a dictionary definition of a word. • **Idiom** relates to a natural way of using language: the way of using a language that comes naturally to its native speakers (e.g.,blessing in disguise, chip on your shoulder, • An **allusion** is an indirect reference to a person, place, event, or thing – real or fictional. J.D. Salinger's "The Catcher in the Rye" is an allusion to a poem by Robert Burns. Stephen Vincent Benet's story "By the Waters of Babylon" alludes to Psalm 137 in the Bible .		

12.4 The student will read, comprehend, and analyze the development of British literature and literature of other cultures.

a) Compare and contrast the development of British literature in its historical context.
b) Recognize major literary forms and their elements.
c) Recognize the characteristics of major chronological eras.
d) Relate literary works and authors to major themes and issues of their eras.
e) Analyze the social and cultural function of British literature.
f) Explain how the sound of a poem (rhyme, rhythm, onomatopoeia, repetition, alliteration, assonance, and parallelism) supports the subject, mood, and theme.
g) Compare and contrast traditional and contemporary poems from many cultures.
h) Analyze how dramatic conventions including character, scene, dialogue, and staging contribute to the theme and effect.
i) Compare and contrast dramatic elements of plays from American, British, and other cultures.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will understand how British literature has influenced and has been influenced by the literature of other cultures. • Students will trace and examine the development of British literature and the literature of other cultures by recognizing characteristics of chronological periods and literary techniques. Students will relate literary works and their authors to major themes and issues. • Students will understand that critical evaluation is the process of judging the merit or value of a piece of literature and that the process includes evaluating the author's effectiveness in integrating component parts to create a whole. • ~~Students will use critical analysis to judge the merit of a dramatic selection. Critical analysis includes determining the author's effectiveness in integrating component parts of a drama to create a whole~~. • A complete list of literary devices is found in	**All students should** • recognize literary forms employed in major literary eras. • recognize the literary characteristics of the major chronological eras. • understand how a writer's choice of words reveals the content of a poem and the speaker's attitude regarding the content of the poem. • understand how the subject and mood of the poem are supported or reinforced through the use of sound structures. • understand a reader's response to ~~the poem~~ poetry is manipulated by imagery and figures of speech.	**To be successful with this standard, students are expected to** • use reading strategies to improve comprehension and to achieve the purposes for reading: predicting and adjusting predictions; questioning the text; restating main ideas and summarizing supporting details; and close reading. • analyze texts to identify the author's attitudes, viewpoints, and beliefs and critique how these relate to larger historical, social, and cultural contexts. • analyze the representation of a subject or a key scene in two different media . • ~~identify literary forms, such as~~ ◦ ~~epic~~ ◦ ~~tragedy~~ ◦ ~~comedy~~ ◦ ~~sonnet and other poetic forms~~ ◦ ~~essay~~ ◦ ~~journal/diary~~ ◦ ~~satire~~ • identify the literary characteristics of specific eras, such as: ◦ Anglo-Saxon/Medieval period; ◦ Tudor/Renaissance period; ◦ Neoclassical period;

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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
Essential Knowledge, Skills, and Processes column for SOL 9.4. • **Close reading** entails close observation of the text, including annotating, determining all word meanings including connotations, syntax, and structure. It also involves paying close attention to figures of speech, and other features that contribute to a writer's style. Close reading also involves reflecting on deeper meanings of text including considering relationships to other texts or social or cultural history. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer Relationship), thinking aloud, etc.	• understand traditional and contemporary dramatic works of authors from a variety of cultures. • identify and understand the most effective elements of a selected play.	◦ Restoration Age; ◦ Romantic and Victorian periods; and ◦ Modern and Postmodern periods. • recognize major themes and issues related to: ◦ religious diversity; ◦ political struggles; ◦ ethnic and cultural mores and traditions; and ◦ individual rights, gender equity, and civil rights. • distinguish between what is directly stated in a text from what is really meant because of the use of satire, sarcasm, irony, or understatement. • analyze how British literature has provided social commentary on various cultural developments including religious and political struggles, changing mores and traditions, etc. • ~~identify sound structures, such as~~ ◦ ~~rhyme~~ ◦ ~~rhythm~~ ◦ ~~repetition~~ ◦ ~~alliteration~~ ◦ ~~assonance~~ ◦ ~~consonance~~

12.4 The student will read, comprehend, and analyze the development of British literature and literature of other cultures.

a) Compare and contrast the development of British literature in its historical context.
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UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		◦ ~~onomatopoeia~~ ◦ ~~parallelism~~ • explain how the choice of words in a poem creates tone. • explain how the reader's response to the poem is manipulated by imagery, figures of speech, and diction (word choice)~~, such as~~. ◦ ~~metaphor~~ ◦ ~~simile~~ ◦ ~~analogy~~ ◦ ~~symbolism~~ ◦ ~~personification~~ ◦ ~~paradox~~ ◦ ~~oxymoron~~ ◦ ~~apostrophe~~ ◦ ~~allusion~~ • compare and contrast traditional and contemporary poetry <u>and drama</u> from many cultures. • ~~explain how dramatic conflict is created through~~ ◦ ~~exposition/initiating event~~ ◦ ~~rising action~~ ◦ ~~climax or crisis~~ ◦ ~~falling action~~

12.4 The student will read, comprehend, and analyze the development of British literature and literature of other cultures.

a) Compare and contrast the development of British literature in its historical context.
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h) Analyze how dramatic conventions including character, scene, dialogue, and staging contribute to the theme and effect.
i) Compare and contrast dramatic elements of plays from American, British, and other cultures.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		° ~~resolution/dénouement (conclusion/resolution)~~ • explain how a dramatist uses dialogue to reveal the theme of a drama. • ~~compare and contrast the use of dialogue and staging found in a variety of plays~~ • ~~identify the most effective elements of selected plays~~ • compare and contrast the use of exposition/initiating event, rising action, complication/conflict, climax or crisis, falling action, and resolution/denouement among plays from various cultures.

12.5 The student will read and analyze a variety of nonfiction texts.

a) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.
b) Analyze and synthesize information in order to solve problems, answer questions, and generate new knowledge.
c) Analyze two or more texts addressing the same topic to identify authors' purpose and determine how authors reach similar or different conclusions.
d) Recognize and analyze use of ambiguity, contradiction, paradox, irony, overstatement, and understatement in text.
e) Identify false premises in persuasive writing.
f) Draw conclusions and make inferences on explicit and implied information using textual support.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will develop skill in analyzing, evaluating, and applying the format (structure) and content of a variety of informational and technical texts. Such informational and technical texts include statements of fact and essential information needed for making consumer choices and other important decisions. • Students should recognize persuasive techniques, such as: ◦ ad hominem – means "to the man" does not argue the issue, instead it argues the person; ◦ red herring – is a deliberate attempt to divert attention; ◦ straw man – creates the illusion of having refuted a proposition by substituting a similar yet weaker proposition (the "straw man"); and ◦ begging the question – assumes the conclusion is true without proving it; circular argument. • Analyze and identify false premises in arguments and evaluate their role in the	**All students should** • understand formats common to information resources ~~and new publications~~.	**To be successful with this standard, students are expected to** • before, during, and after reading texts, generate and respond to a variety of critical thinking questions to activate prior knowledge, engage actively with learning new information, and reflect on new learning or fresh insights. • use graphic organizers to analyze printed and Web-based informational and technical texts.~~, such as~~ ◦ ~~product evaluations~~ ◦ ~~warranties~~ ◦ ~~instructional manuals~~ ◦ ~~technical manuals~~ ◦ ~~contracts~~ ◦ ~~E-zines~~ • examine the format (structure) of an informational or technical text as an aid to determining and analyzing its content. • recognize and apply specialized vocabulary. • analyze how two or more texts develop and treat the same idea. • determine an author's point of view or purpose in a text in which the rhetoric is particularly effective, • ~~draw conclusions regarding the quality of a product based on analysis of the accompanying warranty and instruction manual~~. • make frequent references to texts in order to verify conclusions and support logical inferences.

12.5 The student will read and analyze a variety of nonfiction texts.

a) Generate and respond logically to literal, inferential, evaluative, synthesizing, and critical thinking questions before, during, and after reading texts.
b) Analyze and synthesize information in order to solve problems, answer questions, and generate new knowledge.
c) Analyze two or more texts addressing the same topic to identify authors' purpose and determine how authors reach similar or different conclusions.
d) Recognize and analyze use of ambiguity, contradiction, paradox, irony, overstatement, and understatement in text.
e) Identify false premises in persuasive writing.
f) Draw conclusions and make inferences on explicit and implied information using textual support.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
argument. • Students will use a variety of reading strategies including text annotation, QAR (Question-Answer, Relationship), thinking aloud, etc.		

At the twelfth-grade level, students will produce expository, ~~and~~ informational, analytic, and persuasive/argumentative papers that are logically organized and contain ~~with~~ clear and accurate ideas. Students will clarify and defend a position using precise and relevant evidence. In addition, students will revise writing for clarity of content and depth of information.

12.6 The student will develop expository and informational, analyses, and persuasive/argumentative writings.

a) Generate, gather, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis to demonstrate~~s~~ knowledgeable judgments, address counterclaims, and provide effective conclusions.
c) Clarify and defend a position with precise and relevant evidence.
d) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
e) Use a variety of rhetorical strategies to accomplish a specific purpose.
f) Create arguments free of errors in logic and externally supported.
g) Revise writing for clarity of content, depth of information and technique of presentation.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• The intent of this standard is that students will develop skill in creating expository, technical, and persuasive/argumentative writings. ~~Technical writing is prose that explains or clarifies information of a specialized nature for a targeted audience.~~ • Persuasive techniques are defined under SOL 12.5. • Students should have practice writing for shorter time frames as well as extended time frames.	**All students should** • understand that writing is a process. • locate and select appropriate information that clearly supports a definite purpose and position. • understand that format (structure) determines the sequence of a writing. ~~(The sequence in technical writing may be determined by the format of the task, for example, filling in blanks and answering questions.)~~ • understand that vocabulary is used to develop voice and tone for a specific audience, purpose, or situation.	**To be successful with this standard, students are expected to** • ~~generate~~ develop expository writings that: ◦ explain their ideas through a clear general statement of the writer's point (thesis); ◦ use specific evidence and illustrations; and ◦ provide concise and accurate information. • ~~plan~~ develop technical writings (e.g., personal data sheet, résumé, job description, questionnaire, job application, or business communication) that address a clearly identified audience and have a clearly identified purpose. • develop analytical essays that do one or more of the following: ◦ examine a process; ◦ make a comparison; ◦ propose solutions; ◦ classify; ◦ define; ◦ show cause and effect; ◦ illustrate problems; and ◦ evaluate. • construct arguments that: ◦ introduce precise, substantive claims; ◦ establish the significance of the claims;

12.6 The student will develop expository and informational, analyses, and persuasive/argumentative writings.

a) Generate, gather, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis to demonstrate~~s~~ knowledgeable judgments, address counterclaims, and provide effective conclusions.
c) Clarify and defend a position with precise and relevant evidence.
d) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
e) Use a variety of rhetorical strategies to accomplish a specific purpose.
f) Create arguments free of errors in logic and externally supported.
g) Revise writing for clarity of content, depth of information and technique of presentation.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		° distinguish them from opposing claims; and ° sequence information logically (e.g., problem-solution, cause and effect). • use a range of strategies to elaborate and persuade, such as: ° descriptions; ° anecdotes,; ° case studies, ° analogies; and ° illustrations. • develop claim(s) and counterclaims thoroughly, supplying the most relevant data and evidence for each while pointing out the strengths and limitations of both. • provide a clear and effective conclusion. • develop a thesis that demonstrates clear and knowledgeable judgments. • clarify and defend positions with precise and relevant evidence, including facts, expert opinions, quotations and/logical reasoning. • strategically focus paragraphs by using a variety of techniques. • use transition words and phrases to signal progression of ideas within and between paragraphs, and use appropriate words and phrases to signal organizational patterns (e.g., description, question-answer, compare-

12.6 The student will develop expository and informational, analyses, and persuasive/argumentative writings.

a) Generate, gather, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis to demonstrate~~s~~ knowledgeable judgments, address counterclaims, and provide effective conclusions.
c) Clarify and defend a position with precise and relevant evidence.
d) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
e) Use a variety of rhetorical strategies to accomplish a specific purpose.
f) Create arguments free of errors in logic and externally supported.
g) Revise writing for clarity of content, depth of information and technique of presentation.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		contrast, problem-solution, cause and effect). • use words, phrases, and clauses to link the major sections of the text. • create cohesion, and clarify the relationships between claim(s) and reasons, between reasons and evidence, and between claim(s) and counterclaims. • elaborate ~~on ideas~~ for clarity and accuracy developing the topic fully with significant and relevant facts, extended definitions, concrete details, and important quotations. • develop ideas in a logical sequence. • establish and maintain a style and tone. • apply persuasive rhetorical devices and techniques including rhetorical questioning, parallel structuring, metaphor, imagery, figures of speech, alliterative expressions, etc., when appropriate. • recognize and avoid common logical fallacies or false premises. • revise writing to provide depth of information and to adhere to ~~their~~ presentation format. • use computer technology as available to edit writing before submitting the final copy ~~for correct use of language, spelling, punctuation, and capitalization~~.

12.6 The student will develop expository and informational, analyses, and persuasive/argumentative writings.

a) Generate, gather, and organize ideas for writing to address a specific audience and purpose.
b) Produce arguments in writing that develop a thesis to demonstrate~~s~~ knowledgeable judgments, address counterclaims, and provide effective conclusions.
c) Clarify and defend a position with precise and relevant evidence.
d) Adapt content, vocabulary, voice, and tone to audience, purpose, and situation.
e) Use a variety of rhetorical strategies to accomplish a specific purpose.
f) Create arguments free of errors in logic and externally supported.
g) Revise writing for clarity of content, depth of information and technique of presentation.
h) Use computer technology to plan, draft, revise, edit, and publish writing.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		• ~~proofread writing before submitting the final copy~~.

12.7 The student will write, revise, and edit writing.

a) Edit, proofread, and prepare writing for intended audience and purpose.

b) Apply grammatical conventions to edit writing for correct use of language, spelling, punctuation, and capitalization.

c) Use a style manual, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA), to apply rules for punctuation and formatting of direct quotations.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will understand and apply mechanics, usage, and grammar conventions to prepare writing for intended audiences. • Students will use a style manual, such as MLA or APA, to apply punctuation rules and the formatting of quotations in documented papers.	**All students should** • use grammatical conventions to adjust sentence and paragraph structures for a variety of purposes and audiences. • understand the difference between revising and editing, which is similar to the difference between an architect and a carpenter.	**To be successful with this standard, students are expected to** • assess the quality of writing and strengthen it through revision. • use a variety of strategies (e.g., reading the draft aloud; peer feedback; using a rubric; reading the draft from the perspective of the intended audience) to evaluate whether the draft is effectively supported and adequately developed. • edit both one's own and others' work for grammar, style and tone appropriate to audience, purpose and context. • apply MLA or APA style for punctuation conventions and formatting direct quotations, particularly for in-text citation in documented papers.

At the twelfth-grade level, students will produce well-documented research papers, using a standard method of documentation, such as MLA or APA. Students will critically evaluate the accuracy, quality, and validity of all information and follow ethical and legal guidelines for using and gathering information.

12.8 The student will write documented research papers.

a) Use technology as a tool to research, organize, evaluate, and communicate information.
b) Frame, analyze, and synthesize information to solve problems, answer questions, and generate new knowledge.
c) Critically evaluate the accuracy, quality, and validity of the information.
d) Synthesize information to support the thesis and present information in a logical manner.
e) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
f) Revise writing for clarity, depth of information, and technique of presentation.
g) Edit writing for language, spelling, punctuation, capitalization, syntax, and paragraphing as appropriate for standard English.
h) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
• Students will research topics and develop documented papers that support a thesis. A documented paper is the result of following a process leading to discovery of information that is then synthesized to support a focus on a particular topic through content, style, structure, and presentation. • ~~Students must avoid committing plagiarism.~~ • Students will recognize consequences of plagiarism according to the guidelines established by school divisions or post-secondary schools.	**All students should** • understand how to gather information and analyze it to organize and begin the writing process. • understand the ethical issues and responsibility of documentation in research writings.	**To be successful with this standard, students are expected to** • identify and narrow a topic for research through a variety of strategies, such as mapping, listing, brainstorming, webbing, and using an Internet search engine. • utilize technology to conduct research, organize information, and develop writing. • ~~identify the ethical issues of documentation in research writings~~. • collect, evaluate, analyze and synthesize relevant information, using a variety of primary and secondary print and electronic sources. • evaluate collected information from print and electronic sources by: ° determining its validity, accuracy, credibility, reliability, consistency, strengths and limitations; and ° formulating a reason/focus to represent findings. • record and organize information into a draft by: ° prioritizing and synthesizing information; ° ~~developing an outline with appropriate details~~ ° summarizing and/or paraphrasing information; and ° selecting direct quotations. • cite print or electronic sources of information to avoid plagiarism when

12.8 The student will write documented research papers.

a) Use technology as a tool to research, organize, evaluate, and communicate information.
b) Frame, analyze, and synthesize information to solve problems, answer questions, and generate new knowledge.
c) Critically evaluate the accuracy, quality, and validity of the information.
d) Synthesize information to support the thesis and present information in a logical manner.
e) Cite sources for both quoted and paraphrased ideas using a standard method of documentation, such as that of the Modern Language Association (MLA) or the American Psychological Association (APA).
f) Revise writing for clarity, depth of information, and technique of presentation.
g) Edit writing for language, spelling, punctuation, capitalization, syntax, and paragraphing as appropriate for standard English.
h) Define the meaning and consequences of plagiarism and follow ethical and legal guidelines for gathering and using information.

UNDERSTANDING THE STANDARD (Teacher Notes)	ESSENTIAL UNDERSTANDINGS	ESSENTIAL KNOWLEDGE, SKILLS, AND PROCESSES
		paraphrasing, summarizing, quoting, or inserting graphics, using MLA or APA style. • ~~revise and edit writing to comply with major requirements and expectations of the assignment~~. • edit writing for correct use of language, capitalization, punctuation, and spelling. • demonstrate a sophisticated understanding of the ethics of writing by: ° understanding that *plagiarism* is the act of presenting someone else's ideas as one's own; ° recognizing that one must correctly cite sources to give credit to the author of an original work; ° recognizing that sources of information must be cited even when the information has been paraphrased; and ° using quotation marks when someone else's exact words are quoted.

Board of Education Agenda Item

Item: I. **Date:** September 23, 2010

Topic: First Review of Proposed Revised Curriculum Framework for 2010 *Science Standards of Learning*

Presenter: Ms. Paula J. Klonowski, Science Coordinator

Telephone Number: (804) 371-0249 **E-Mail Address:** paula.klonowski@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

____ Action requested at this meeting _X_ Action requested at future meeting: After public comment

Previous Review/Action:

____ No previous board review/action

_X_ Previous review/action
date January 14, 2010
action Board of Education adopted the 2010 *Science Standards of Learning*

Background Information:
New academic content *Science Standards of Learning* were developed in 1995 and revised in 2003. The Standards of Quality require the Board of Education to review the Standards of Learning on a regular schedule. The *Science Standards of Learning* were scheduled for review in 2010. As a result, on January 15, 2009, the Board approved a plan to complete the review and revision of these standards and the companion Curriculum Framework during 2010.

On January 14, 2010, the Board approved the 2010 *Science Standards of Learning*. In accordance with the plan, the Department of Education took the following steps to produce a draft of the proposed revised Curriculum Framework for the 2010 *Science Standards of Learning* for the Board's first review:

- Selected a review committee that consisted of individuals solicited from school divisions as well as other stakeholder groups to participate in the process;
- Met with the review committee during June 2010;
- Developed a draft of the proposed revised Curriculum Framework for the 2010 *Science Standards of Learning*.

Summary of Major Elements:
The Virginia Department of Education has developed the attached draft of the proposed revised Curriculum Framework for the 2010 *Science Standards of Learning* (Attachment A).

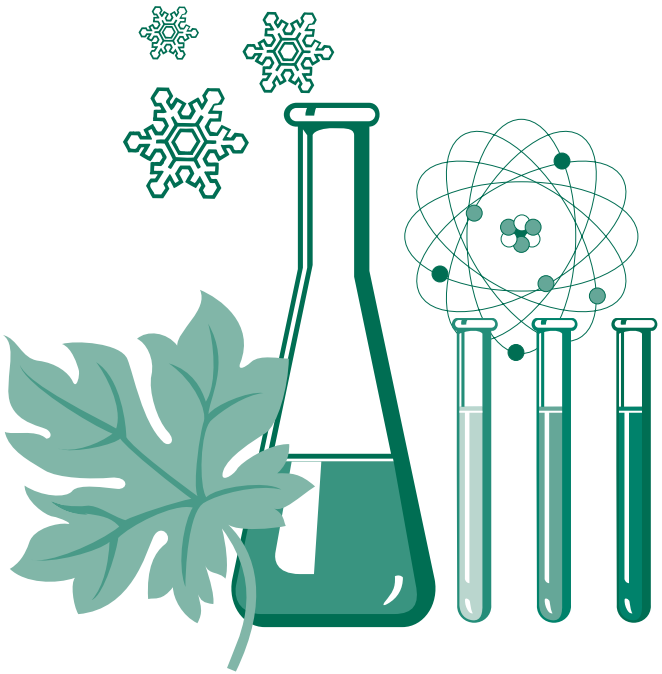
The major elements of the attached proposed revised Curriculum Framework for the 2010 *Science Standards of Learning* include:

- Specificity and clarity of the scope and intent of each of the 2010 *Science Standards of Learning*;
- Instructional focus for the nature of science;
- Organizational change to structure of high school framework and inclusion of student expectations; and
- Increased emphasis on the inclusion of STEM applications to content.

Superintendent's Recommendation:
The Superintendent of Public Instruction recommends that the Board of Education accept for first review the proposed revised Curriculum Framework for the 2010 *Science Standards of Learning*.

Impact on Resources:
This responsibility can be absorbed by the agency's existing resources at this time.

Timetable for Further Review/Action:
Following the Board of Education's acceptance of the 2010 *Science Standards of Learning* Curriculum Framework for first review, the Department of Education will receive public comment for at least 30 day before bringing the Curriculum Framework to the Board for final review later in 2010.



Science Standards of Learning Curriculum Framework

Kindergarten

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Barbara P. Young, Science Specialist

NOTICE
The Virginia Department of Education does not discriminate on the basis of race, sex, color, national origin, religion, age, political affiliation, veteran status, or against otherwise qualified persons with disabilities in its programs or activities.

The 2010 *Science Curriculum Framework* can be found in PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at http://www.doe.virginia.gov.

Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Kindergarten
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard K.1 represent more specifically what a student should achieve during the course of instruction in kindergarten. Across the grade levels, the skills in the first standards form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.")~~ It is important that the classroom teacher understand how the skills in standards K.1 and K.2 are a key part of this sequence (i.e., 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1). ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in the "Scientific Investigation, Reasoning, and Logic" strand.~~

K.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) basic characteristics or properties of objects are identified by direct observation; b) observations are made from multiple positions to achieve different perspectives; c) a set of objects is sequenced according to size; d) a set of objects is separated into two groups based on a single physical characteristic; e) nonstandard units are used to measure the length, mass, and volume of common objects; f) observations and predictions are made for an unseen member in a sequence of objects; g) a question is developed and predictions are made from one or more observations; h) observations are recorded; i) picture graphs are constructed; j) unusual or unexpected results in an activity are recognized; and k) objects are described both pictorially and verbally.

~~Understanding the Standard~~ Overview

~~The skills defined in~~ Standard K.1 ~~are~~ is intended to develop ~~the~~ investigative and inquiry ~~components~~ skills and an understanding of the nature of science ~~of all of the other kindergarten standards (i.e., K.2–K.10)~~. Standard K.1 describes the range of inquiry skills and the level of proficiency in using those skills ~~that~~ students should achieve, and the components of the nature of science that should be developed and reinforced in the context of science concepts developed in kindergarten. **Standard K.1 does not require a discrete unit be taught on scientific investigation and the nature of science because the ~~inquiry~~ skills that make up the standard should be incorporated in all the other kindergarten science standards.** It is also intended that by participating in activities and experiences that develop these skills, students will achieve a preliminary understanding of scientific inquiry and the nature of science and more fully grasp the content-related concepts.

K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) basic characteristics or properties of objects are identified by direct observation;
b) observations are made from multiple positions to achieve different perspectives;
c) a set of objects is sequenced according to size;
d) a set of objects is separated into two groups based on a single physical characteristic;
e) nonstandard units are used to measure the length, mass, and volume of common objects;
f) observations and predictions are made for an unseen member in a sequence of objects;
g) a question is developed and predictions are made from one or more observations;
h) observations are recorded;
i) picture graphs are constructed;
j) unusual or unexpected results in an activity are recognized; and
k) objects are described both pictorially and verbally.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts: a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected. e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. In kindergarten, an emphasis should be placed on concepts a, b, and e. • Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' knowledge from just facts to understanding why the facts are relevant to everyday life. • Science demands evidence. Scientists develop their ideas based on	In order to meet this standard, it is expected that students ~~should be able to~~ will • observe objects and describe their basic properties. These properties include color, shape (circle, triangle, square, and rectangle), size (big, little, large, small), texture (rough, smooth, hard, soft), and weight (heavy, light). • observe an object or objects from multiple positions to achieve different perspectives. In order to accomplish this, the student should look at the object from top, bottom, front, and back, and describe what he/she sees. • arrange a set of objects in sequence according to size. • separate a set of objects into two groups based on a single physical ~~attribute~~ characteristic, including ~~size,~~ color, shape, size, texture, and weight. • measure common objects with nonstandard units. Examples of nonstandard units include hands, pennies, and paper clips for measuring length; holding and comparing two different objects for measuring mass; and liquids put in drinking cups and compared for

K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) basic characteristics or properties of objects are identified by direct observation;
b) observations are made from multiple positions to achieve different perspectives;
c) a set of objects is sequenced according to size;
d) a set of objects is separated into two groups based on a single physical characteristic;
e) nonstandard units are used to measure the length, mass, and volume of common objects;
f) observations and predictions are made for an unseen member in a sequence of objects;
g) a question is developed and predictions are made from one or more observations;
h) observations are recorded;
i) picture graphs are constructed;
j) unusual or unexpected results in an activity are recognized; and
k) objects are described both pictorially and verbally.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for kindergarten students to engage in frequent discussions with peers about their understanding of their investigations. • Observation is an important ~~way~~ skill that enables us to learn about the world. Observations are expressed as descriptive statements about natural phenomena that are accessible to the senses either directly or with the use of technology. Through observation one can learn to compare, contrast, and note similarities and differences. • An object can appear very different depending on how it is oriented. To describe an object fully and accurately, it should be observed from	measuring volume. • predict an unseen member in a sequence of objects to complete a pattern. • develop a question from one or more observations. • make a prediction based on observations. • record observations using pictures. • construct picture graphs using 10 or fewer units. • identify unusual or unexpected results in an activity. • describe objects both pictorially and verbally.

K.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) basic characteristics or properties of objects are identified by direct observation;
b) observations are made from multiple positions to achieve different perspectives;
c) a set of objects is sequenced according to size;
d) a set of objects is separated into two groups based on a single physical characteristic;
e) nonstandard units are used to measure the length, mass, and volume of common objects;
f) observations and predictions are made for an unseen member in a sequence of objects;
g) a question is developed and predictions are made from one or more observations;
h) observations are recorded;
i) picture graphs are constructed;
j) unusual or unexpected results in an activity are recognized; and
k) objects are described both pictorially and verbally.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
several different positions. • Putting objects in a sequence allows one to understand how things are related. A sequence can ~~show how things can change a little at a time~~ illustrate incremental changes over time. • A nonstandard unit of measure, such as the length of a paper clip, can be used to describe and communicate the dimensions of an object. For the nonstandard unit to be most useful, it should be consistent and easily applied. • Sequenced objects or events can show patterns over time. Occasionally, items are missing in a sequence, but observations of patterns in the sequence can offer clues to predict the item(s) that are missing. • Observations about familiar objects or events often lead to the development of predictions and important questions that can spark further investigation. • Observations that are made can be recorded in a variety of ways. Picture graphs are useful ways to display and report information. • It is important to observe the results of an investigation carefully. Results that are unexpected or unusual may be of interest for further study.	

K.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) basic characteristics or properties of objects are identified by direct observation; b) observations are made from multiple positions to achieve different perspectives; c) a set of objects is sequenced according to size; d) a set of objects is separated into two groups based on a single physical characteristic; e) nonstandard units are used to measure the length, mass, and volume of common objects; f) observations and predictions are made for an unseen member in a sequence of objects; g) a question is developed and predictions are made from one or more observations; h) observations are recorded; i) picture graphs are constructed; j) unusual or unexpected results in an activity are recognized; and k) objects are described both pictorially and verbally.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Observations can be communicated through pictures and discussions.	

K.2	The student will investigate and understand that humans have senses that allow them to seek, find, take in, and react or respond to information in order to learn about their surroundings. Key concepts include a) the five senses and corresponding sensing organs; and b) sensory descriptors used to describe common objects and phenomena.

~~Understanding the Standard~~ Overview

~~The second standard at the kindergarten level~~ Standard K.2 is very closely related to K.1 in developing the inquiry skill of observation ~~developed in K.1~~. This standard focuses on the senses — sight, smell, hearing, touch, and taste. Standard K.2 focuses on student understanding that each sensing organ (eyes, ears, nose, tongue, and skin) is associated with a sense. It is important to emphasize that ~~one~~ a student should never taste, touch, or sniff something when the identity is unknown or has any potential danger.

K.2	The student will investigate and understand that humans have senses that allow them to seek, find, take in, and react or respond to information in order to learn about their surroundings. Key concepts include a) the five senses and corresponding sensing organs; and b) sensory descriptors used to describe common objects and phenomena.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A particular sensing organ (eye~~s~~, ear~~s~~, nose, tongue, and skin) is associated with each of the five senses. • Using the senses, we can make careful observations about the world ~~and communicate those observations through descriptors~~. • To communicate what is observed, descriptors should be used.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify and describe the five senses: taste, touch, smell, hearing, and sight. • match each sensing organ (eye~~s~~, ear~~s~~, nose, tongue, and skin) with its associated sense. • match sensory descriptors with the senses (**taste**: sweet, sour, bitter, salty; **touch**: rough, smooth, hard, soft, cold, warm, hot; **hearing**: loud, soft, high, low; **sight**: bright, dull, color, black, ~~and~~ white; **smell**: strong, faint, bad, and good.)

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

K.3	The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications. Key concepts include a) magnetism and its effects; and b) useful applications of magnetism.

~~Understanding the Standard~~ Overview

Magnets have an effect on certain metals and can cause objects to move without physically touching them. Standard K.3 focuses on developing a basic understanding of magnetism that will be expanded in standards 2.2 and 4.3. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.3 The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications. Key concepts include

a) magnetism and its effects; and
b) useful applications of magnetism.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A magnet has two ends called poles, one of which is called a north pole or north-seeking pole, and the other is called a south pole or south-seeking pole. • The north pole of one magnet attracts the south pole of a second magnet, while the north pole of one magnet repels the other magnet's north pole. One way to state this is that like poles repel and unlike poles attract. Repulsion is the force that pushes like poles of magnets apart. • A magnet creates an invisible area of magnetism all around it called a magnetic field. • The north pole of a magnet points roughly toward Earth's North Pole and vice-versa. That is because Earth itself contains magnetic materials and behaves like a gigantic magnet. • If you cut a bar magnet in half, you get two new, smaller magnets, each with its own north and south pole. • Magnets will attract certain metals (iron-bearing, nickel, and cobalt). • Magnets have an effect on some items and can cause them to move. Some items are not affected by magnets and remain stationary. • Because some metals are attracted to magnets, magnets have many simple useful applications in the home such as can openers, magnetized screwdrivers, magnetic cabinet door latches, and magnetic games. • The force of a magnet can move something without actually touching it. • Students will be introduced to the vocabulary attract/repel, nonattraction, metal, and nonmetal in grade two. The focus of the	In order to meet this standard, it is expected that students ~~should be able to~~ will • predict and test which common objects will be attracted to magnets and which will not be attracted to magnets. • classify objects as being attracted or not attracted to magnets, such as an iron nail, an iron-bearing paper clip, cereal, and a book. • ~~explain in their own words essential vocabulary, including the concepts of attraction/nonattraction, push/pull, attract/repel, and metal/nonmetal.~~ • explain in their own words how an object such as an iron nail, an iron-bearing paper clip, cereal, or a book is affected by a magnet. • identify items in the home or school that contain a magnet or magnets, such as can openers, magnetized screwdrivers, magnetic games, magnetic cabinet door latches, ~~and~~ refrigerator magnets, and magnetic letters. • ~~evaluate the importance and usefulness of magnets in the home.~~

K.3 The student will investigate and understand that magnets have an effect on some materials, make some things move without touching them, and have useful applications. Key concepts include a) magnetism and its effects; and b) useful applications of magnetism.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
investigations in this standard should be on the concepts, not the terminology.	

Kindergarten
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, ~~states~~ phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure ~~of~~ and classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

K.4	The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include a) colors of objects; b) shapes and forms of objects; c) textures and feel of objects; d) relative sizes and weights of objects; and e) relative positions and speed of objects.

~~Understanding the Standard~~ Overview

Standard K.4 focuses on student understanding that all objects have physical properties, which include color, shape or form, texture, and size. Position and speed, though not physical properties, can also be observed and described. A basic understanding of physical properties provides a foundation for observing, investigating, and studying matter. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.4 The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include
a) colors of objects;
b) shapes and forms of objects;
c) textures and feel of objects;
d) relative sizes and weights of objects; and
e) relative positions and speed of objects.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following~~: • An object may have many properties that can be observed and described. • An ~~Objects~~ object can be described readily in terms of color~~, shape, and texture~~. • Visible light waves are the only electromagnetic waves that we can see with the naked eye. We see these waves as the colors of the rainbow. Each color has a different wavelength. Red has the longest wavelength and violet has the shortest wavelength. • When all the waves are seen together, they make white light. When white light shines through a prism, the white light is broken apart into colors. Water vapor in the atmosphere can act as a prism and break apart the white light, creating a rainbow. • The order of the colors in the visible spectrum are red, orange, yellow, green, blue, and violet. Most scientists no longer include the color indigo, which used to be included between blue and violet. • ~~Indigo and~~ At the kindergarten level, violet is referred to as purple. It is not required at the kindergarten level that students know the term violet. ~~are not required at the kindergarten level.~~ • Black and white are not spectral colors, but students should recognize them by name. Black is the total absence of light and is when a material absorbs all the light. White is a reflection of all visible light together. • An object can be described in terms of shape, size, and texture.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify and name ~~eight~~ six basic colors, including red, orange, yellow, green, blue, and purple~~.~~; and identify and name black and white. • identify and name a circle, triangle, square, and rectangle. • compare and contrast objects that are flexible, stiff, straight, and/or curved. • compare and contrast objects that are rough, smooth, hard, and/or soft. • compare objects using the concepts of heavy/light, long/short, wide/thin, big/little, and large/small. • measure objects, using nonstandard units, and direct comparisons. • identify the position of an object, using position words over/under, in/out, above/below, and left/right. • group objects according to their speed — fast or slow.

K.4	The student will investigate and understand that the position, motion, and physical properties of an object can be described. Key concepts include a) colors of objects; b) shapes and forms of objects; c) textures and feel of objects; d) relative sizes and weights of objects; and e) relative positions and speed of objects.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• An object can be described according to its position relative to another object and according to its motion. • Two different objects can have some of the same physical properties and some different physical properties.	

K.5	The student will investigate and understand that water flows and has properties that can be observed and tested. Key concepts include a) water occurs in different phases; b) water flows downhill; and c) some materials float in water, while others sink.

~~Understanding the Standard~~ Overview

Standard K.5 focuses on student understanding that water has identifying properties that can be observed and described. This standard serves as a basis for understanding physical properties and ~~states~~ phases of matter. Related primary standards include 1.3, 2.3, ~~and~~ 3.3, 5.4, and 6.5. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.5	The student will investigate and understand that water flows and has properties that can be observed and tested. Key concepts include a) water occurs in different phases; b) water flows downhill; and c) some materials float in water, while others sink.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Water can be a solid, liquid, or gas. • The ~~state~~ phase of water can be changed by heating or cooling it. • The natural flow of water is from a higher to a lower level. • Some objects float in water, while others do not.	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~identify~~ classify examples of the different ~~states~~ phases of water (solid, liquid, and gas). • ~~classify examples of different states of matter as solid, liquid, or gas.~~ • describe the natural flow of water. • predict where a stream of water will flow. • predict whether items will float or sink when placed in water. Items to use include wood, metal, ~~fruits,~~ paper, and plastics.

Kindergarten
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

K.6	The student will investigate and understand the differences between living organisms and nonliving objects. Key concepts include a) all things can be classified as living or nonliving; and b) living organisms have certain characteristics that distinguish them from nonliving objects including growth, movement, response to the environment, having offspring, and the need for food, air, and water.

~~Understanding the Standard~~ Overview

Standard K.6 focuses on student understanding that living organisms have identifying properties that distinguish them from nonliving objects and those properties can be observed and described. This standard serves as a basis for understanding the differences between living organisms and nonliving objects, and the interactions between living and nonliving things. Related elementary standards include 1.4, 1.5, 2.5, 3.4, and 4.4. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.6 The student will investigate and understand the differences between living organisms and nonliving objects. Key concepts include
a) all things can be classified as living or nonliving; and
b) living organisms have certain characteristics that distinguish them from nonliving objects including growth, movement, response to the environment, having offspring, and the need for food, air, and water.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Living is used to describe anything that is or has ever been alive (e.g., dog, flower, seed, log). • Nonliving is used to describe anything that is not now nor has ever been alive (e.g., rock, mountain, glass, wristwatch). • All living things grow, breathe, reproduce, excrete, respond to stimuli, and have similar basic needs like nourishment.	In order to meet this standard, it is expected that students will • identify and describe the basic characteristics of living things (growth, movement, response to the environment, having offspring, and the need for food, air, and water). • identify living organisms and nonliving objects found at home and at school. • classify items by living or nonliving.

K.7	The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include a) animals need adequate food, water, shelter, air, and space to survive; b) plants need nutrients, water, air, light, and a place to grow to survive; c) plants and animals change as they grow, have varied life cycles, and eventually die; and d) offspring of plants and animals are similar but not identical to their parents or to one another.

~~Understanding the Standard~~ Overview

Standard ~~K.6~~ K.7 focuses on student understanding that all living things have basic life needs and life processes. This standard introduces basic life science concepts that progress through high school ~~B~~biology. ~~K.6~~ K.7 is very closely related to the concepts presented in 1.4 and 1.5. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.7 The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include

a) animals need adequate food, water, shelter, air, and space to survive;
b) plants need nutrients, water, air, light, and a place to grow to survive;
c) plants and animals change as they grow, have varied life cycles, and eventually die; and
d) offspring of plants and animals are similar but not identical to their parents or to one another.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Plants and animals change as they grow. • Animals need adequate food, water, shelter, air, and space to survive. • Some animals are terrestrial animals, some animals are aquatic animals, and some are both. Terrestrial animals get their oxygen from the air they breathe and aquatic animals extract oxygen from water. • In order to survive, plants ~~and animals~~ need ~~food~~ nutrients, water, ~~and gases in the air to live~~ air, light, and a place that has adequate space for them to grow. ~~(Many animals and plants that live in water use the gases that are dissolved in the water.)~~ • Plants provide food for people and animals. • Some plants are terrestrial plants and some are aquatic plants. • Plants make the oxygen that other living things breathe. They produce the oxygen as part of the process of photosynthesis. Carbon dioxide from the air enters a leaf through the stomata. Oxygen is produced by plants as a waste product and is released into the air through the stomata. • Plants and animals ~~live~~ change as they grow and eventually die. This is part of their life cycle. The life cycles of plants and animals vary by species. • Many offspring of plants and animals are like their parents but not identical to them or to one another.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the life needs of animals ~~and plants~~. The life needs are food, water, ~~and air~~ shelter, air, and space. • describe the life needs of plants. The life needs are nutrients, water, air, light, and a place that has adequate space for them to grow. • predict what will happen to animals and plants if life needs are not met. • describe some simple changes animals ~~and plants~~ undergo during the life cycles. ~~For animals t~~This may include changes in their body size, color, ~~body~~ covering, ~~and overall size~~ or shape. ~~For plants this may include size, presence of leaves and branches, and ability to produce flowers and fruits.~~ • describe some simple changes that plants undergo during their life cycles. This may include size, presence of leaves and branches, fruits, and seeds. • compare and contrast young plants and animals with their parents, using pictures and/or live organisms.

Kindergarten
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of relationships within and among Earth and space systems. The topics developed include shadows; relationships between the sun and the Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7~~, K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

K.8	The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include a) shadows occur in nature when sunlight is blocked by an object; and b) shadows can be produced by blocking artificial light sources.

~~Understanding the Standard~~ Overview

Standard ~~K.7~~ K.8 focuses on student understanding that shadows are produced when objects block light. This is a key concept for ~~student's~~ students' future understanding of more complex Earth and physical science concepts such as night and day and eclipses. Within the primary grades, related concepts are found in standards 1.6 and 3.8. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.8	The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include a) shadows occur in nature when sunlight is blocked by an object; and b) shadows can be produced by blocking artificial light sources.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A shadow is an image of an object created when light is blocked by that object. • Shadows can occur whenever light is present. • People can make shadows. • Living and nonliving things can make shadows.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify a shadow ~~or variety of shadows~~. • describe how to make a shadow. • identify and describe sources of light — sun, electric lights, and flashlights — that can produce shadows. • match objects with the shadow they would create. • ~~analyze how~~ demonstrate that shadows change as the direction of the light source changes.

Kindergarten
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in ~~the~~ Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

K.9	The student will investigate and understand that there are simple repeating patterns in his/her daily life. Key concepts include a) weather observations; b) the shapes and forms of many common natural objects including seeds, cones, and leaves; and c) animal and plant growth.

~~Understanding the Standard~~ Overview

Standard ~~K.8~~ K.9 focuses on student understanding of basic patterns in daily life. Careful observations of patterns help predict events. Patterns are found in weather; in natural objects, including seeds, cones, and leaves; in the growth of animals and plants; and in daily routines. The basic kindergarten concepts related to patterns will be further developed in the primary grades, especially basic concepts of cycles, sequences, and rate. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.9 The student will investigate and understand that there are simple repeating patterns in his/her daily life. Key concepts include
a) weather observations;
b) the shapes and forms of many common natural objects including seeds, cones, and leaves; and
c) animal and plant growth.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • One can make simple predictions in weather patterns. On a cloudy, warm day, it may rain. On a cloudy day that is very cold, it may snow. On a clear day there most likely will be no rain or snow. • As animals and plants grow, they get larger according to a pattern. • Natural objects such as leaves, seeds, and cones have patterns we can see. • ~~Home and school routines frequently follow a pattern.~~	In order to meet this standard, it is expected that students ~~should be able to~~ will • observe and identify daily weather conditions — sunny, rainy, cloudy, snowy, windy, warm, hot, cool, and cold. • predict daily weather based on basic observable conditions. • chart daily weather conditions. • identify simple patterns in natural objects — veins in a leaf, spiral patterns in cones, shapes and colors of common seeds. • ~~identify and describe patterns in their daily schedule at home.~~ • ~~identify and describe patterns in their daily schedule at school.~~ • ~~distinguish between the patterns in home activities and those in school activities.~~ • describe how animals and plants change as they grow. (Related to ~~K.6~~ K.7.)

K.10	The student will investigate and understand that change occurs over time and rates may be fast or slow. Key concepts include a) natural and human-made things may change over time; and b) changes can be observed and measured.

~~Understanding the Standard~~ Overview

Almost everything changes over time. Those changes can be observed and measured. Standard ~~K.9~~ K.10 focuses on student understanding of the basic aspects of change, especially in those things that can be easily observed and are within the experience of kindergarten children. Change is a key concept woven into most of the science standards throughout elementary, middle, and high school. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.10 The student will investigate and understand that change occurs over time and rates may be fast or slow. Key concepts include
a) natural and human-made things may change over time; and
b) changes can be observed and measured.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Change occurs over time. • Change can be fast or slow depending upon the object and conditions. • As people grow, they change. • Not all things change at a rate that can be observed easily. • Many changes can be measured.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify some changes that people experience over time — e.g., height, weight, and color of hair. • predict how their own height ~~and weight~~ will change over the school year. Measure and graph the information. • describe how people cause things to change — e.g., demolition of buildings, construction of buildings, cutting down trees, planting trees, and building highways. • describe how things change naturally. This includes seasonal changes, the growth in seeds and common plants, common animals, ~~including the butterfly,~~ and the weather. • identify examples of fast changes and slow changes. Slow changes should be the kinds of familiar changes that occur over weeks, months, or seasons. (Students are not responsible for long-term changes.)

Kindergarten
Science Strand

Earth Resources

This strand focuses on student understanding of the role of natural resources and how people can utilize those resources in a sustainable way. Resource management is an important idea developed within the strand. This begins with basic ideas of conservation and proceeds in the sixth grade to the more abstract consideration of costs and benefits. The topics developed include the conservation of household materials, the importance of soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10,~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8,~~ 4.9, and 6.9.

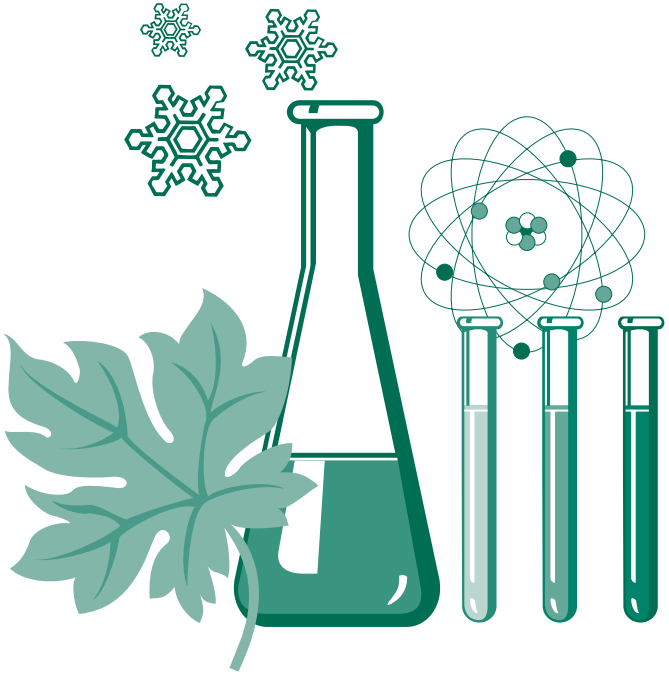
K.11	The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include a) materials and objects can be used over and over again; b) everyday materials can be recycled; and c) water and energy conservation at home and in school helps ensure resources are available for future use.

~~Understanding the Standard~~ Overview

Standard ~~K.10~~ K.11 focuses on student understanding that materials can be reused, recycled, and conserved. This should include common objects and materials found in the school and home environment. ~~K.10~~ K.11 establishes a foundation for increasingly advanced conservation concepts developed in the primary standards. Note that science standard 1.8 is very closely related to ~~K.10~~ K.11. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (K.1 and K.2) in the context of the key concepts presented in this standard.

K.11 The student will investigate and understand that materials can be reused, recycled, and conserved. Key concepts include
a) materials and objects can be used over and over again;
b) everyday materials can be recycled; and
c) water and energy conservation at home and in school helps ensure resources are available for future use.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Natural resources such as water and energy should be conserved. • Recycling helps to save our natural resources. Recycling recovers used materials. Many materials can be recycled and used again, sometimes in different forms. Examples include newspapers that are turned into writing tablets. • Reusing materials means using them more than once. Examples include using dishes and utensils that are washed after use rather than using paper plates and plastic utensils and putting them in the trash. • Recycling, reusing, and conserving helps preserve resources for future use. • Resources will last longer if we recycle, reuse, and reduce consumption.	In order to meet this standard, it is expected that students ~~should be able to~~ will • give examples of objects, such as paper, plastic containers, and glass containers, that can be recycled. • identify materials that can be reused. • describe the difference between recycle and reuse. • name ways to conserve water and energy. • describe how to ~~recycle~~ properly dispose of a given material — paper, oil, aluminum, glass and plastics — by recycling. • predict what would happen if recycling and reusing were not practiced.



Science Standards of Learning Curriculum Framework

Grade One

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
© 2010

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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade One
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations, and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 1.1 represent more specifically what a student should achieve during the course of instruction in the first grade. Across the grade levels, the skills in the first standards form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence").~~ It is important that the classroom teacher understand~~s~~ how the skills in standard 1.1 are a key part of this sequence (i.e., K.1, K.2, 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1). ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in the "Scientific Investigation, Reasoning, and Logic" strand.~~

1.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) the senses are used to observe differences in physical properties; b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy; c) objects or events are classified and arranged according to characteristics or properties; d) simple tools are used to enhance observations; e) length, mass, volume, and temperature are measured using nonstandard units; f) inferences are made and conclusions are drawn about familiar objects and events; g) a question is developed from one or more observations; h) predictions are made based on patterns of observations; i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and j) simple investigations and experiments are conducted to answer questions.

~~Understanding the Standard~~ Overview

~~The skills described in s~~Standard 1.1 ~~are~~ is intended to define the "investigate" component of all other first-grade standards (1.2–1.8). The intent of standard 1.1 is that students will continue to develop a range of inquiry skills, ~~and~~ achieve proficiency with those skills, and continue to develop an understanding of the nature of science in the context of the concepts developed ~~at the~~ in first grade. **Standard 1.1 does not require a discrete unit be taught on scientific investigation because the ~~inquiry~~ skills that make up the standard should be incorporated in all other first-grade standards.** It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science as well as more fully grasp the content-related SOL concepts.

1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) the senses are used to observe differences in physical properties;
b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c) objects or events are classified and arranged according to characteristics or properties;
d) simple tools are used to enhance observations;
e) length, mass, volume, and temperature are measured using nonstandard units;
f) inferences are made and conclusions are drawn about familiar objects and events;
g) a question is developed from one or more observations;
h) predictions are made based on patterns of observations;
i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j) simple investigations and experiments are conducted to answer questions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts: a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected. e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. In grade one, an emphasis should be placed on concepts a, b, and e. • Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' knowledge from just facts to understanding why the facts are relevant to everyday life.	In order to meet this standard, it is expected that students ~~should be able to~~ will • use their senses and simple tools, such as a magnifying glass~~, ruler, and thermometer,~~ and a balance to enhance their observations of physical properties. • make repeated observations of an object or event from multiple positions. • classify and arrange objects or events according to at least two attributes or properties so that similarities and differences become apparent. • measure length, mass, and volume, using ~~standard and~~ nonstandard units~~ and appropriate instruments~~. ~~By the third grade, students will be expected to have basic facility with metric measures, including centimeters, grams, and liters.~~ • use familiar events and objects to make inferences and draw conclusions.

1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) the senses are used to observe differences in physical properties;
b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c) objects or events are classified and arranged according to characteristics or properties;
d) simple tools are used to enhance observations;
e) length, mass, volume, and temperature are measured using nonstandard units;
f) inferences are made and conclusions are drawn about familiar objects and events;
g) a question is developed from one or more observations;
h) predictions are made based on patterns of observations;
i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j) simple investigations and experiments are conducted to answer questions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for first-grade students to engage in frequent discussions with peers about their understanding of their investigations. • To communicate an observation accurately, one must provide a clear description of exactly what is observed and nothing more. • Observations should be made from multiple positions (e.g., observations of the same object from the front of the object, from the back of the object, looking down on the object, etc.) whenever possible to achieve a variety of perspectives.	• develop a question from one or more observations. • predict outcomes based on actual observations and evidence rather than random guesses. • communicate observations ~~made~~ and data ~~collected orally and~~ with simple graphs~~,~~ and pictures, oral and written statements, and with numbers. • answer questions by conducting simple experiments/investigations, using nonstandard measuring units and simple tools, such as ~~thermometer, ruler, or~~ a magnifying glass or ~~nonstandard measuring units~~ a balance. A simple experiment is one that changes only one thing at a time (tests only one variable), gives quick results, and provides easily observable changes. • record observations of movement (length/distance)~~,~~ using ~~standard (English/metric) and~~ nonstandard units. • compare the movement of objects, using graphs, pictures, and/or numbers.

1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) the senses are used to observe differences in physical properties;
b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c) objects or events are classified and arranged according to characteristics or properties;
d) simple tools are used to enhance observations;
e) length, mass, volume, and temperature are measured using nonstandard units;
f) inferences are made and conclusions are drawn about familiar objects and events;
g) a question is developed from one or more observations;
h) predictions are made based on patterns of observations;
i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j) simple investigations and experiments are conducted to answer questions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Observations should be repeated multiple times to assure accuracy. • Once the characteristics of several objects or several events have been observed and recorded, the objects or events can be arranged by those characteristics (e.g., several objects sorted by color, several events sorted on a timeline by age, etc.). • Simple tools, such as a magnifying glass~~, ruler, and thermometer~~ and a balance~~,~~ can extend the observations that people can make. • ~~Standard measures are important for describing an object because standard measures are recognized by everyone. Many nonstandard measures, such as hand or finger length, vary considerably.~~ Nonstandard units such as paper clips, a student's foot, index cards, etc., can be used to measure the length of objects. The mass of two objects can be compared by holding each object in a different hand. The volume of various liquids can be compared by pouring them in cups of the same size. Variations in temperature of different objects can be compared by the difference that is felt when each object is touched. Variations in air temperature can be compared by observing the differences one feels when in different environments (e.g., inside the classroom vs. outside on the playground in winter, inside the freezer compartment of a refrigerator vs. inside a kitchen).	

1.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) the senses are used to observe differences in physical properties;
b) observations are made from multiple positions to achieve a variety of perspectives and are repeated to ensure accuracy;
c) objects or events are classified and arranged according to characteristics or properties;
d) simple tools are used to enhance observations;
e) length, mass, volume, and temperature are measured using nonstandard units;
f) inferences are made and conclusions are drawn about familiar objects and events;
g) a question is developed from one or more observations;
h) predictions are made based on patterns of observations;
i) observations and data are recorded, analyzed, and communicated orally and with simple graphs, pictures, written statements, and numbers; and
j) simple investigations and experiments are conducted to answer questions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• An inference is a conclusion based on evidence about events that have already occurred. • Questions about what is observed can be developed. • A prediction is a forecast about what may happen in some future situation. It is based on information and evidence. A prediction is different from a guess. • Graphs are powerful ways to display data, making it easier to recognize important information. Describing things as accurately as possible is important in science because it enables people to compare their observations with those of others. • Data should be displayed in bar graphs and picture graphs at the grade one level. • An experiment is a fair test designed to answer a question.	

Grade One
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

1.2	The student will investigate and understand that moving objects exhibit different kinds of motion. Key concepts include a) objects may have straight, circular, and back-and-forth motions; b) objects may vibrate and produce sound; and c) pushes or pulls can change the movement of an object.

~~Understanding the Standard~~ Overview

Physical science includes topics that give students a chance to increase their understanding of the characteristics of objects and materials that they encounter daily. Knowledge about objects develops through learning how they move and change position and shape in relation to the viewer, as when we look at objects from different angles. Students learn about objects by observing them and noting similarities and differences and by acting on them by applying force. This concept relates to science standard K.3, in which magnets push and pull objects. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.2 The student will investigate and understand that moving objects exhibit different kinds of motion. Key concepts include
a) objects may have straight, circular, and back-and-forth motions;
b) objects may vibrate and produce sound; and
c) pushes or pulls can change the movement of an object.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • An object's motion may be described by tracing and measuring its position over time. The motion of objects may be straight, circular, curved, or back-and-forth. • One kind of back-and-forth motion is vibration. Vibrations may create sound. • Pushing or pulling can change the position and motion of objects. For the same object, the size of the change is related to the strength of the push or pull.	In order to meet this standard, it is expected that students ~~should be able to~~ will • make and communicate observations about moving objects. Examples should include balls, objects with wheels, windup toys, tops, rubber bands, and playground equipment. • predict an object's movement, using its size, shape, and the force of the push or pull on it. • ~~conduct a simple experiment to determine an object's movement.~~ • manipulate objects in order to describe and classify the motion of ~~an~~ each object as straight, circular, ~~curved,~~ or back-and-forth. • understand that vibrations may create sound, such as humming, strumming a guitar, or plucking a rubber band. • record observations of movement (length/distance), using ~~standard (English/metric) and~~ nonstandard units. • ~~compare the movement of objects, using graphs, pictures, and/or numbers.~~

Grade One
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, ~~states~~ phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure of classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

1.3	The student will investigate and understand how different common materials interact with water. Key concepts include a) some liquids will separate when mixed with water, but others will not; b) some solids will dissolve in water, but others will not; and c) some substances will dissolve more readily in hot water than in cold water.

~~Understanding the Standard~~ Overview

Students continue their study of water by examining and qualitatively describing water and its behavior with other matter. When carefully observed, described, and measured, the properties of objects in or with water, and the changes that occur when materials interact with water, provide the necessary foundation for more abstract ideas in the upper grade levels. This concept is related to science standard K.5 in which students identify water in its different ~~states~~ phases (solid, liquid, gas). It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.3	The student will investigate and understand how different common materials interact with water. Key concepts include a) some liquids will separate when mixed with water, but others will not; b) some solids will dissolve in water, but others will not; and c) some substances will dissolve more readily in hot water than in cold water.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Different types of materials react differently when mixed with water. • Some liquids will mix with water, while others will not. • Some solids will dissolve in water, while others will not. • The temperature of the water affects how easily a substance will dissolve in it.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe and apply the term dissolve. • predict and describe how various materials (vinegar, milk, baking soda, powdered drink mix, sugar, salt, sand, oil, soil, rocks) act when mixed with water. • classify liquids and solids into those that will dissolve in water and those that will not. Use ~~picture graphs,~~ tables~~,~~ and/or charts to record and display the information. • infer that some substances will dissolve more easily in hot water than in cold water by conducting investigations using water at different temperatures.

Grade One
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

1.4	The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics. Key concepts include a) plants need nutrients, air, water, light, and a place to grow; b) basic parts of plants; and c) plants can be classified based on a variety of characteristics.

~~Understanding the Standard~~ Overview

Young children have a natural curiosity about the living things that they encounter. Observation is a method by which students can answer questions about how plants live, their parts, and characteristics. All plants need ~~nourishment~~ nutrients, air, water, light, and a place with sufficient space to grow. They have specific structures to meet their needs. Students need to know the concepts, not the definitions, of the terms edible, nonedible, evergreen, and deciduous. They need to know that we eat certain plants (edible) but not others (nonedible). They need to know that some plants stay green all year long (evergreen) while others lose their leaves each fall (deciduous). The concepts in this standard build upon the Life Processes strand (K.6 and K.7), in which students investigate and understand basic needs and life processes of plants and animals. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.4 The student will investigate and understand that plants have basic life needs and functional parts and can be classified according to certain characteristics. Key concepts include

a) plants need nutrients, air, water, light, and a place to grow;
b) basic parts of plants; and
c) plants can be classified based on a variety of characteristics.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Plants have basic needs, including ~~food~~ nutrients, air, water, light, and a place with sufficient space to grow. • Plants have different structures that serve different functions in growth, survival, and reproduction. • The functions of plant parts include the roots which hold~~ing~~ plants in place and absorb~~ing~~ water, seeds which ~~making~~ make new plants, leaves which ~~making~~ make food for the plant, and stems which hold~~ing~~ the plants upright and transport~~ing~~ materials up and down the plant. • Plants can be categorized by their different characteristics, such as edible/nonedible, flowering/nonflowering, and evergreen/deciduous. **Students do not need to know the terms nonedible, edible, evergreen, and deciduous. The focus should be on the concept, not the terminology.**	In order to meet this standard, it is expected that students ~~should be able to~~ will • conduct simple experiments/investigations related to plant needs by changing one variable (~~food~~ nutrients, air, water, light, or place to grow) at a time. **Students do not need to know the term variable**. • create and interpret a model/drawing of a plant, including seeds, roots, stems, leaves, ~~blossoms~~ flowers, and fruits. • identify the functions of the seed, root, stem, and leaf. • classify plants by the characteristics of edible/nonedible, flowering/nonflowering, and evergreen/deciduous, using ~~tables,~~ charts~~, and picture graphs~~.

1.5	The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. Key concepts include a) basic needs include adequate air, food, water, shelter, and space (habitat); b) animals, including humans, have many different physical characteristics; and c) animals can be classified according to a variety of characteristics.

~~Understanding the Standard~~ Overview

This standard focuses on the idea that animals move, need food, breathe, and reproduce. Animals have a variety of ways in which they accomplish these activities. Each type of animal has features that allow it to function in unique and specific ways to obtain food, reproduce, and survive in a particular place. This standard builds upon the Life Processes strand (K.6 and K.7), in which students are introduced to the concept of living and nonliving, and investigate and understand basic needs and life processes of plants and animals. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.5 The student will investigate and understand that animals, including humans, have basic needs and certain distinguishing characteristics. Key concepts include

a) basic needs include adequate air, food, water, shelter, and space (habitat);
b) animals, including humans, have many different physical characteristics; and
c) animals can be classified according to a variety of characteristics.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Animals, including people, have basic life needs, including air, food, water, ~~and a suitable place to live~~ shelter, and space (habitat). **Students do not need to know the term habitat. The focus should be on the items that are necessary components of a habitat, not on the terminology.** • Body coverings include hair, fur, feathers, scales, and shells. • Appendages are parts, such as arms, legs, wings, fins, and tails, ~~that~~ which extend from the main body and ~~that~~ have specific functions. **Students do not need to know the term appendage. The focus should be on the concept, not the terminology.** • Methods of movement may include walking, crawling, flying, and swimming. • Simple ways to classify animals are whether they are wild or tame and whether they live on land or in water.	In order to meet this standard, it is expected that students ~~should be able to~~ will • make and communicate observations of live animals, including ~~people~~ humans, about their needs, physical characteristics, and where they live. • describe the life needs of animals, including air, food, water, ~~and a suitable place to live~~ shelter, and space. • identify and chart simple characteristics by which animals can be classified, including body coverings (hair, fur, feathers, scales, and shells), body shape, appendages (arms, legs, wings, fins, and tails), methods of movement (walking, crawling, flying, and swimming), wild or tame, and water homes or land homes. • distinguish between wild animals (raccoon, hawk, squirrel, shark) and tame animals (dog, cat, sheep) and recognize examples of each. • infer types of animal homes (water or land), using the physical characteristics of the animals, such as scales and fins that allow fish to live and move in water or fur and legs that allow dogs to live and move on land. • classify animals by where they live (their homes).

Grade One
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of relationships within and among Earth and space systems. The topics developed include shadows; relationships between the sun and the Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7~~ K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

1.6	The student will investigate and understand the basic relationships between the sun and Earth. Key concepts include a) the sun is the source of energy and light that warms the land, air, and water; and b) the sun's relative position in the morning is east and in the late afternoon is west.

~~Understanding the Standard~~ Overview

This standard focuses on some of the important relationships between the sun and ~~the~~ Earth. ~~Day and night occur because Earth turns or rotates on its axis. Earth turns on its axis once a day. Students need to understand the concepts of rotation and axis, but they do not need to know the terms.~~ Students need to understand that the sun is a source of energy, and that energy provides light and warmth for Earth. This standard builds upon science standard ~~K.7~~ K.8 about light and shadow. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.6 The student will investigate and understand the basic relationships between the sun and Earth. Key concepts include
a) the sun is the source of energy and light that warms the land, air, and water; and
b) the sun's relative position in the morning is east and in the late afternoon is west.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The sun is ~~the~~ a source of light and heat on Earth. • Heat is a form of energy. Heat may be transferred from one substance to another by three means: conduction, convection, and radiation. • The sun provides ~~heat~~ energy, which warms the land, air, and water on Earth. • ~~The rotation of Earth means that Earth turns once a day. The part of Earth facing the sun has daytime and the part not facing the sun has nighttime.~~ • ~~Rotation of the Earth causes day and night.~~ • The sun's relative position in the morning is east and in the late afternoon is west.	In order to meet this standard, it is expected that students ~~should be able to~~ will • infer that sunlight striking an object makes the object warmer. • conduct simple experiments to show how sunlight changes the temperature of land, air, and water. • ~~demonstrate and describe the concept of rotation.~~ • ~~comprehend that day and night are caused by Earth's rotation.~~ • ~~compare and contrast day and night by characteristic changes in temperature and light.~~ • ~~model the rotation of Earth and its physical relationship to the sun.~~ • interpret the relationship between the sun's position in the sky and the general time of day. This includes the sun's relative position in the morning (east), at noon, and in the late afternoon (west).

Grade One
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in ~~the~~ Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10 1.7, 2.7, 3.8, 3.9, 4.7, and 5.7.

1.7	The student will investigate and understand weather and seasonal changes. Key concepts include a) changes in temperature, light, and precipitation affect plants and animals, including humans; b) there are relationships between daily and seasonal changes; and c) changes in temperature, light, and precipitation can be observed and recorded over time.

~~Understanding the Standard~~ Overview

The focus of this standard is on temperature, light, and precipitation as they relate to life changes in plants, animals, and people. There are many ways to acquaint children with Earth science-related phenomena that they will come to understand later as being cyclic, and this standard introduces those ideas. It is enough for young children to observe the pattern of daily changes without getting deeply into the nature of climate. They should notice how these changes affect plants and animals. This is observable and can be charted over short and intermediate time periods. Students need to understand the concepts of migration, hibernation, and habitat, but they do not necessarily need to know the terms at first grade. This standard builds upon science standard ~~K.8~~ K.9 in which students investigate and understand simple patterns in their daily lives. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.7 The student will investigate and understand weather and seasonal changes. Key concepts include
a) changes in temperature, light, and precipitation affect plants and animals, including humans;
b) there are relationships between daily and seasonal changes; and
c) changes in temperature, light, and precipitation can be observed and recorded over time.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Seasonal changes bring about changes in plants, animals, and people. • With seasonal changes come changes in weather, including temperature, light, and precipitation. • Precipitation includes rain, snow, and ice. • Changes in plants include budding, growth, ~~wilting,~~ and losing leaves. • Some animals hibernate and some animals migrate as a result of seasonal changes, resulting in changes in habitat. **Students do not need to know the terms migration, hibernation, and habitat. The focus should be on the concepts, not the terminology.** • Hibernation is a state of greatly reduced metabolic activity and lowered body temperature adopted by certain mammals as an adaptation to adverse winter conditions. Most animals are not "true hibernators" but rely on a combination of reserve body fat, stored food supplies (in rodents only), and a protected den to enable it to survive the winter. At intervals of several weeks the animal elevates its body temperature, awakens, moves about, feeds, and then returns to its state of torpor. • Migration is the regular, usually seasonal, movement of all or part of an animal population to and from a given area. The distance traveled may be a few miles or several thousands of miles. Animals migrate for many different reasons. Some animals migrate to find better sources of food, water, or shelter. Other animals migrate to visit particular breeding grounds, rear their young, or find warmer climates. The frequency of animals' migrations also differs. • An animal's living place is called its habitat. Most animals are only adapted to live in one or two habitats. Earth has many different	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify types of precipitation as rain, snow, and ice and the temperature conditions that result in each one. • relate a temperature, light, and precipitation chart to the corresponding season (daily or weekly). • ~~measure~~ observe and chart changes in plants, including budding, growth, ~~wilting,~~ and losing leaves. Recognize in what season budding and ~~wilting~~ losing leaves will most likely occur. • predict how an outdoor plant would change through the seasons. • compare and contrast the four seasons of spring, summer, fall (autumn) and winter in terms of temperature, light, and precipitation. • compare and contrast the activities of some common animals (e.g., squirrels, chipmunks, butterflies, bees, ants, bats, ~~and~~ frogs, and humans) during summer and winter by describing changes in their behaviors and body covering. • compare and contrast how some common plants (e.g., oak trees, pine trees, and lawn grass) appear during summer and winter. • comprehend at an introductory level that some animals respond to seasonal changes by hibernating (e.g., frogs, bats) or migrating (e.g., some birds and butterflies) ~~the concepts of hibernation, migration, and habitat, and describe how these relate to seasonal changes~~. (It may be useful to recognize common Virginia animals that hibernate and migrate, but the specific names of animals is not the focus of student learning here.)

1.7 The student will investigate and understand weather and seasonal changes. Key concepts include a) changes in temperature, light, and precipitation affect plants and animals, including humans; b) there are relationships between daily and seasonal changes; and c) changes in temperature, light, and precipitation can be observed and recorded over time.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
environments, varying in temperature, moisture, light, and many other factors. Each of these habitats has distinct life forms living in it, forming complex communities of interdependent organisms. A habitat must include a source of food for the animal, a source of water for the animal, access to some sort of shelter for the animal, and an adequate amount of space so that enough habitat components are available to the animal. Some animals' habitats are very small, but some animals require a large amount of space. • The body coverings of some animals change with the seasons. This includes thickness of fur and coloration. • Changes ~~in~~ made by people include their dress, recreation, and work.	• infer what the season is from people's dress, recreational activities, and work activities.

Grade One
Science Strand

Earth Resources

This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the concept of management of resource use. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8~~ 4.9, and 6.9.

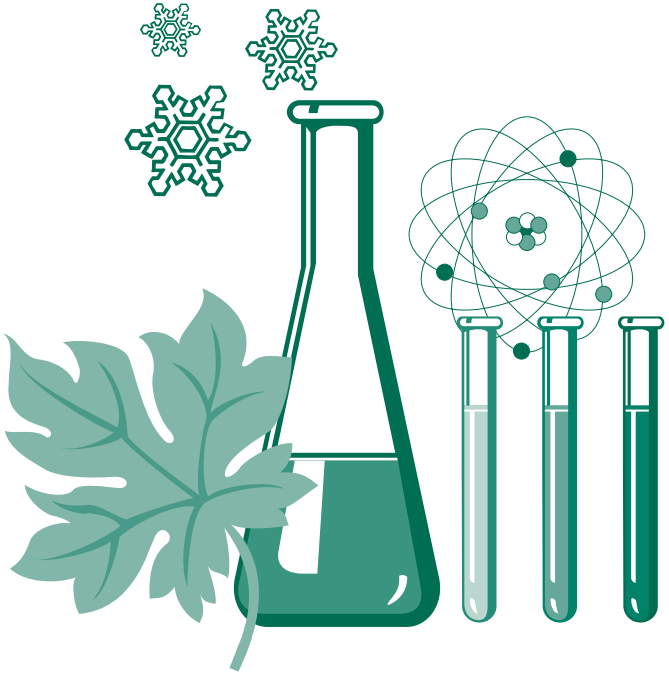
1.8	The student will investigate and understand that natural resources are limited. Key concepts include a) identification of natural resources; b) factors that affect air and water quality; and c) recycling, reusing, and reducing consumption of natural resources.

~~Understanding the Standard~~ Overview

This standard focuses on identifying what natural resources are; basic ways we can help conserve those natural resources, especially water and air; and the preservation of land to use as parks. The standard extends the perception of young students from the present to the future and from self to their community. Standard ~~K.10~~ K.11 establishes a foundation for this standard. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (1.1) in the context of the key concepts presented in this standard.

1.8 The student will investigate and understand that natural resources are limited. Key concepts include
a) identification of natural resources;
b) factors that affect air and water quality; and
c) recycling, reusing, and reducing consumption of natural resources.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Natural resources provide us with the things we need in order to live, including food, clothing, water, air, shelter, land, and energy. • What we put into the air, especially the products of the fuels we burn, affects the quality of the air. Waste produced by ~~A~~animals, including humans, and factor~~y~~ies ~~wastes~~ can affect the quality of water. Some pollution washes from yards, streets, and farms. • Many natural resources are limited and cannot be renewed. Other resources are limited and cannot be renewed, but they may last a very long time. • Recycling recovers used materials. Many materials can by recycled and used again, sometimes in different forms. Recycling helps to save our natural resources. An example of a recycled material is newspapers that are turned into writing tablets. • Reusing materials means using them more than once. Examples include using dishes and utensils that are washed after use rather than using paper plates and plastic utensils and putting them in the trash. • Resources will last longer if we recycle them, reuse them, or reduce consumption of them. • The creation of parks can help preserve land. Parks have many uses, including recreation.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify natural resources such as plants and animals, water, air, land, minerals, forests, and soil. • recognize that many natural resources are limited. • compare and contrast ways of conserving resources. This includes recycling, reusing, and reducing consumption of natural resources. • classify factors that affect air and water quality. • describe ways students and schools can help improve water and air quality in our communities. • determine some basic factors that affect water quality by conducting simple investigations in the school environment. Students should be able to make and record observations of what happens to runoff water on rainy days. (Related to 1.3.) • predict what would happen if natural resources were used up, and explain ways to prevent this from happening. • discuss the value of parks to wildlife and to people.



Science Standards of Learning Curriculum Framework

Grade Two

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
© 2010

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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Two
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations, and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 2.1 represent more specifically what a student should achieve during the course of instruction in the second grade. Across the grade levels, the skills in the first standards form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.").~~ It is very important that the second grade classroom teacher be familiar with the skills in the sequence leading up to standard 2.1. For example in K.1 and in 1.1, nonstandard units are used to measure common objects~~, and in 1.1, standard and nonstandard units are used~~. In grade two, 2.1 specifies metric and English units of measure. A second-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed. ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in the "Scientific Investigation, Reasoning, and Logic" strand.~~

2.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations and predictions are made and questions are formed; b) observations are differentiated from personal interpretation; c) observations are repeated to ensure accuracy; d) two or more characteristics or properties are used to classify items; e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools; f) time is measured using the proper tools; g) conditions that influence a change are identified and inferences are made; h) data are collected and recorded, and bar graphs are constructed using numbered axes; i) data are analyzed, and unexpected or unusual quantitative data are recognized; j) conclusions are drawn; k) observations and data are communicated; l) simple physical models are designed and constructed to clarify explanations and show relationships; and m) current applications are used to reinforce science concepts.

~~Understanding the Standard~~ Overview

~~The skills defined in s~~Standard 2.1 ~~are~~ is intended to ~~define the "investigate" to~~ develop investigative and inquiry ~~component~~ skills and the understanding of the nature of science ~~of~~ for all of the other second-grade standards. Standard 2.1 requires students to continue developing a range of inquiry skills and achieve proficiency with those skills, and develop and reinforce their understanding of the nature of science in the context of the concepts developed ~~at the~~ in second grade. **Standard 2.1 does not require a discrete unit be taught on scientific investigation and the nature of science because the ~~inquiry~~ skills that make up the standard should be incorporated in all the other second grade standards.** It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science as well as more fully grasp the content-related concepts.

2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations and predictions are made and questions are formed;
b) observations are differentiated from personal interpretation;
c) observations are repeated to ensure accuracy;
d) two or more characteristics or properties are used to classify items;
e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;
f) time is measured using the proper tools;
g) conditions that influence a change are identified and inferences are made;
h) data are collected and recorded, and bar graphs are constructed using numbered axes;
i) data are analyzed, and unexpected or unusual quantitative data are recognized;
j) conclusions are drawn;
k) observations and data are communicated;
l) simple physical models are designed and constructed to clarify explanations and show relationships; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts:
  a) the natural world is understandable;
  b) science is based on evidence, both observational and experimental;
  c) science is a blend of logic and innovation;
  d) scientific ideas are durable yet subject to change as new data are collected.
  e) science is a complex social endeavor; and
  f) scientists try to remain objective and engage in peer review to help avoid bias.

  In grade two, an emphasis should be placed on concepts a, b, and e.

- Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students'

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- conduct simple experiments, make predictions, gather data from those experiments, repeat observations to improve accuracy, and draw conclusions.
- differentiate among simple observations and personal interpretations. This requires students to comprehend what an observation is and apply the term in novel situations related to second-grade SOL concepts.
- classify items, using two or more attributes such as size, shape, color, texture, and weight.
- use centimeters, meters, liters, degrees Celsius, grams, and kilograms in measurement.
- use inches, feet, yards, quarts, gallons, degrees Fahrenheit, ounces, and pounds in measurement.
- measure time using both digital and analog clocks.

2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations and predictions are made and questions are formed;
b) observations are differentiated from personal interpretation;
c) observations are repeated to ensure accuracy;
d) two or more characteristics or properties are used to classify items;
e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;
f) time is measured using the proper tools;
g) conditions that influence a change are identified and inferences are made;
h) data are collected and recorded, and bar graphs are constructed using numbered axes;
i) data are analyzed, and unexpected or unusual quantitative data are recognized;
j) conclusions are drawn;
k) observations and data are communicated;
l) simple physical models are designed and constructed to clarify explanations and show relationships; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
knowledge from just facts to understanding why the facts are relevant to everyday life. • Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for second-grade students to engage in frequent discussions with peers about their understanding of their investigations. • In order to communicate accurately, it is necessary to provide a clear description of exactly what is observed. There is a difference between what one can observe and what can be interpreted from an observation.	• identify conditions that influence a change in an experiment. • construct and interpret simple models (~~for example~~ e.g., weathering and erosion of land surfaces — 2.7). • analyze sets of objects, numerical data, or pictures, and create basic categories to organize the data (descriptive or numerical). • judge which, if any, collected data in a small set appear to be unexpected or unusual. • construct and interpret picture and bar graphs with numbered axes depicting the distribution of data. • communicate observations and data.

2.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations and predictions are made and questions are formed;
b) observations are differentiated from personal interpretation;
c) observations are repeated to ensure accuracy;
d) two or more characteristics or properties are used to classify items;
e) length, volume, mass, and temperature are measured in metric units and standard English units using the proper tools;
f) time is measured using the proper tools;
g) conditions that influence a change are identified and inferences are made;
h) data are collected and recorded, and bar graphs are constructed using numbered axes;
i) data are analyzed, and unexpected or unusual quantitative data are recognized;
j) conclusions are drawn;
k) observations and data are communicated;
l) simple physical models are designed and constructed to clarify explanations and show relationships; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• The more times an observation is repeated, the greater the chance of ensuring the accuracy of the observation. • It is easier to see how things are related if objects are classified according to their common characteristics. • By constructing and studying simple models, it is sometimes easier to understand how real things work. • Scientific investigations require standard measures, ~~reliable~~ proper tools (e.g., balance scale, thermometer, ruler, magnifying glasses), and organized collection and reporting of data. The way the data are displayed can make it easier to interpret important information. • Students should communicate observations and data publicly.	

Grade Two
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

2.2	The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals. Key concepts include a) magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and b) important applications of magnetism.

~~Understanding the Standard~~ Overview

This standard continues the focus on magnets. In K.3 students investigate and learn that magnets can be used to make some things move without touching them by either attracting them or repelling them. In 2.2, the study of magnets ~~are revisited~~ is expanded ~~and~~ as students investigate and understand that magnets can be artificial or natural and have certain characteristics. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.2 The student will investigate and understand that natural and artificial magnets have certain characteristics and attract specific types of metals. Key concepts include
a) magnetism, iron, magnetic/nonmagnetic, poles, attract/repel; and
b) important applications of magnetism.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Magnets have a north and a south pole. • Unlike magnetic poles attract, and like poles repel. The north pole of one magnet attracts the south pole of a second magnet, while the north pole of one magnet repels the other magnet's north pole. • A magnet creates an invisible area of magnetism all around it called a magnetic field. • The north pole of a magnet points roughly toward Earth's North Pole and vice-versa. That is because Earth itself contains magnetic materials and behaves like a gigantic magnet. • When a magnetized metal, such as a compass needle, is allowed to swing freely, it displays the interesting property of aligning with the Earth's magnetic fields. • A magnet is strongest at its poles. • The farther away the magnetic poles are from each other, the weaker the magnetic force. • If you cut a bar magnet in half, you get two new, smaller magnets, each with its own north and south pole. • Magnets can attract objects made of iron, ~~or~~ nickel, or cobalt. • Magnets can be artificially made from special metals or can occur naturally. Naturally occurring magnets are composed of a mineral called magnetite ~~(~~ or lodestone~~)~~. • Magnets have important applications and uses in everyday life.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify the north and south magnetic poles of magnets. • use magnetic compasses to determine the directions of north and south poles. • predict which materials will be attracted to magnets, test the predictions, and create a chart that shows the results, classifying materials as to whether they are attracted to magnets or not. • conduct an investigation to determine how the different poles of magnets react to the poles of other magnets. • identify important applications of magnets in everyday life: - refrigerator magnets and chalkboard letters - toys - door latches - paper clip holders - computers - motors - credit card magnetic strips. • compare natural magnets (lodestone or magnetite) and artificial magnets. • create a new application for using a magnet.

Grade Two
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, ~~states~~ phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure of classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

2.3	The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include a) identification of distinguishing characteristics of solids, liquids, and gases; b) measurement of the mass and volume of solids and liquids; and c) changes in phases of matter with the addition or removal of energy.

~~Understanding the Standard~~ Overview

This standard continues to focus on matter. In 2.3 students build upon the knowledge introduced in K.4 and 1.3. In K.4 physical properties of matter are investigated and the properties of water are observed and tested. In 1.3 students investigate how common materials interact with water. In 2.3 students investigate, by conducting simple experiments, the properties of solids, liquids, and gases. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.3 The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include
a) identification of distinguishing characteristics of solids, liquids, and gases;
b) measurement of the mass and volume of solids and liquids; and
c) changes in phases of matter with the addition or removal of energy.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • All ~~common~~ substances are made of matter. • Matter is anything that has mass and takes up space. • Solids have a defined shape and volume. • Liquids have a definite volume and take the shape of the container. • Gases will completely fill any closed container (take the shape of its container) and assume the volume of its container. (e.g., Helium gas put into a balloon takes the shape of the balloon because the balloon defines its shape.) • Mass is a measure of the amount of matter. • Weight is the measure of the gravitational pull on an object. • Volume is the measure of the amount of space occupied by matter. • Matter most commonly occurs in three ~~states~~ phases: solids, liquids, and gases. • Matter can change from one ~~state~~ phase to another. • When matter changes from one ~~state~~ phase to another, these changes are referred to as physical changes. • Changes from solid to liquid to gas require ~~heat~~ the addition of energy.	In order to meet this standard, it is expected that students ~~should be able to~~ will • classify materials as to whether they are liquids, solids, or gases. • describe and identify examples of condensation, evaporation, melting, and freezing of water. • measure the mass of solids and the volume of liquids in metric and standard English units. • examine and describe the transformation of matter from one ~~state~~ phase to another, i.e., solid water (ice) to liquid (water) to gas (steam). • conduct an investigation to observe the condensation of water. • design and conduct an investigation to determine basic factors that affect the evaporation of water. • identify the phases of water and the uses of water in its various phases in the home and at school.

Grade Two
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

2.4	The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. Key concepts include a) animal life cycles; and b) plant life cycles.

~~Understanding the Standard~~ Overview

In 2.4 students investigate and understand that plants and animals undergo change throughout their lives. This concept builds upon K.6 in which students learn about classifying things as living and nonliving. In K.7 ~~in~~ ~~which~~ students learn about the basic needs and life processes of animals~~,~~. ~~And~~ In 1.4, ~~in which~~ they learn that plants have life needs, ~~and~~ functional parts, and can be classified according to certain characteristics. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. Key concepts include
a) animal life cycles; and
b) plant life cycles.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Throughout their lives, plants and animals undergo a series of orderly and identifiable changes. • Changes in ~~living things~~ organisms over time occur in cycles and differ among the various plants and animals. • Some animals, such as mealworms, pill bugs, frogs, and butterflies~~,~~ go through distinct stages as they mature to adults. Other animals, such as crickets, praying mantis, gray squirrels, and white-tailed deer, resemble their parents from birth to maturity and do not have distinct stages. • White-tailed deer are the largest herbivores in Virginia. They are found in all areas of Virginia including forests, open fields, mountain tops, coastal islands, and in cities and towns. Their diet consists of grasses, leaves, nuts, fruits, and fungi. Virginia's white-tailed deer have few predators. Predation in Virginia is mainly in the form of harassment by dogs. Fawns may be taken by bobcat. Mortality factors include hunting, motor vehicles, poaching, depredation, dogs, fences, cripples, and trains respectively. • Newborn white-tailed deer are called fawns. They become yearlings at 14 to 18 months of age. As adults, males are called bucks and females are called does. White-tailed deer are tan or reddish brown in the summer and grayish brown in the winter. The underside and throat are white, and the tail is brown above and white below. • A white-tailed deer's lifespan averages eight years. • Of the more than 200,000 kinds of vascular plants in the world today over 95 percent flower at some time in their lives. The best-known flowers are bright and colorful but others, like those of grasses, are small	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe changes in the life cycle of ~~a frog and~~ a butterfly and a white-tailed deer. • ~~identify and describe changes in a plant from flower (blossom) to fruit.~~ • compare and contrast life cycles of ~~a frog and~~ a butterfly and a white-tailed deer. • identify the stages in the life cycle of a flowering plant. • construct and interpret models/diagrams of animal and plant life cycles.

2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes as they mature and grow. Key concepts include a) animal life cycles; and b) plant life cycles.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
and inconspicuous. • The basic stages in the life cycle of flowering plants include: seeds, germination of the seed, growth of the stem and roots, growth of leaves, growth of flowers, fertilization (pollination) of the flowers, production of fruit/new seeds, and death. • ~~An important part of the life cycle of a flowering plant is the formation of the flower to the development of the fruit.~~	

Grade Two
Science Strand

Living Systems

This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of kingdoms of living ~~things~~ organisms and a general classifying of organisms are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

2.5	The student will investigate and understand that living things are part of a system. Key concepts include a) living organisms are interdependent with their living and nonliving surroundings; b) an animal's habitat includes adequate food, water, shelter or cover, and space; c) habitats change over time due to many influences; and d) fossils provide information about living systems that were on Earth years ago.

~~Understanding the Standard~~ Overview

In K.6 students are introduced to the concept of living and nonliving. Students are introduced to living systems in 2.5 and investigate and understand that living ~~things~~ organisms interact with other living ~~things~~ organisms and their surroundings. The formal word system is introduced in this standard. The expectation is that students understand the concept in terms of the interactions between living and nonliving things. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.5 The student will investigate and understand that living things are part of a system. Key concepts include
a) living organisms are interdependent with their living and nonliving surroundings;
b) an animal's habitat includes adequate food, water, shelter or cover, and space;
c) habitats change over time due to many influences; and
d) fossils provide information about living systems that were on Earth years ago.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Living ~~things~~ organisms are dependent on other living ~~things~~ organisms and their nonliving surroundings for survival. • All of the interactions between and among living ~~things~~ organisms and their nonliving surroundings are referred to as a system. • Shelter may be living (coral, tree) or nonliving (caves, houses). • The habitat of an animal includes adequate food, water, shelter or cover, and space. If any of the basic elements of an animal's habitat are absent, the animal's survival is threatened. The animal may adapt or leave the area. • The habitats of living ~~things~~ organisms, such as forests, grasslands, rivers, and streams, change due to many human or natural influences (e.g., forest fires, hurricanes, and droughts). Habitats change from season to season. • Fossils found provide scientists with information about plants and animals that lived on Earth many years ago. (e.g., The rise and fall of sea level is recorded in the richly fossiliferous rocks of Virginia's coastal plain. An abundance of marine fossils – fossil clams, snails, sand dollars, shark's teeth, and whalebones – can be found in Virginia's coastal plains.) • Virginia's state fossil, Chesapecten jeffersonius, is a large extinct species of scallop that dates to approximately 4.5 million years ago. It was the first fossil ever described in North America and is named after Thomas Jefferson, one of our founding fathers, and an amateur paleontologist.	In order to meet this standard, it is expected that students ~~should be able to~~ will • classify objects as to whether they are living or nonliving. • describe the basic components of an animal habitat (food, water, shelter or cover, and space). • classify the parts of an animal's habitat as living or nonliving. • ~~describe the nonliving components of an organism's surroundings, including water, space, and shelter. (Shelter may be living or nonliving.)~~ • construct and interpret simple models of different kinds of habitats, including a forest and a stream. • predict and describe seasonal changes in habitat and their effects on plants and animals, for example, how trees change through the seasons and how animals respond to changes in the seasons. • describe how animals are dependent on their surroundings, for example, how squirrels and other animals are affected by the loss of forest habitat. • describe how scientists use the study of fossils to show past weather/climate conditions and environmental characteristics.

Grade Two
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of how Earth systems are connected and how the Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and the Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7~~ K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

2.6	The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include a) identification of common storms and other weather phenomena; b) the uses and importance of measuring, recording, and interpreting weather data; and c) the uses and importance of tracking weather data over time.

~~Understanding the Standard~~ Overview

In ~~K.8~~ K.9 students conduct weather observations~~, and~~. ~~i~~In 1.6 and 1.7 students are introduced to the concept that the sun is the source of heat energy and light energy for the Earth, and ~~to the ways~~ that heat energy, light energy, and precipitation affect people and other living things. In 2.6 students investigate and understand types of weather and weather patterns and measure and record current weather data. Students also explore the uses of tracking weather data over time. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.6 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include
a) identification of common storms and other weather phenomena;
b) the uses and importance of measuring, recording, and interpreting weather data; and
c) the uses and importance of tracking weather data over time.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The Earth's weather changes continuously from day to day. • Changes in the weather are characterized by daily differences in wind, temperature, and precipitation. • Precipitation occurs when water, previously evaporated, condenses out of the air and changes ~~state~~ its phase from a gas to a liquid (rain) or to a solid (snow or sleet). • Extremes in the weather, such as too little or too much precipitation, can result in droughts or floods. • Storms have powerful winds, which may be accompanied by rain, snow, or other kinds of precipitation. • Weather data ~~is~~ are collected and recorded using instruments. This information is very useful for predicting weather and determining weather patterns. • Weather influences human activity. • Scientists collect weather data over time to study trends and patterns. These trends and patterns help them to make future weather predictions.	In order to meet this standard, it is expected that students ~~should be able to~~ will • observe and describe seasonal weather patterns and local variations. • observe and record daily weather conditions, such as sunny, cloudy, windy, rainy, or snowy. • record and interpret daily temperature, using a graph with numbered axes. • measure and record weather data, using weather instruments, including a thermometer, rain gauge, and weather vane (standard English and metric measures). • describe weather in terms of temperature, wind, and precipitation. • observe and describe precipitation in terms of evaporation and condensation of water. • observe and describe types of precipitation, including rain, snow, and ice (sleet and hail). • describe how tracking weather data over time helps scientists make future weather predictions. • evaluate the influence of daily weather conditions on personal activities and dress. • identify common types of storms. Examples include hurricanes, tornadoes, blizzards, and thunderstorms. • compare and contrast droughts and floods.

Grade Two
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in the Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

2.7	The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include a) effects of weather and seasonal changes on the growth and behavior of living things; and b) weathering and erosion of land surfaces.

~~Understanding the Standard~~ Overview

Students are introduced to the concepts of patterns, cycles, and change in standards ~~K.8~~ K.9 and ~~K.9~~ K.10. These concepts include, in ~~K.8~~ K.9, weather observations, shapes and forms of common natural objects (seeds, cones, and leaves), and animal and plant growth~~, and home and school routine~~. ~~K.9~~ K.10 introduces concepts that include natural and human-made ~~things~~ objects that change over time, either fast or slow, and that change can be measured. In 1.7 students investigate and understand the relationship between seasonal change and weather. Important concepts include how plants, animals, and people respond to changes in light, temperature, and precipitation. In 2.7 the students investigate and understand that weather and seasons affect plants, animals, and their surroundings. The effects of weather and seasonal changes on weathering and erosion of the land surface are included in 2.7. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include

a) effects of weather and seasonal changes on the growth and behavior of living things; and
b) weathering and erosion of land surfaces.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Living ~~things~~ organisms respond to weather and seasonal changes. This can be reflected in changes in growth and behavior. • ~~Adverse~~ Conditions of weather may slow the growth and development of plants and animals ~~*(dormancy)*~~, whereas optimal weather conditions may accelerate the growth and development of plants and animals. • Dormancy is a state of reduced metabolic activity adopted by many organisms (both plants and animals) under conditions of environmental stress or when such stressful conditions are likely to appear, such as in winter. • Many trees produce new leaves in the spring and lose them in the fall due to seasonal changes in temperature and light. • The outward coloration and coloration patterns of many animals are similar in appearance to the plants in the places in which they live. This similarity to background is referred to as camouflage, and it enables animals to hide and avoid those that may eat or harm them. • Some animals (e.g., geese, monarch butterflies, tundra swans) ~~migrate~~ travel from one place to another and back again (migration) in search of a new temporary habitat because of climate, availability of food, season of the year, or reproduction. • Some animals (e.g., groundhogs, black bears) ~~or~~ go into a deep sleep (hibernation) due to seasonal changes. Hibernation is a condition of biological rest or inactivity where growth, development, and metabolic processes slow down. • ~~Some animals (geese, monarch butterflies) Some animals (bears,~~	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify growth and behavioral responses of plants and animals to weather and seasonal changes. Examples of responses that are adaptive include migration, hibernation, camouflage, and dormancy. • identify animals that migrate, hibernate, or show other changes throughout the seasons or in the presence of adverse environmental conditions. • evaluate the usefulness of camouflage in an animal's habitat (for example, coloration patterns ~~in~~ of frogs). • compare and contrast the responses of plants and animals to weather and seasonal changes. • model the effects of weathering and erosion on the land surface.

2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include a) effects of weather and seasonal changes on the growth and behavior of living things; and b) weathering and erosion of land surfaces.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
~~groundhogs) hibernate.~~ • Some animals undergo physical changes (e.g., thickening of dog fur in the winter and shedding in the summer) from season to season. • Land surfaces are subject to the agents of weathering and erosion. Land surfaces that are not covered with or protected by plants are more likely to be subject to the loss of soil by wind and water. • Weathering is the breaking down of rocks, which usually happens over long periods of time. • Erosion is the process by which the products of weathering are moved from one place to another. Erosion may happen quickly (e.g., during a flood or a hurricane) or over a long period of time.	

Grade Two
Science Strand

Earth Resources

This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the concept of management of resource use. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8~~ 4.9, and 6.9.

2.8	The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include a) important plant products are identified and classified; b) the availability of plant products affects the development of a geographic area; c) plants provide oxygen, homes, and food for many animals; and d) plants can help reduce erosion.

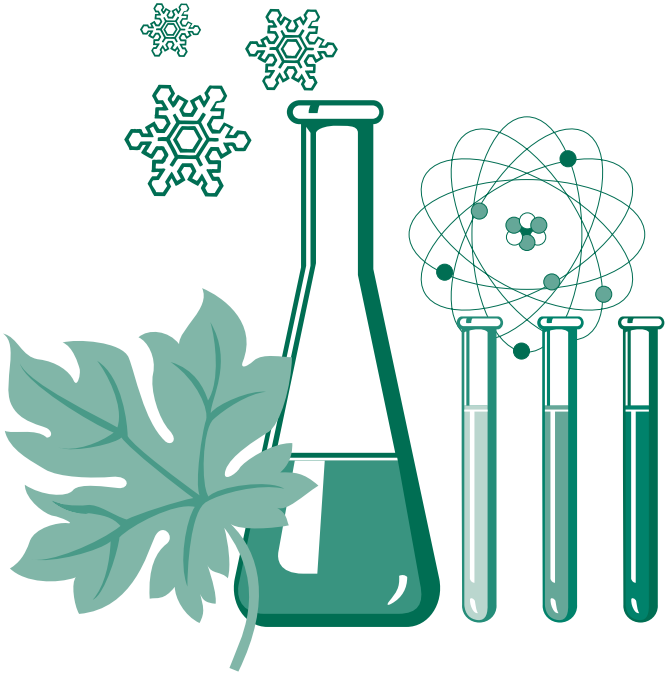
~~Understanding the Standard~~ Overview

In ~~K.10~~ K.11 students investigate and understand that materials can be used, recycled, and conserved, while in 1.8 students investigate and understand that natural resources, which are identified as plants, animals, water, air, land, minerals, forests, and soil, are limited. In 2.8 students investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (2.1) in the context of the key concepts presented in this standard.

2.8 The student will investigate and understand that plants produce oxygen and food, are a source of useful products, and provide benefits in nature. Key concepts include

a) important plant products are identified and classified;
b) the availability of plant products affects the development of a geographic area;
c) plants provide oxygen, homes, and food for many animals; and
d) plants can help reduce erosion.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Plants provide many useful products and materials, which benefit human beings as well as other living ~~things~~ organisms. • Plant products include such essentials as oxygen and food, as well as materials useful for clothing and shelter. • Plants may grow well ~~only~~ in certain geographic areas, thus enabling the production of plant products that allow humans to live in ~~as well as to~~ and ~~develop~~ thrive in those areas. • Some examples of plants that grow in Virginia's geographic regions include: - Coastal Plains (Tidewater): peanuts, cotton, soybeans; - Piedmont: apples, tobacco, cabbage; - Blue Ridge Mountains: evergreens, apples, corn; - Valleys and Ridges: evergreens, apples, corn; and - Appalachian Plateau: tobacco. • Plants provide homes and food sources for many animals. • Plants ~~are also~~ are important ~~agents~~ in the prevention of soil erosion. • Products from plants include, but are not limited to, cinnamon from the bark of trees; fiber from reeds, grasses and trees; and cotton from a cotton plant. Spices come from various plant parts, lumber comes from wood, rubber comes from rubber trees, and medicines (e.g., aloe vera from the aloe plant, quinine from the bark of Cinchona trees found in South America to treat malaria).	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~comprehend~~ understand that plants produce oxygen and food. • classify and identify the sources and uses of plant products, such as fiber, cotton, oil, spices, lumber, rubber, medicines, and paper. • describe how the availability of certain plant products in a geographic area would affect the development of that area. • describe plant products grown in Virginia that are useful to people, including wood, fruits, and vegetables. List and classify plant products. (e.g., peanuts, cotton, soybeans, apples, evergreens). • compare and contrast different ways animals use plants as homes and shelters. • construct and interpret a chart illustrating the plant foods consumed by different animals. • construct and interpret a model that demonstrates how plants prevent soil erosion.



Science Standards of Learning Curriculum Framework

Grade Three

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Three
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations, and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 3.1 represent more specifically what a student should be able to do as a result of science experiences in third grade. Across the grade levels, the skills in the "Scientific Investigation, Reasoning, and Logic" strand form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.")~~ It is important that the classroom teacher understand~~s~~ how the skills in standard 3.1 are a key part of this sequence (i.e., K.1, K.2, 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1). The third-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed. ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in the "Scientific Investigation, Reasoning, and Logic" strand.~~

3.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations are made and are repeated to ensure accuracy;
b) predictions are formulated using a variety of sources of information;
c) objects with similar characteristics or properties are classified into at least two sets and two subsets;
d) natural events are sequenced chronologically;
e) length, volume, mass, and temperature are estimated and measured in metric and standard English units using proper tools and techniques;
f) time is measured to the nearest minute using proper tools and techniques;
g) questions are developed to formulate hypotheses;
h) data are gathered, charted, graphed, and analyzed;
i) unexpected or unusual quantitative data are recognized;
j) inferences are made and conclusions are drawn;
k) data are communicated;
l) models are designed and built; and
m) current applications are used to reinforce science concepts.

~~Understanding the Standard~~ Overview

The skills defined in standard 3.1 are intended to define the "investigate" component and the understanding of the nature of science ~~of~~ for all of the other third-grade standards (3.2–3.11). The intent of standard 3.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed at the third grade, and continue to strengthen their understanding of the components of the nature of science. **Standard 3.1 does not require a discrete unit be taught on scientific investigation and the nature of science because the ~~inquiry~~ skills that make up the standard should be incorporated in all the other third-grade standards.** For example, it is not expected that teachers should develop a separate unit on the metric system, but that they should integrate metric measurement into the teaching of the rest of the third-grade standards. It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science as well as more fully grasp the content-related concepts.

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~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts: a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected. e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. In grade three, an emphasis should be placed on concepts a, b, c, and e. • Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' knowledge from just facts to understanding why the facts are relevant to everyday life.	In order to meet this standard, it is expected that students ~~should be able to~~ will • make and communicate careful observations. • demonstrate that observations should be repeated to ensure accuracy. • classify objects into at least two major sets and subsets based on similar characteristics, such as predator/prey and herbivore, carnivore, and omnivore. • sequence natural events chronologically~~.~~ (Example: ~~3.9~~ 3.8 — plant and animal life cycles, phases of the moon, the water cycle, and tidal change). • measure length to the nearest centimeter, mass to the nearest gram, volume to the nearest milliliter, temperature to the nearest degree Celsius, and time to the nearest minute, using the appropriate instrument. • develop hypotheses from simple questions. These questions should be related to the concepts in the third-grade standards. Hypotheses should

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~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science uses both logic and innovation. Innovation has always been an important part of science. Scientists draw upon their creativity to visualize how nature works, using analogies, metaphors, and mathematics. • Science is a complex social activity. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for third-grade students to engage in frequent discussions with peers about their understanding of their investigations.	be stated in terms such as: "If an object is cut into smaller pieces, then the physical properties of the object and its smaller pieces will remain the same." • analyze data that have been gathered and organized. • communicate results of investigations by displaying data in the form of tables, charts, and graphs. Students will construct bar and picture graphs and line plots to display data~~.~~ (Example: 3.7 — comparison of types of soil and their effect on plant growth). • communicate any unexpected or unusual quantitative data that are noted. • make and communicate predictions about the outcomes of investigations. • design and build a model to show experimental results.

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~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Questions frequently arise from observations. Hypotheses can be developed from those questions. Data gathered from an investigation may support a hypothesis. At the third-grade level, a method for helping students understand how to develop a hypothesis is to have them build "if/then" statements (e.g., If heat is added to ice, then the ice will melt.). • Complete observations are made using all of the senses. Simple instruments can help extend the senses (e.g., magnifying glass enhances the vision of an item). • Predictions are statements of what is expected to happen in the future based on past experiences and observations. • In order for data from an investigation to be most useful, it must be organized so that it can be examined more easily. • Charts and graphs are powerful tools for reporting and organizing data. • It is sometimes useful to organize objects according to similarities and differences. By organizing objects in sets and subsets, it may be easier to determine a specific type of characteristic.	

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~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• An inference is a conclusion based on evidence. • Putting natural events in a sequence allows us to notice change over time. • Metric measures, including centimeters, grams, milliliters, and degrees Celsius, are a standard way to record measurements. The metric system is recognized everywhere around the world. • A bar graph can be horizontal or vertical, and it compares amounts. Both the X- and Y-axis need to be identified. Discrete data are found on a bar graph. • A line plot shows the spread of data. *(See Grade 3 Mathematics Curriculum Framework, Standard ~~3.21~~ 3.17, page ~~32~~ 31.)* • A picture graph is similar to a bar graph except that it uses symbols to represent quantities. • Scientists use a variety of modes to communicate about their work. Examples of ways they communicate include oral presentations; graphs and charts created to visualize, analyze and present information about their data; and written reports.	

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~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

- In science, it is important that experiments and the observations recorded are replicable. There are two different types of data – qualitative and quantitative. Qualitative data deal with descriptions and data that can be observed, but not measured precisely. Quantitative data are data that can be counted or measured and the results can be recorded using numbers. Quantitative data can be represented visually in graphs and charts. Quantitative data define, whereas qualitative data describe. Quantitative data are more valuable in science because they allow direct comparisons between observations made by different people or at different times.

Example of Qualitative Data vs. Quantitative Data

Third-Grade Class

Qualitative Data	Quantitative Data
• Friendly • Like science • Positive about schoolwork	• 25 students • 10 girls, 15 boys • 68 percent have perfect attendance

Essential Knowledge, Skills, and Processes

Grade Three
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

3.2	The student will investigate and understand simple machines and their uses. Key concepts include a) purpose and function of simple machines; b) types of simple machines; c) compound machines; and d) examples of simple and compound machines found in the school, home, and work environments.

~~Understanding the Standard~~ Overview

This standard introduces students to six types of simple machines, their uses, and examples of these six machines found in everyday environments. These simple machines function to make doing work easier. Activities should focus on identifying the six simple machines, explaining how they operate, and locating examples in everyday life that make a task easier at home, in school, and in the workplace. The students should have experiences using the simple and compound machines to determine how each makes a task easier. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

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a) purpose and function of simple machines;
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d) examples of simple and compound machines found in the school, home, and work environments.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Simple machines are tools that make work easier. Examples of tasks made easier include lifting a heavy weight, moving a heavy object over a distance, pushing things apart, changing the direction of a force, or holding an object together. • The six simple machines are the lever, inclined plane, wedge, wheel and axle, screw, and pulley. • The lever is a stiff bar that moves about a fixed point (fulcrum). It is a simple machine that is used to push, pull, or lift things. Examples include a seesaw, crowbar, and shovel. • The inclined plane is a flat surface that is raised so one end is higher than the other. The inclined plane helps move heavy objects up or down. An example is a ramp. • The wedge is wide at one end and pointed at the other to help cut or split other objects. Examples include a knife or ax. • The wheel and axle consists of a rod attached to a wheel. A wheel and axle makes it easier to move or turn things. Examples include bicycle wheels, roller skates, and a door knob. • The screw is an inclined plane wrapped around a cylinder or cone. A common use of the screw is to hold objects together. Examples include a jar lid and wood screw. • The pulley is a wheel that has a rope wrapped around it. Pulleys can be used to lift heavy objects by changing the direction or amount of the force. Examples include a flagpole.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify and differentiate the six types of simple machines: lever, screw, pulley, wheel and axle, inclined plane, and wedge. • differentiate and classify specific examples of simple machines found in school and household items. These include a screwdriver, nutcracker, screw, flagpole pulley, ramp, and seesaw. • analyze the application of and explain the function of each of the six types of simple machines. An example would be that an inclined plane is a ramp to make it easier for a heavy object to be moved up or down. • identify and classify the simple machines which compose a compound machine, such as scissors, wheelbarrow, and bicycle. • design and construct an apparatus that contains a simple machine.

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~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• A compound machine is a combination of two or more simple machines. Examples include scissors, wheelbarrow, and bicycle.	

Grade Three
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, ~~states~~ phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure of classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

3.3	The student will investigate and understand that objects are made of materials that can be described by their physical properties. Key concepts include a) objects are made of one or more materials; b) physical properties remain the same as the material is changed in visible size; and c) visible physical changes are identified.

~~Understanding the Standard~~ Overview

Students should understand that all objects are made of materials that have observable physical properties. Every object that takes up space is made of matter. Materials can be different colors, shapes, textures, or sizes. They can be hard or soft. The properties of objects can be used to sort or classify them. If materials are broken down into smaller visible parts, each of these smaller parts still has the same physical properties as the original material. (Clear examples include plastics, metal, paper, and ice. Substances that are coarse mixtures, ~~i.e.,~~ e.g., many types of rock, are not good examples.) ~~This standard introduces the concept that materials are made up of smaller parts that are too small to be seen without magnification.~~ It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.3 The student will investigate and understand that objects are made of materials that can be described by their physical properties. Key concepts include

a) objects are made of one or more materials;
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c) visible physical changes are identified.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Objects are made of one or more materials (e.g., toys, shoes, and furniture). • ~~All materials are composed of parts too small to be seen without magnification.~~ • Physical properties remain the same even if the visible material (e.g., plastic, paper, metal, ice) is reduced in size. • Nanotechnology is the study of materials at the molecular (atomic) scale. Items at this scale are so small they are no longer visible with the naked eye. Nanotechnology has shown that the behavior and properties of some substances at the nanoscale (a nanometer is one-billionth of a meter) contradict how they behave and what their properties are at the visible scale.	In order to meet this standard, it is expected that students ~~should be able to~~ will • explain that physical properties are observable characteristics that enable one to differentiate objects. • infer that objects are made of one or more materials based on observations of the physical properties that are common to each individual object. • compare the physical properties of smaller, visible pieces of a material to those physical properties of the entire material. • conclude that materials have their own set of physical properties that are observable. • design an investigation to determine if the physical properties of a material will remain the same if the material is reduced in size.

Grade Three
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

3.4	The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment. Key concepts include a) behavioral adaptations; and b) physical adaptations.

~~Understanding the Standard~~ Overview

Students will compare and contrast the physical and behavioral characteristics of different animals that allow the animals to adapt and respond to life needs. The students will need to describe specific examples of how animals gather food, find shelter, defend themselves, and rear young. The concepts of hibernation, migration, camouflage, mimicry, instinct, and learned behavior are specific ways in which animals respond to their environment. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.4 The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment. Key concepts include
a) behavioral adaptations; and
b) physical adaptations.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • In order to survive, animals act in different ways to gather and store food, find shelter, defend themselves, and rear their young. • Physical adaptations help animals survive in their environment (~~Examples include~~ e.g., camouflage, ~~and~~ mimicry). • Various animals blend into their environments to protect themselves from enemies (camouflage). Camouflage is the means by which animals escape the notice of predators, usually because of a resemblance to their surroundings using coloration or outer coverage patterns. • Mimicry occurs when a species has features similar to another species. Either one or both are protected when a third species cannot tell them apart. (Mimicry happens in both animal and plant species.) Some animals look like other animals to avoid being eaten (mimicry). This adaptation helps protect them from their predators. (For example, the viceroy butterfly tastes good to birds, but the monarch butterfly tastes bad. Because the viceroy looks like the monarch butterfly, it is safer from predators.) Mimicry can also occur as mimicked behaviors, mimicked sounds, mimicked scents, or mimicked locations. • Behavioral adaptations allow animals to respond to life needs. Examples include hibernation, migration, dormancy, instinct, and learned behavior. • Some animals (e.g., groundhogs, black bears) go into a deep ~~winter~~ sleep in which their body activities slow down due to seasonal changes and they can live off stored food (hibernation). Hibernation is a condition of biological rest or inactivity where growth, development, and metabolic processes slow down.	In order to meet this standard, it is expected that students ~~should be able to~~ will • give examples of methods that animals use to gather and store food, find shelter, defend themselves, and rear young. • describe and explain the terms ~~hibernation, migration,~~ camouflage, mimicry, hibernation, migration, dormancy, instinct, and learned behavior. • explain how an animal's behavioral adaptations help it live in its specific habitat. • distinguish between physical and behavioral adaptations of animals. • compare the physical characteristics of animals, and explain how the animals are adapted to a certain environment. • compare and contrast instinct and learned behavior. • create (model) a camouflage pattern for an animal living in a specific dry-land or water-related environment. (Relates to 3.6.) • design and construct a model of a habitat for an animal with a specific adaptation.

3.4	The student will investigate and understand that adaptations allow animals to satisfy life needs and respond to the environment. Key concepts include a) behavioral adaptations; and b) physical adaptations.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Some animals (e.g., geese, monarch butterflies, tundra swans) go on a long-distance journey from one place to another ~~as seasons change~~ (migration) in search of a new temporary habitat because of climate, availability of food, season of the year, or reproduction. • Dormancy is a state of reduced metabolic activity adopted by many organisms (both plants and animals) under conditions of environmental stress or, when such stressful conditions are likely to appear, as in winter. • Some animals are born with natural behaviors that they need in order to survive in their environments (instincts). These behaviors are not learned but are instinctive, such as a beaver building a dam or a spider spinning a web. • Some behaviors need to be taught in order for the animal to survive, such as a bear cub learning to hunt (learned behavior).	

Grade Three
Science Strand

Living Systems

This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of kingdoms of living ~~things~~ organisms and a general classifying of ~~organisms~~ them are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

3.5	The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include a) producer, consumer, decomposer; b) herbivore, carnivore, omnivore; and c) predator and prey.

~~Understanding the Standard~~ Overview

This standard focuses on student understanding of the food chain in water and land environments. It focuses on the types of relationships among living ~~things~~ organisms and their dependence on each other for survival. The strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include the basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards ~~K.6~~ K.7, 1.4, 1.5, 2.4, 3.4, 4.4, and 6.7. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.5 The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include
a) producer, consumer, decomposer;
b) herbivore, carnivore, omnivore; and
c) predator and prey.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A food chain shows a food relationship among plants and animals in a specific area or environment. • Terrestrial organisms are found on land habitats such as deserts, grasslands, and forests. Aquatic organisms are found in water habitats such as ponds, marshes, swamps, rivers, and oceans. • A green plant makes it own food from sunlight, air, and water. Green plants are producers. • A consumer is an animal that eats living organisms (plant or animal). • Certain organisms break down decayed plants and animals into smaller pieces that can be used again by other living ~~things~~ organisms. These organisms are decomposers. • A food chain, which shows part of a food web, can have an animal that eats only plants (herbivore). It can have an animal that eats only other animals (carnivore). It can also have an animal that eats both plants and animals (omnivore). • An animal can hunt other animals to get its food (predator). • An animal can be hunted by another animal for food (prey).	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between predators and prey. • distinguish among producers, consumers, herbivores, omnivores, carnivores, and decomposers. • infer that most food chains begin with a green plant. • identify sequences of feeding relationships in a food chain. • explain how a change in one part of a food chain might affect the rest of the food chain. • create and interpret a model of a food chain showing producers and consumers.

3.6	The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. Key concepts include a) aquatic ecosystems; b) terrestrial ecosystems; c) populations and communities; and d) the human role in conserving limited resources.

~~Understanding the Standard~~ Overview

Students should become familiar with several specific examples of aquatic and terrestrial ~~environments~~ ecosystems and the plants and animals unique to them. The water-related ~~environments~~ ecosystems to be discussed are the pond, marshland, swamp, stream, river, and ocean, and the dry-land ~~environments~~ ecosystems to be discussed are the desert, grassland, rain forest, and forest. Water-related and dry-land ~~environments~~ ecosystems contain many types of plants and animals that often compete for the same natural resources. These resources are often shared. Students will also explore the human role in protecting and conserving limited resources in the various ecosystems. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.6 The student will investigate and understand that ecosystems support a diversity of plants and animals that share limited resources. Key concepts include

a) aquatic ecosystems;
b) terrestrial ecosystems;
c) populations and communities; and
d) the human role in conserving limited resources.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Water-related ~~environments~~ ecosystems include those with fresh water or salt water. Examples include ponds, marshes, swamps, streams, rivers, and oceans. • Dry-land ~~environments~~ ecosystems include deserts, grasslands, rain forests, and forests. • There are distinct differences among pond, marshland, swamp, stream, river, ocean, desert, grassland, rainforest, and forest ~~environments~~ ecosystems. • A population is a group of organisms of the same kind that lives in the same place. Examples of a population are a ~~group~~ flock of swans in a pond, a school of fish in a river, and a herd of cattle in the grassland. • A community is all of the populations that live together in the same place. An example of a dry-land community would be a forest made up of trees, squirrels, worms, rabbits, and hawks. An example of a water-related community would be an ocean made up of fish, crabs, and seaweed. • Organisms compete for the limited resources in their specific ~~environment~~ ecosystem. • Humans need to help conserve limited resources.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe major water-related ~~environments~~ ecosystems and examples of animals and plants that live in each. • describe major dry-land ~~environments~~ ecosystems and examples of animals and plants that live in each. • compare and contrast water-related and dry-land ~~environments~~ ecosystems. • explain how animals and plants use resources in their ~~environment~~ ecosystem. • distinguish between a population and a community. • predict what would occur if a population in a specific ~~environment~~ ecosystem ~~were~~ was to die. • analyze models or diagrams of different water-related ~~environments~~ ecosystems in order to describe the community of organisms each contains and interpret how the organisms use the resources in that ~~environment~~ ecosystem. • analyze models or diagrams of different dry-land ~~environments~~ ecosystems in order to describe the community of organisms each contains and interpret how the organisms use the resources in that environment. • list ways that humans can help conserve limited resources.

Grade Three
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of how Earth systems are connected and how the Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and the Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7,~~ K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

3.7	The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include a) soil provides the support and nutrients necessary for plant growth; b) topsoil is a natural product of subsoil and bedrock; c) rock, clay, silt, sand, and humus are components of soils; and d) soil is a natural resource and should be conserved.

~~Understanding the Standard~~ Overview

Students should know that most plants grow in soil and that people and many other animals are dependent on plants for food. The nutrients in soil are materials that plants and animals need to live and grow. Soil takes a long time to form; therefore, it should be conserved. Soil is made up of humus, silt, rock, and sand. Humus is decayed (once living) matter in soil. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.7 The student will investigate and understand the major components of soil, its origin, and its importance to plants and animals including humans. Key concepts include

a) soil provides the support and nutrients necessary for plant growth;
b) topsoil is a natural product of subsoil and bedrock;
c) rock, clay, silt, sand, and humus are components of soils; and
d) soil is a natural resource and should be conserved.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Soil is important because many plants grow in soil, and it provides support and nutrients for the plants. • Over many years, weather, water, and living ~~things~~ organisms help break down rocks and create soil (weathering). • Nutrients are materials that plants and animals need to live and grow. • Rock, clay, silt, sand, and humus are components of soil. • Topsoil is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth. • Subsoil and bedrock are layers of soil under the topsoil that are formed over a long period of time by the action of water. • Subsoil and bedrock are not as good for growing plants as is topsoil. • Humus is decayed matter in soil. It adds nutrients to the soil. It is located in the topsoil. • Clay contains tiny particles of soil that hold water well and provides nutrients. • Sand is made up of small grains of worn-down rock, has few nutrients, and does not hold water well. • Silt is made up of very small broken pieces of rock. Its particles are larger than clay and smaller than sand. • Since soil takes a long time to form, it should be conserved, not wasted.	In order to meet this standard, it is expected that students ~~should be able to~~ will • observe and recognize that soil, as a natural resource, provides the support and nutrients necessary for plant growth. • ~~comprehend~~ understand the key terminology related to soil, including humus, nutrients, topsoil, and bedrock. • interpret and illustrate a basic diagram showing major soil layers, including bedrock, subsoil, and topsoil. • analyze and describe the different components of soil, including rock fragments, clay, silt, sand, and humus. • explain how soil forms over time. • design an investigation to compare how different types of soil affect plant growth. This includes organizing data in tables and constructing simple graphs. • collect, chart, and analyze data on soil conservation on the school grounds. • evaluate the importance of soil to people. • describe how soil can be conserved.

Grade Three
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living ~~things~~ organisms. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, and change in the Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

3.8	The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include a) patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides; b) animal life cycles; and c) plant life cycles.

~~Understanding the Standard~~ Overview

This standard focuses on students understanding that many events on Earth happen in cycles or patterns. Examples of these patterns are day turning into night and night into day. Seasons cycle from fall to winter to spring to summer and back to fall. Light reflecting from the sun causes the moon to appear illuminated. The phases of the moon appear in sequence as the moon makes one revolution around ~~the~~ Earth. Seasons are caused by the tilt of ~~the~~ Earth as it revolves around the sun. The main cause of the tides is the gravitational attraction between ~~the~~ Earth and the moon. Plants and animals also undergo life cycles from birth to death. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.8 The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include
a) patterns of natural events such as day and night, seasonal changes, simple phases of the moon, and tides;
b) animal life cycles; and
c) plant life cycles.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A cycle is a repeated pattern. A sequence is a series of events that occur in a natural order. • The pattern of day and night is caused by the rotation of ~~the~~ Earth. One complete rotation occurs every 24 hours. The part of ~~the~~ Earth toward the sun has daylight while the part of ~~the~~ Earth away from the sun has night. • The pattern of seasonal changes takes place because ~~the~~ Earth's axis is tilted toward or away from the sun during its revolution around the sun. ~~The~~ Earth takes 365 ¼ days, or one year, to make one revolution. • The cycle of moon phases ~~of the moon~~ occurs as the moon makes one revolution around ~~the~~ Earth. The ~~shapes~~ visible portion of the moon that we see each night follows a pattern. • The tides follow a pattern of two high and two low tides every 24 hours. This pattern is caused for the most part by the gravitational attraction between ~~the~~ Earth and the moon. • Plants and animals undergo life cycles~~. For example,~~ (e.g., Frogs begin as eggs in water. The eggs grow into tadpoles, the tadpoles eventually become frogs, and the adult frogs lay eggs to start ~~the~~ a new life cycle over again. In the plant life cycle, a seed grows into a new plant that forms seeds. Then the new seeds repeat the life cycle.).	In order to meet this standard, it is expected that students ~~should be able to~~ will • explain how some events in nature occur in a pattern or cycle, such as the seasons, day and night, phases of the moon (first quarter, full, last [third] quarter, new), tides, and life cycles. • recognize that the relationships that exist between and among ~~the~~ Earth, sun, and moon result in day and night, seasonal changes, phases of the moon, and the tides. • model and describe how ~~the~~ Earth's rotation causes day and night. • model and describe how the sun's rays strike the Earth to cause seasons. • observe, chart, and illustrate phases of the moon (first quarter, full, last [third] quarter, new), and describe the changing pattern of the moon as it revolves around ~~the~~ Earth. • collect and analyze data from simple tide tables to determine a pattern of high and low tides. • explain the pattern of growth and change that organisms, such as the ~~butterfly and~~ frog and butterfly undergo during their life cycle.

3.9	The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include a) there are many sources of water on Earth; b) the energy from the sun drives the water cycle; c) the water cycle involves several processes; d) water is essential for living things; and e) water on Earth is limited and needs to be conserved.

~~Understanding the Standard~~ Overview

This standard introduces students to the movement of water on ~~the~~ Earth by evaporation, condensation, and precipitation, which is called the water cycle. All the water on Earth is part of the water cycle. Water is stored in ponds, lakes, streams, rivers, ground water, and oceans. Water is essential to maintain life on Earth and should be conserved as a natural resource. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.9 The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include

a) there are many sources of water on Earth;
b) the energy from the sun drives the water cycle;
c) the water cycle involves several processes;
d) water is essential for living things; and
e) water on Earth is limited and needs to be conserved.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The water cycle is the movement of water from the ground to the air and back to the ground by evaporation, condensation, and precipitation. The energy that drives this cycle comes from the sun. • During the water cycle, liquid water is heated and changed to a gas (water vapor). ~~(~~This process is called evaporation~~)~~. The gas (water vapor) is cooled and changed back to a liquid. ~~(~~This process is called condensation~~)~~. ~~A~~ Water as a liquid or a solid falls to the ground as precipitation. • Our water supply on Earth is limited. Pollution reduces the amount of usable water; therefore, the supply should be conserved carefully. • Water is a simple compound essential for life on Earth. Living cells are mostly water. In each cell, the chemicals necessary for life are dissolved in water.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify the sun as the origin of energy that drives the water cycle. • describe the processes of evaporation, condensation, and precipitation as they relate to the water cycle. • construct and interpret a model of the water cycle. • ~~realize living things~~ identify the different ways that organisms get water from the environment ~~in different ways~~. • identify major water sources for a community, including rivers, reservoirs, and wells. Describe the major water sources for the local community. • explain methods of water conservation in the home and school. • ~~appraise~~ identify and communicate the importance of water to people and to other living ~~things~~ organisms. • analyze possible sources of water pollution in their neighborhoods, at school, and in the local community. This includes runoff from over-fertilized lawns and fields, oil from parking lots, eroding soil, and animal waste.

Grade Three
Science Strand

Earth Resources

This strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the concept of management of resource use. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8~~ 4.9, and 6.9.

3.10	The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include a) the interdependency of plants and animals; b) the effects of human activity on the quality of air, water, and habitat; c) the effects of fire, flood, disease, and erosion on organisms; and d) conservation and resource renewal.

~~Understanding the Standard~~ Overview

This standard reinforces the concept that plants and animals are dependent upon each other for survival. Living ~~things~~ organisms depend on other living ~~thing~~ organisms to survive. Human and natural events can change habitats. Natural disasters such as fire, flood, disease, and erosion can kill organisms and destroy their habitats. Methods of ensuring the survival of plant and animal species include specific conservation measures. These are resource renewal, habitat management procedures, and species monitoring practices. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include
a) the interdependency of plants and animals;
b) the effects of human activity on the quality of air, water, and habitat;
c) the effects of fire, flood, disease, and erosion on organisms; and
d) conservation and resource renewal.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Every living thing depends on ~~every~~ other living things to survive. This is called interdependency. • Human actions, such as polluting, can affect the survival of plants and animals. • Natural events, such as fires, floods, diseases, and erosion, can also affect the survival of plant and animal species. • Conservation is the careful use and preservation of our natural resources. • Resource renewal is a conservation practice in which species are protected. An example would be protecting endangered plants by saving their seeds, growing the seeds indoors, and later putting the new plants back in their natural habitats.	In order to meet this standard, it is expected that students ~~should be able to~~ will • explain how living things in an area are dependent on each other. • compare and contrast human influences on the quality of air, water, and habitats. • analyze the effects of fire, flood, disease, and erosion on organisms and habitats. • describe how conservation practices can affect the survival of a species. • describe a conservation practice in the local community.

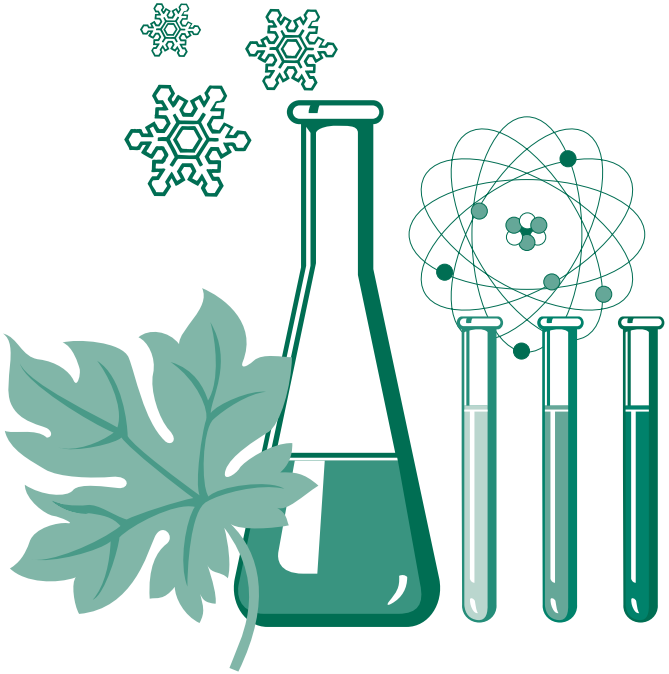
3.11	The student will investigate and understand different sources of energy. Key concepts include a) energy from the sun; b) sources of renewable energy; and c) sources of nonrenewable energy.

~~Understanding the Standard~~ Overview

This standard focuses on ~~the~~ Earth's major types of energy sources. The sun produces light and heat energy. Natural forms of energy include sunlight, water, and wind. Important fossil fuels are coal, oil, and natural gas, which were formed over millions of years by decaying plants and animals buried in layers of rock. Sources of energy are classified either as renewable or nonrenewable. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

3.11 The student will investigate and understand different sources of energy. Key concepts include
a) energy from the sun;
b) sources of renewable energy; and
c) sources of nonrenewable energy.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The sun is the source of almost all energy on Earth. The sun is the direct source of light and heat energy. • Sunlight, water, and wind are sources of energy. The force of flowing water and moving air (wind) can also be used to generate electricity. • Wood comes from trees. It has many important uses, including its use as a fuel. • Some energy sources are renewable. That means that they can be replaced. Some energy sources are nonrenewable. That means that once they are used up, they are gone and cannot be replaced. Coal, oil, and natural gas are nonrenewable resources. • Fossil fuels, such as coal, oil, and natural gas, are formed from decayed plants and animals. The formation of fossil fuels takes millions of years.	In order to meet this standard, it is expected that students ~~should be able to~~ will • explain that the sun is the major source of energy for ~~the~~ Earth. • identify sources of energy and their uses. • describe how solar energy, wind, and moving water can be used to produce electricity. • describe how fossil fuels are used as an energy source. • compare and contrast renewable and nonrenewable energy sources. • analyze the advantages and disadvantages of using different naturally occurring energy sources. • design a basic investigation to determine the effects of sunlight on warming various objects and materials, including water.



Science Standards of Learning Curriculum Framework

Grade Four

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
© 2010

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by the

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The 2010 *Science Curriculum Framework* can be found in PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at http://www.doe.virginia.gov.

Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Four
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 4.1 represent more specifically what a student should be able to do as a result of science experiences in fourth grade. Across the grade levels, the skills in the "Scientific Investigation, Reasoning, and Logic" strand form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.")~~ It is important that the classroom teacher understand~~s~~ how the skills in standard 4.1 are a key part of this sequence (i.e., K.1, K.2, 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1). The fourth-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed. ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in this strand.~~

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Understanding the Standard~~ Overview

The skills described in standard 4.1 are intended to define the "investigate" component of all of the other fourth-grade standards (4.2–4.8). The intent of standard 4.1 is that students will continue to develop a range of inquiry skills, ~~and~~ achieve proficiency with those skills in the context of the concepts developed at the fourth-grade level, and strengthen their understanding of the nature of science. **Standard 4.1 does not require a discrete unit be taught on scientific investigation and the nature of science because the ~~inquiry~~ skills that make up the standard should be incorporated in all the other fourth-grade standards.** It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science as well as more fully grasp the content-related concepts.

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts:
  a) the natural world is understandable;
  b) science is based on evidence, both observational and experimental;
  c) science is a blend of logic and innovation;
  d) scientific ideas are durable yet subject to change as new data are collected.
  e) science is a complex social endeavor; and
  f) scientists try to remain objective and engage in peer review to help avoid bias.

  In grade four, an emphasis should be placed on concepts a, b, c, d, and e.
- Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' knowledge from just facts to understanding why the facts are relevant to everyday life.

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- differentiate among simple observations, conclusions, inferences, and predictions, and correctly apply the terminology in oral and written work. ~~This requires students to comprehend the basic terminology and apply it in novel situations related to fourth grade SOL concepts.~~
- analyze a set of 20 or fewer objects~~, measures,~~ or pictures~~;~~. ~~classify~~ Sort them into ~~basic~~ categories to organize the data (~~descriptive or numerical~~ qualitative or quantitative); and construct bar graphs and line graphs depicting the distribution of those data based on characteristics or properties.
- use millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, ~~grams, and kilograms~~ and degrees Celsius in measurement.
- choose the appropriate instruments, including centimeter rulers, meter sticks, scales, balances, graduated cylinders, beakers, ~~scales and balances,~~ and Celsius thermometers, for making basic metric

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Science demands evidence. Scientists develop their ideas based on evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science uses both logic and innovation. Innovation has always been an important part of science. Scientists draw upon their creativity to visualize how nature works, using analogies, metaphors, and mathematics. • Scientific ideas are durable yet subject to change as new data are collected. The main body of scientific knowledge is very stable and grows by being corrected slowly and having its boundaries extended gradually. Scientists themselves accept the notion that scientific knowledge is always open to improvement and can never be declared absolutely certain. New questions arise, new theories are proposed, new instruments are invented, and new techniques are developed. • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise	measures. • measure elapsed time using a stopwatch or a clock. • make predictions, inferences, and draw conclusions using a variety of sources such as ~~based on~~ picture graphs, bar graphs, and basic line graphs. • analyze the variables in a simple experiment~~,~~, ~~and decide~~ Identify the independent variable and the dependent variable. Decide which other variable(s) must be held constant (not allowed to change) in order for the investigation to represent a fair test. ~~This requires students to comprehend what "variables" are and to apply that idea in new situations related to fourth grade SOL related concepts. Variables are either manipulated or responding.~~ • create a plausible hypothesis, stated in terms of cause (if) and effect (then), from a set of basic observations that can be tested. ~~This requires a student to comprehend what "cause and effect" is and to be able to apply that idea in new situations. The application should occur in terms of fourth grade SOL related concepts or other concrete situations.~~ Hypotheses should be stated in terms such as: "If the water

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of professional scientists, it is essential for fourth-grade students to engage in frequent discussions with peers about their understanding of their investigations. • An observation is what you see, feel, taste, hear, or smell. Scientists construct knowledge from observations and inferences, not observations alone. To communicate an observation accurately, one must provide a clear description of exactly what is observed and nothing more. Those conducting investigations need to understand the difference between what is seen and what inferences, conclusions, or interpretations can be drawn from the observation. • An inference is a conclusion based on evidence about events that have already occurred. Accurate observations and evidence are necessary to draw realistic and plausible conclusions. • A scientific prediction is a forecast about what may happen in some future situation. It is based on the application of scientific principles and	temperature is increased, then the amount of sugar that can be dissolved in it will increase." • organize and analyze data from a simple experiment. Construct bar graphs and line graphs depicting the data. • judge which, if any, data in a simple set of results (generally 10 or fewer in number) appear to be ~~considerably outside the expected range. Students should be able to determine the significance of unusual data~~ contradictory or unusual. • present results of a simple experiment using graphs, pictures, statements, and numbers. • construct a physical model to clarify an explanation, demonstrate a relationship, or solve a need ~~using information related to fourth-grade SOL concepts~~.

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
b) objects or events are classified and arranged according to characteristics or properties;
c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
h) hypotheses are developed as cause and effect relationships;
i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
factual information. • When drawing a conclusion, you make a judgment after considering all the information you have gathered. Conclusions are based on details and facts. • Systematic investigations require standard measures (metric), consistent and reliable tools, and organized reporting of data. The way the data are displayed can make it easier to uncover important information. This can assist in making reliable scientific forecasts of future events. • Elapsed time is the amount of time that has passed between two given times. (*See Grade Four Mathematics Curriculum Framework, Standard 4.9, page 24.*) • An experiment is a fair test driven by a hypothesis. A fair test is one in which only one variable is compared. • A hypothesis is a prediction about the relationship between variables. A hypothesis is an educated guess/prediction about what will happen based on what you already know and what you have already learned from your research. It must be worded so that it is "testable."	

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
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l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• In order to conduct an experiment, one must recognize all of the potential variables or changes that can affect its outcome. • An ~~*manipulated*~~ independent variable is the factor in an experiment that is altered by the experimenter. The independent variable is purposely changed or manipulated. • A ~~*responding*~~ dependent variable is the factor in an experiment that changes as a result of the change applied to the ~~manipulated~~ independent variable. • The constants in an experiment are those things that are not changed but remain the same throughout the experiment. • In science, it is important that experiments and the observations recorded are repeatable. There are two different types of data – qualitative and quantitative. Qualitative data deal with descriptions and data that can be observed, but not measured. Quantitative data are data that can be counted or measured and the results can be recorded using numbers. Quantitative data can be represented visually in graphs and charts. Quantitative data define whereas qualitative data describe. Quantitative data are more valuable in science because they allow direct comparisons	

4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) distinctions are made among observations, conclusions, inferences, and predictions;
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c) appropriate instruments are selected and used to measure length, mass, volume, and temperature in metric units;
d) appropriate instruments are selected and used to measure elapsed time;
e) predictions and inferences are made, and conclusions are drawn based on data from a variety of sources;
f) independent and dependent variables are identified;
g) constants in an experimental situation are identified;
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i) data are collected, recorded, analyzed, and displayed using bar and basic line graphs;
j) numerical data that are contradictory or unusual in experimental results are recognized;
k) data are communicated with simple graphs, pictures, written statements, and numbers;
l) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
m) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
between observations made by different people or at different times. Example of Qualitative vs. Quantitative Data **Main Street Elementary School Science Club** Qualitative: • Friendly • Like science • Positive about schoolwork Quantitative: • 10 fourth-grade students and 12 fifth-grade students • 14 girls, 8 boys • 92 percent participated in the divisionwide science fair last year • It is important for students to apply the science content they have learned to current events and applications to bring realism to their learning.	

Grade Four
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

4.2	The student will investigate and understand characteristics and interactions of moving objects. Key concepts include a) motion is described by an object's direction and speed; b) changes in motion are related to force and mass; c) friction is a force that opposes motion; and d) moving objects have kinetic energy.

~~Understanding the Standard~~ Overview

This standard is introduced in first-grade and prepares students for a more in-depth study of energy in eighth grade. This standard focuses on the characteristics of moving objects. Key concepts include the effect of forces, such as friction, on moving objects. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.2 The student will investigate and understand characteristics and interactions of moving objects. Key concepts include
a) motion is described by an object's direction and speed;
b) changes in motion are related to force and mass;
c) friction is a force that opposes motion; and
d) moving objects have kinetic energy.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • The position of an object can be described by locating it relative to another object or to the background. • Tracing and measuring an object's position over time can describe its motion. • Speed describes how fast an object is moving. • Energy may exist in two states: kinetic or potential. • Kinetic energy is the energy of motion. • A force is any push or pull that causes an object to move, stop, or change speed or direction. • The greater the force, the greater the change in motion will be. The more massive an object, the less effect a given force will have on the object. • Friction is the resistance to motion created by two objects moving against each other. Friction creates heat. • Unless acted on by a force, objects in motion tend to stay in motion and objects at rest remain at rest.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the position of an object. • collect and display in a table and line graph time and position data for a moving object. • explain that speed is a measure of motion. • interpret data to determine if the speed of an object is increasing, decreasing, or remaining the same. • identify the forces that cause an object's motion. • describe the direction of an object's motion: up, down, forward, backward. • infer that objects have kinetic energy. • design an investigation to test the following hypothesis: "If the mass of an object increases, then the force needed to move it will increase." • design an investigation to determine the effect of friction on moving objects. Write a testable hypothesis, identify the dependent variable, the independent variable, and the constants. Conduct a fair test, collect and record the data, analyze the data, and report the results of the data.

4.3	The student will investigate and understand the characteristics of electricity. Key concepts include a) conductors and insulators; b) basic circuits; c) static electricity; d) the ability of electrical energy to be transformed into light and motion, and to produce heat; e) simple electromagnets and magnetism; and f) historical contributions in understanding electricity.

~~Understanding the Standard~~ Overview

This standard focuses on the characteristics of electricity as related to circuits and circuit components, magnetism, static charges, and historical contributions important to the understanding of electricity. As electrical energy is an integral part of modern civilization (e.g., powering our computers; lighting, heating and cooling our homes and businesses; and making the information age possible), it is critical that students begin to understand basic electricity concepts. This standard will be the basis for a more in-depth study in the eighth grade. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.3 The student will investigate and understand the characteristics of electricity. Key concepts include
a) conductors and insulators;
b) basic circuits;
c) static electricity;
d) the ability of electrical energy to be transformed into light and motion, and to produce heat;
e) simple electromagnets and magnetism; and
f) historical contributions in understanding electricity.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • A continuous flow of negative charges (electrons) creates an electric current. The pathway taken by an electric current is a circuit. Closed circuits allow the movement of electrical energy. Open circuits prevent the movement of electrical energy. • Electrical energy moves through materials that are conductors (metals). Insulators (rubber, plastic, wood) do not conduct electricity well. • Among conducting materials, ~~energy passes more or less easily because of the material's resistance~~ the rate at which energy flows depends on the material's resistance. • In a series circuit, there is only one pathway for the current, but in a parallel circuit there are two or more pathways for it. • Rubbing certain materials together creates static electricity. • Lightning is the discharge of static electricity in the atmosphere. • Electrical energy can be transformed into ~~heat,~~ light~~,~~ or motion, and ~~to~~ can produce heat ~~mechanical energy~~. • Certain iron-bearing metals attract other such metals (also nickel and cobalt). • Lines of force extend from the poles of a magnet in an arched pattern defining the area over which magnetic force is exerted. • An electric current creates a magnetic field, and a moving magnetic field	In order to meet this standard, it is expected that students ~~should be able to~~ will • apply the terms insulators, conductors, open and closed in describing electrical circuits. • differentiate between an open and closed electric circuit. • use the dry cell symbols (–) and (+). • create and diagram a functioning series circuit using dry cells, wires, switches, bulbs, and bulb holders. • create and diagram a functioning parallel circuit using dry cells, wires, switches, bulbs, and bulb holders. • differentiate between a parallel and series circuit. • describe the types of energies (i.e., light, heat, motion) that are transformed by various household appliances (e.g., lamp, toaster, fan). • create a diagram of a magnetic field using a magnet. • compare and contrast a permanent magnet and an electromagnet. • explain how electricity is generated by a moving magnetic field. • design an investigation using static electricity to attract or repel a variety of materials. • explain how static electricity is created and occurs in nature.

4.3 The student will investigate and understand the characteristics of electricity. Key concepts include
a) conductors and insulators;
b) basic circuits;
c) static electricity;
d) the ability of electrical energy to be transformed into light and motion, and to produce heat;
e) simple electromagnets and magnetism; and
f) historical contributions in understanding electricity.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
creates an electric current. • A current flowing through a wire creates a magnetic field. Wrapping a wire around certain iron-bearing metals (iron nail) and creating a closed circuit is an example of a simple electromagnet. • Benjamin Franklin, Michael Faraday, and Thomas Edison made important discoveries about electricity.	• construct a simple electromagnet using a wire, nail, or other iron-bearing object, and a dry cell. • design and perform an investigation to determine the strength of an electromagnet. (The ~~manipulated~~ independent variable could be the number of coils of wire and the ~~responding~~ dependent variable could be the number of paperclips the magnet can attract.) • describe the contributions of Ben Franklin, Michael Faraday, and Thomas Edison to the understanding and harnessing of electricity.

Grade Four
Science Strand

Life Processes

This strand focuses on the life processes of plants and animals and the specific needs of each. The major topics developed in the strand include basic needs and life processes of organisms, their physical characteristics, orderly changes in life cycles, behavioral and physical adaptations, and survival and perpetuation of species. This strand includes science standards K.6, K.7, 1.4, 1.5, 2.4, 3.4, and 4.4.

4.4	The student will investigate and understand basic plant anatomy and life processes. Key concepts include a) the structures of typical plants and the function of each structure; b) processes and structures involved with plant reproduction; c) photosynthesis; and d) adaptations allow plants to satisfy life needs and respond to the environment.

~~Understanding the Standard~~ Overview

This standard focuses on the basic life processes and anatomy of plants. It represents a more in-depth treatment of the plant structures and the processes associated with plant reproduction. Photosynthesis is introduced in this standard. Closely related standards from previous grades include K.6, 1.4, and 2.4. This standard also is closely connected with concepts presented in science standard 4.5. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
a) the structures of typical plants and the function of each structure;
b) processes and structures involved with plant reproduction;
c) photosynthesis; and
d) adaptations allow plants to satisfy life needs and respond to the environment.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • For many typical green plants, there are anatomical structures that perform certain basic functions. For example, roots anchor the plants and take water and nutrients from the soil. Plant stems provide support and allow movement of water and nutrients. • ~~The plant kingdom~~ Plants can be divided into two general groups: those that produce seeds and those that produce spores. • Many seed-producing plants have roots, stems, leaves, and flowers. • Seeds vary considerably in size. Orchids, for example, produce seeds as small as dust particles. The coconut is one of the largest seeds in the plant kingdom. In many seeds, the protective outer seed coat is resistant to physical damage and may also contain waxes and oils that help prevent water loss. • The embryo within the seed begins as a single cell, the zygote. The basic organs of the plant body can be found in the embryo. In some seeds the embryonic leaves are quite large, filling most of the volume of the seed. The embryonic leaves are a major source of stored food for the embryo. Beans are an example of plants with large embryonic leaves. In many other plants the embryonic leaves are relatively small, and the embryo is nourished by a tissue called endosperm. • Pollination is part of the reproductive process of flowering plants. Pollination is the process by which pollen is transferred from the stamens to the stigma. • The stamen and pistil are reproductive parts of the flower. The sepals are the small leaves that form the housing of the developing flower.	In order to meet this standard, it is expected that students ~~should be able to~~ will • analyze a common plant: identify the roots, stems, leaves, and flowers, and explain the function of each. • create a model/diagram illustrating the parts of a flower and its reproductive processes. ~~e~~Explain your model/diagram using the following terminology: pollination, ~~(~~stamen, stigma, pistil, sepal, embryo, spore, ~~ovary, ovuole,~~ seed~~)~~. • ~~create a model/diagram illustrating the reproductive processes in typical flowering plants, and explain the processes.~~ • compare and contrast different ways plants are pollinated. • explain that ferns and mosses reproduce with spores rather than seeds. • explain the process of photosynthesis, using the following terminology: sunlight, chlorophyll, water, carbon dioxide, oxygen, and sugar. • ~~design an investigation to determine the relationship between the presence of sunlight and plant growth.~~ • explain the role of ~~dormancy for~~ adaptations of common plants to include dormancy, response to light, and response to moisture.

4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include a) the structures of typical plants and the function of each structure; b) processes and structures involved with plant reproduction; c) photosynthesis; and d) adaptations allow plants to satisfy life needs and respond to the environment.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• Some plants reproduce with spores. These include ferns and mosses. • Green plants produce their own food through the process of photosynthesis. Green plants use chlorophyll to produce food (sugar), using carbon dioxide, water, ~~nutrients~~ enzymes and other chemicals, and sunlight. Leaves are the primary food producing part of these plants. • Oxygen is produced during photosynthesis. • Plants adapt to changes in their environment in order to survive. Dormancy is a plant adaptation. Dormancy is a period of suspended life processes brought on by changes in the environment.	

Grade Four
Science Strand

Living Systems

This strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of kingdoms of living things and a general classifying of organisms are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

4.5	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations; b) organization of populations, communities, and ecosystems and how they interrelate; c) flow of energy through food webs; d) habitats and niches; e) changes in an organism's niche at various stages in its life cycle; and f) influences of human activity on ecosystems.

~~Understanding the Standard~~ Overview

This standard focuses on the relationships among plants, animals, and the nonliving environment and brings together several elements of both Life Processes and Living Systems. This standard assumes students have a basic understanding that all living ~~things~~ organisms are interrelated and dependent in some way on other living ~~things~~ organisms and their environment. Plants and animals in ecological systems live in a web of interdependence in which each species contributes to the functioning of the overall system. Organisms live in a habitat to which they are structurally and behaviorally adapted. Certain conditions within environments determine which organisms and communities succeed there. This standard builds upon previous standards 1.5, 2.4, 2.5. 3.4, 3.5 and 3.6. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.5 The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include

a) plant and animal adaptations;
b) organization of populations, communities, and ecosystems and how they interrelate;
c) flow of energy through food webs;
d) habitats and niches;
e) changes in an organism's niche at various stages in its life cycle; and
f) influences of human activity on ecosystems.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Organisms have structural adaptations, or physical attributes, that help them meet a life need. • Organisms also have behavioral adaptations, or certain types of activities they perform, which help them meet a life need. • All the organisms of the same species that live in the same place at the same time are a population. • Populations of species that live in the same place at the same time together make up a community. • The organization of communities is based on the utilization of the energy from the sun within a given ecosystem. The greatest amount of energy in a community is in the producers. • Within a community, organisms are dependent on the survival of other organisms. Energy is passed from one organism to another. • All the populations and the nonliving components in an environment that interact with each other form an ecosystem. • The sun's energy cycles through ecosystems from producers through consumers and back into the nutrient pool through decomposers. • A habitat is the place or kind of place in which an animal or plant naturally lives. An organism's habitat provides food, water, shelter, and space. The size of the habitat depends on the organism's needs.	In order to meet this standard, it is expected that students ~~should be able to~~ will • distinguish between structural (physical) and behavioral adaptations. • investigate and infer the function of basic adaptations ~~and provide evidence for the conclusion~~. • understand that adaptations allow an organism to succeed in a given environment. • explain how different organisms use their unique adaptations to meet their needs. • describe why certain communities exist in given habitats. • illustrate the food webs in a local area. • ~~and~~ compare and contrast the niches of several different organisms within the community. • compare and contrast the differing ways an organism interacts with its surroundings at various stages of its life cycle. Specific examples include a frog and a butterfly. • differentiate among positive and negative influences of human activity on ecosystems.

4.5	The student will investigate and understand how plants and animals, including humans, in an ecosystem interact with one another and with the nonliving components in the ecosystem. Key concepts include a) plant and animal adaptations; b) organization of populations, communities, and ecosystems and how they interrelate; c) flow of energy through food webs; d) habitats and niches; e) changes in an organism's niche at various stages in its life cycle; and f) influences of human activity on ecosystems.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• A niche is the function that an organism performs in the food web of that community. A niche also includes everything else the organism does and needs in its environment. No two types of organisms occupy exactly the same niche in a community. • The organization of a community is defined by the interrelated niches within it. • During its life cycle, an organism's role in the community — its niche — may change. For example, what an animal eats, what eats it, and other relationships will change. • Humans can have a major impact on ecosystems.	

Grade Four
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of how Earth systems are connected and how ~~the~~ Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and ~~the~~ Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7~~ K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

4.6	The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include a) weather phenomena; b) weather measurements and meteorological tools; and c) use of weather measurements and weather phenomena to make weather predictions.

~~Understanding the Standard~~ Overview

This standard focuses on weather conditions and a more technical understanding of the tools and methods used to forecast future atmospheric conditions. Weather is introduced in science standard 2.6. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include
a) weather phenomena;
b) weather measurements and meteorological tools; and
c) use of weather measurements and weather phenomena to make weather predictions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Temperature is the measure of the amount of heat energy in the atmosphere. • Air pressure is due to the weight of the air and is determined by several factors including the temperature of the air. • A front is the boundary between air masses of different temperature and humidity. • Cirrus, stratus, cumulus, and cumulo-nimbus clouds are associated with certain weather conditions. • Cumulus clouds are fluffy and white with flat bottoms. They usually indicate fair weather. However, when they get larger and darker on the bottom, they ~~produce thunderstorms~~ become cumulo-nimbus clouds. Cumulo-nimbus clouds may produce thunderstorms. • Stratus clouds are smooth, gray clouds that cover the whole sky (block out direct sunlight). Light rain and drizzle are usually associated with stratus clouds. • Cirrus clouds are feathery clouds. They are associated with fair weather. Cirrus clouds often indicate that rain or snow will fall within several hours. • Extreme atmospheric conditions create various kinds of storms such as thunderstorms, hurricanes, and tornadoes. • Different atmospheric conditions create different types of precipitation. • Meteorologists gather data by using a variety of instruments. • Meteorologists use data to predict weather patterns.	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~use a thermometer~~ design an investigation in which a thermometer is used to compare air temperatures over a period of time. • analyze the changes in air pressure occurring over time, using a barometer, and predict what the changes mean in terms of changing weather patterns. • illustrate and label high and low pressures on a map. • differentiate between the types of weather associated with high and low pressure air masses. Illustrate and label high and low pressure air masses and warm and cold fronts. • differentiate between cloud types (i.e., cirrus, stratus, cumulus, and cumulo-nimbus clouds) and the associated weather. • compare and contrast the formation of different types of precipitation (e.g., rain, snow, sleet, and hail). • recognize a variety of storm types, describe the weather conditions associated with each, and explain when they occur (e.g., thunderstorms, hurricanes, and tornadoes). • analyze and report information about temperature and precipitation on weather maps. • measure wind speed, using an anemometer. • measure precipitation with a rain gauge. • design an investigation in which weather data are gathered using meteorological tools and charted to make weather predictions.

4.6	The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include a) weather phenomena; b) weather measurements and meteorological tools; and c) use of weather measurements and weather phenomena to make weather predictions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• A barometer measures air pressure. • An anemometer measures wind speed. • A rain gauge measures the amount of precipitation. • A thermometer measures the temperature of the air.	

Grade Four
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in ~~the~~ Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

4.7	The student will investigate and understand the organization of the solar system. Key concepts include a) the planets in the solar system; b) the order of the planets in the solar system; and c) the relative sizes of the planets.

~~Understanding the Standard~~ Overview

This standard focuses on providing an introduction to our solar system. This includes the introduction to the planets in the solar system, their order in the solar system in relation to the sun, and the sizes of the planets in relation to the size of Earth. A more in-depth study of the solar system is in standard 6.8. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.7 The student will investigate and understand the organization of the solar system. Key concepts include
a) the planets in the solar system;
b) the order of the planets in the solar system; and
c) the relative sizes of the planets.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Our solar system is ancient. Early astronomers believed that Earth was the center of the universe and all other heavenly bodies orbited around Earth. We now know that our sun is the center of our solar system and eight planets, a handful of dwarf planets, 170 named moons, dust, gas, and thousands of asteroids and comets orbit around the sun. • Our solar system is made up of eight planets: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, and Neptune. • Mercury, Venus, Earth, and Mars are considered terrestrial planets. Jupiter, Saturn, Uranus, and Neptune are called gas giants. • Mercury is closest to the sun and is a small, heavily cratered planet. Mercury looks like our moon. Since Pluto's downgrade from planet to dwarf planet, Mercury is now the smallest planet in our solar system. • Venus is second from the sun. It is similar to Earth in size and mass, and has a permanent blanket of clouds that trap so much heat that the temperatures on the surface of Venus are hot enough to melt lead. • Earth is third from the sun. Earth's atmosphere, the liquid water found on Earth, and its distance from the sun, among many other factors, make Earth a haven for life. • Mars is fourth from the sun. Mars' atmosphere is thin and there is a vast network of canyons and riverbeds on the red planet. Scientists hypothesize that Mars once supported a wet, warm Earth-like climate. • Jupiter is fifth from the sun. Jupiter is the largest planet in the solar system and is considered a gas giant. Jupiter has no solid surface. • Saturn is sixth from the sun. Ancient scientists thought Saturn was the	In order to meet this standard, it is expected that students ~~should be able to~~ will • name the eight planets and describe whether they are a terrestrial planet or a gas giant. • sequence the eight planets in the solar system based on their position from the sun. (Mercury is the first from the sun, Venus is the second, etc.) • sequence the eight planets in the solar system based on size (Jupiter is the largest, Saturn is next, etc.) • construct a simple model of the sun and the planets in our solar system.

4.7 The student will investigate and understand the organization of the solar system. Key concepts include
a) the planets in the solar system;
b) the order of the planets in the solar system; and
c) the relative sizes of the planets.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
only planet with rings, but we now know that all four gas giants (Jupiter, Saturn, Uranus, and Neptune) have rings. • Uranus is seventh from the sun. Uranus is a gas giant. • Neptune is eighth from the sun. Neptune appears blue through telescopes and is a gas giant. • The eight planets sorted by size from largest to smallest are: Jupiter, Saturn, Uranus, Neptune, Earth, Venus, Mars, and Mercury. • Pluto is no longer included in the list of planets in our solar system due to its small size and irregular orbit. Many astronomers questioned whether Pluto should be grouped with worlds like Earth and Jupiter. In 2006, this debate led the International Astronomical Union (IAU), the recognized authority in naming heavenly objects, to formally reclassify Pluto. On August 24, 2006, Pluto's status was officially changed from planet to dwarf planet. • A new distinct class of objects called "dwarf planets" was identified in 2006. It was agreed that "planets" and "dwarf planets" are two distinct classes of objects. The first members of the dwarf planet category are Ceres, Pluto and 2003 UB313, given the name Eris. More dwarf planets are expected to be announced by the IAU in the future. • What differentiates a dwarf planet from a planet? For the most part, they are identical, but there is one key difference: A dwarf planet has not "cleared the neighborhood" around its orbit, which means it has not become gravitationally dominant and it shares its orbital space with other bodies of a similar size. • Pluto is smaller than seven of the moons in our solar system and cannot be seen without a telescope.	

4.8	The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include a) the motions of Earth, the moon, and the sun; b) the causes for Earth's seasons; c) the causes for the phases of the moon; d) the relative size, position, age, and makeup of Earth, the moon, and the sun; and e) historical contributions in understanding the Earth-moon-sun system.

~~Understanding the Standard~~ Overview

This standard focuses on the Earth-moon-sun system and includes knowledge related to the motions of this system and the results of our unique position in it. This includes the presence of an atmosphere, liquid water, and life. The standard is built on concepts developed in science standards ~~K.7~~ K.8, 1.6, and 3.8 and that will be further expanded in 6.8. A more in-depth study of ~~the~~ Earth's makeup is in standard 5.7. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

Standard 4.8

4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include

a) the motions of Earth, the moon, and the sun;
b) the causes for Earth's seasons;
c) the causes for the phases of the moon;
d) the relative size, position, age, and makeup of Earth, the moon, and the sun; and
e) historical contributions in understanding the Earth-moon-sun system.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • ~~The~~ Earth completes one revolution around the sun every 365 ¼ days. The moon revolves around ~~the~~ Earth about once every month. • Due to its axial tilt, ~~the~~ Earth experiences seasons during its revolution around the sun. • The phases of the moon are caused by its position relative to ~~the~~ Earth and the sun. The phases of the moon include the new, waxing crescent, first quarter, waxing gibbous, full, waning gibbous, last (third) quarter, and waning crescent. • The sun is an average-sized yellow star, about 110 times the diameter of ~~the~~ Earth. The sun is approximately 4.6 billion years old. • Our moon is a small rocky satellite, having about one-quarter the diameter of ~~the~~ Earth and one-eightieth its mass. It has extremes of temperature, virtually no atmosphere~~, no water, and no~~ or life, and very little water. • ~~The~~ Earth is one of ~~nine~~ eight planets that revolve around the sun and comprise the solar system. ~~The~~ Earth, the third planet from the sun, is one of the four ~~rocky~~ terrestrial inner planets. It is about 150 million kilometers from the sun. ~~(The emphasis is placed on the Earth, rather than the other planets.)~~ • ~~The~~ Earth is a geologically active planet with a surface that is constantly changing. Unlike the other three inner planets (see previous bullet), it	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between rotation and revolution. • describe how ~~the~~ Earth's axial tilt causes the seasons. • model the formation of the eight moon phases, sequence the phases in order, and describe how the phases occur. • describe the major characteristics of the sun, including its approximate size, color, age, and overall composition. • create and describe a model of the Earth-moon-sun system with approximate scale distances and sizes. • compare and contrast the surface conditions of ~~the~~ Earth, the moon, and the sun. • compare and contrast an Earth-centered to the sun-centered model of the solar system. • analyze the differences in what Aristotle, Ptolemy, Copernicus, and Galileo observed and what influenced their conclusions. • describe a contribution of the NASA Apollo missions to our understanding of the moon.

Standard 4.8

4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include

a) the motions of Earth, the moon, and the sun;
b) the causes for Earth's seasons;
c) the causes for the phases of the moon;
d) the relative size, position, age, and makeup of Earth, the moon, and the sun; and
e) historical contributions in understanding the Earth-moon-sun system.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
has large amounts of life-supporting water and an oxygen-rich atmosphere. ~~The~~ Earth's protective atmosphere blocks out most of the sun's damaging rays. • Our understanding of the solar system has changed from an Earth-centered model of Aristotle and Ptolemy to the sun-centered model of Copernicus and Galileo. • The NASA Apollo missions added greatly to our understanding of the moon. • Our understanding of the sun, moon, and the solar system continues to change with new scientific discoveries.	

Grade Four
Science Strand

Earth Resources

This strand focuses on student understanding the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the concept of management of resource use. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10,~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8,~~ 4.9, and 6.9.

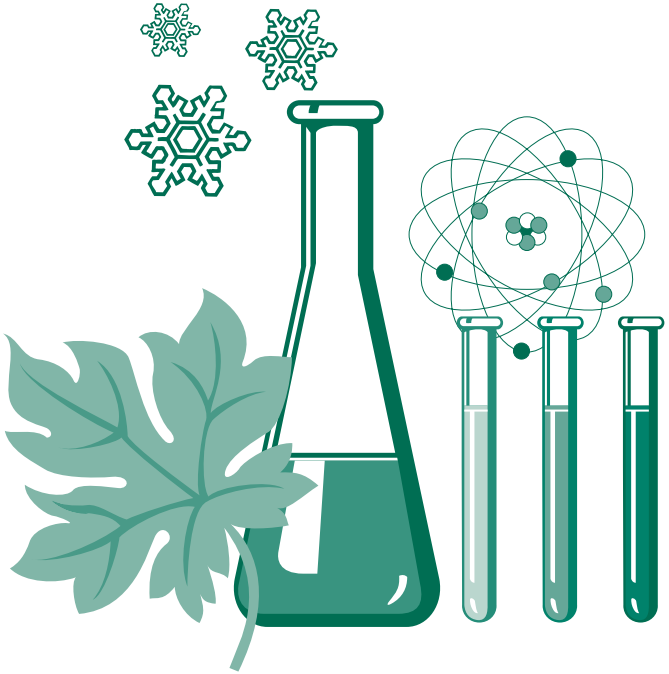
4.9	The student will investigate and understand important Virginia natural resources. Key concepts include a) watersheds and water resources; b) animals and plants; c) minerals, rocks, ores, and energy sources; and d) forests, soil, and land.

~~Understanding the Standard~~ Overview

Virginia has a rich variety of natural resources. These provide the raw materials for our daily lives and sustain our economy. Natural resources are finite and must be used wisely to ~~insure~~ ensure their continued availability. This concept of natural resources is introduced in 1.8 and extended in 6.9. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (4.1) in the context of the key concepts presented in this standard.

4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
a) watersheds and water resources;
b) animals and plants;
c) minerals, rocks, ores, and energy sources; and
d) forests, soil, and land.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Virginia is rich in a wide variety of natural resources, including forests, arable (farmable) land, coal, sand and aggregates (rocks), wildlife and aquatic organisms, clean water and air, and beautiful scenery. • A watershed is an area over which surface water (and the materials it carries) flows to a single collection place. The Chesapeake Bay watershed covers approximately half of Virginia's land area. The other two major watershed systems are the Gulf of Mexico and the North Carolina Sounds. • Virginia's water resources include groundwater, lakes, reservoirs, rivers, bays, and the Atlantic Ocean. • Virginia has a great variety of plant and animal resources. • Natural and cultivated forests are a widespread resource in Virginia. • Virginia's soil and land support a great variety of life, provide space for many economic activities, and offer a variety of recreational opportunities.	In order to meet this standard, it is expected that students ~~should be able to~~ will • compare and contrast natural and ~~man-made~~ human-made resources. • distinguish among rivers, lakes, and bays; describe characteristics of each; and name an example of each in Virginia. • create and interpret a model of a watershed. Evaluate the statement: "We all live downstream." • identify watershed addresses. • recognize the importance of Virginia's mineral resources, including coal, limestone, granite, and sand and gravel. • appraise the importance of natural and cultivated forests in Virginia. • describe a variety of soil and land uses important in Virginia.



Science Standards of Learning Curriculum Framework

Grade Five

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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The 2010 *Science Curriculum Framework* can be found in PDF and Microsoft Word file formats on the Virginia Department of Education's Web site at http://www.doe.virginia.gov.

Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Five
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student ~~should~~ will be able to do when conducting activities and investigations, and represents the student understanding of the nature of science. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standard 5.1 represent more specifically what a student should be able to do as a result of science experiences in fifth grade. Across the grade levels, the skills in the "Scientific Investigation, Reasoning, and Logic" strand form a nearly continuous sequence of investigative skills and an understanding of the nature of science. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.")~~ It is important that the classroom teacher understand~~s~~ how the skills in standard 5.1 are a key part of this sequence (i.e., K.1, K.2, 1.1, 2.1, 3.1, 4.1, 5.1, and 6.1). The fifth-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed. ~~It is also important to note that 25 percent of items on the third and fifth grade SOL assessments measure the skills defined in the "Scientific Investigation, Reasoning, and Logic" strand.~~

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) items such as rocks, minerals, and organisms are identified using various classification keys;
b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
c) estimates are made and accurate measurements of elapsed time are made using proper tools;
d) hypotheses are formed from testable questions;
e) independent and dependent variables are identified;
f) constants in an experimental situation are identified;
g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements;
h) predictions are made using patterns from data collected, and simple graphical data are generated;
i) inferences are made and conclusions are drawn;
j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Understanding the Standard~~ Overview

The skills in standard 5.1 are intended to define the "investigate" component and the understanding of the nature of science ~~of~~ for all of the other fifth-grade standards (5.2–5.7). The intent of standard 5.1 is for students to continue to develop a range of inquiry skills, ~~and~~ achieve proficiency with those skills, and develop and reinforce their understanding of the nature of science in the context of the concepts developed at the fifth-grade level. **Standard 5.1 does not require a discrete unit be taught on scientific investigation because the ~~inquiry~~ skills that make up the standard should be incorporated in all the other fifth-grade standards.** It is also intended that by developing these skills, students will achieve a greater understanding of scientific inquiry and the nature of science and will more fully grasp the content-related concepts.

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) items such as rocks, minerals, and organisms are identified using various classification keys;
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i) inferences are made and conclusions are drawn;
j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts:
  a) the natural world is understandable;
  b) science is based on evidence, both observational and experimental;
  c) science is a blend of logic and innovation;
  d) scientific ideas are durable yet subject to change as new data are collected.
  e) science is a complex social endeavor; and
  f) scientists try to remain objective and engage in peer review to help avoid bias.

  In grade five, an emphasis should be placed on concepts a, b, c, d, and e.
- Science assumes that the natural world is understandable. Scientific inquiry can provide explanations about nature. This expands students' knowledge from just facts to understanding why the facts are relevant to everyday life.
- Science demands evidence. Scientists develop their ideas based on

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- use classification keys to identify rocks, minerals, and organisms.
- select and use the appropriate instruments, including centimeter rulers, meter sticks, graduated cylinders, balances, stopwatches, and thermometers for making basic measurements.
- make plausible estimations of length, mass, ~~and~~ volume, and elapsed time.
- measure ~~temperature,~~ length, mass, ~~and~~ volume, and temperature using metric measures. This includes millimeters, centimeters, meters, kilometers, grams, kilograms, milliliters, liters, and degrees Celsius.
- use a testable question to form a hypothesis as an "if…, then…" statement.
- analyze the variables in a simple experiment and identify the ~~manipulated (~~independent~~)~~ and ~~responding (~~dependent~~)~~ variables, and the constants.
- collect, record, analyze, and report data, using charts and tables, and

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

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j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
evidence and they change their ideas when new evidence becomes available or the old evidence is viewed in a different way. • Science uses both logic and innovation. Innovation has always been an important part of science. Scientists draw upon their creativity to visualize how nature works, using analogies, metaphors, and mathematics. • Scientific ideas are durable yet subject to change as new data are collected. The main body of scientific knowledge is very stable and grows by being corrected slowly and having its boundaries extended gradually. Scientists themselves accept the notion that scientific knowledge is always open to improvement and can never be declared absolutely certain. New questions arise, new theories are proposed, new instruments are invented, and new techniques are developed. • Science is a complex social endeavor. It is a complex social process for producing knowledge about the natural world. Scientific knowledge represents the current consensus as to what is the best explanation for phenomena in the natural world. This consensus does not arise automatically, since scientists with different backgrounds from all over the world may interpret the same data differently. To build a consensus, scientists communicate their findings to other scientists and attempt to replicate one another's findings. In order to model the work of	translate numerical data into bar or line graphs. • make predictions based on trends in data. This requires the recognition of patterns and trends and determination of what those trends may represent. • ~~define~~/make ~~observations and~~ inferences and draw conclusions. • distinguish between ~~observations and~~ inferences and conclusions. • ~~measure, record, identify, collect, and organize observations. Distinguish between qualitative and quantitative observations.~~ • construct a physical model to clarify an explanation, demonstrate a relationship, or solve a need.

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) items such as rocks, minerals, and organisms are identified using various classification keys;
b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
c) estimates are made and accurate measurements of elapsed time are made using proper tools;
d) hypotheses are formed from testable questions;
e) independent and dependent variables are identified;
f) constants in an experimental situation are identified;
g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements;
h) predictions are made using patterns from data collected, and simple graphical data are generated;
i) inferences are made and conclusions are drawn;
j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
professional scientists, it is essential for fifth-grade students to engage in frequent discussions with peers about their understanding of their investigations. • Systematic investigations require standard measures and consistent and reliable tools. Metric measures are a standard way to make measurements and are recognized around the world. • A classification key is an important tool used to help identify objects and organisms. It consists of a branching set of choices organized in levels, with most levels of the key having two choices. Each level provides more specific descriptors, eventually leading to identification. • A hypothesis is an educated guess/prediction about what will happen based on what you already know and what you have already learned from your research. It must be worded so that it is "testable." The hypothesis should be written as an "If…, then…." statement, such as "If all light is blocked from a plant for two weeks, then the plant will die." • An ~~*manipulated*~~ independent variable is the factor in an experiment that is altered by the experimenter. The independent variable is purposely changed or manipulated. • A ~~*responding*~~ dependent variable is the factor in an experiment that changes as a result of the ~~manipulated~~ changes made to the independent	

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) items such as rocks, minerals, and organisms are identified using various classification keys;
b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
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i) inferences are made and conclusions are drawn;
j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
variable. • The constants in an experiment are those things that are not changed throughout the experiment. Constants are all the factors that remain the same throughout the experiment. • Systematic investigations require organized reporting of data. The way the data are displayed can make it easier to see important patterns, trends, and relationships. Bar graphs and line graphs are useful tools for reporting discrete data and continuous data, respectively. • A scientific prediction is a forecast about what may happen in some future situation. It is based on the application of factual information and principles and recognition of trends and patterns. • Estimation is a useful tool for making approximate measures and giving general descriptions. In order to make reliable estimates, one must have experience using the particular unit. • Scientific conclusions are based both on verifiable observations (science is empirical) and on inferences. • ~~Observation is the use of senses to collect information about the environment.~~ An ~~I~~inference is the use of prior knowledge and experience to generate conclusions about ~~those~~ observations.	

5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) items such as rocks, minerals, and organisms are identified using various classification keys;
b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
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j) models are constructed to clarify explanations, demonstrate relationships, and solve needs; and
k) current applications are used to reinforce science concepts.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Scientific modeling is the process of generating abstract, conceptual, graphical and/or mathematical models. It is an approximation or simulation of a real system that omits all but the most essential variables of the system. In order to create a model, a scientist must first make some assumptions about the essential structure and relationships of objects and/or events in the real world. These assumptions are about what is necessary or important to explain the phenomena. • It is important for students to apply the science content that they have learned to current issues and applications.	

Grade Five
Science Strand

Force, Motion, and Energy

This strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism, types of motion, simple and compound machines, and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

5.2	The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include a) compression waves; b) vibration, compression, wavelength, frequency, amplitude; c) the ability of different media (solids, liquids, and gases) to transmit sound; and d) uses and applications of sound waves.

~~Understanding the Standard~~ Overview

This standard introduces the concept of what sound is and how sound is transmitted. The students are introduced to scientific vocabulary and the phenomena of compression waves, frequency, waves, wavelength, and vibration in this standard. Students should make predictions about and experiment with the transmission of sound. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

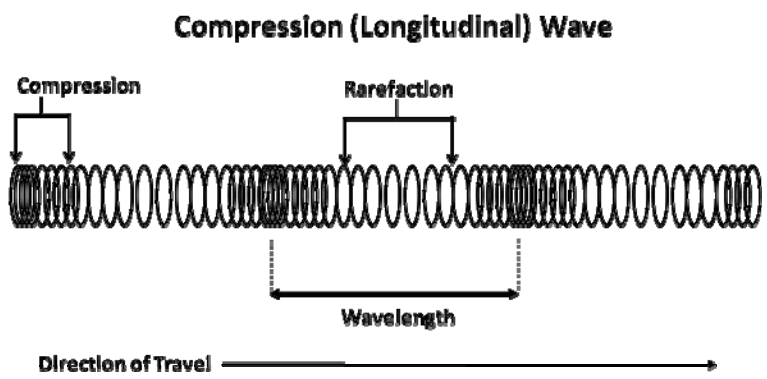
5.2 The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include
a) compression waves;
b) vibration, compression, wavelength, frequency, amplitude;
c) the ability of different media (solids, liquids, and gases) to transmit sound; and
d) uses and applications of sound waves.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- Sound is a form of energy produced and transmitted by vibrating matter.
- Sound waves are compression (longitudinal) waves.
- When compression (longitudinal) waves move through matter (solid, liquid, or a gas), the molecules of the matter move backward and forward in the direction in which the wave is traveling. As sound waves travel, molecules are pressed together in some parts (compression) and in some parts are spread out (rarefaction). A child's toy in the form of a coil is a good tool to demonstrate a compression (longitudinal) wave.



- ~~Sound travels in waves and can be described by the wavelength and frequency of the waves. A wave is a disturbance moving through a medium (solid, liquid, or gas).~~

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- use the basic terminology of sound to describe what sound is, how it is formed, how it affects matter, and how it travels.
- create and interpret a model or diagram of a compression wave.
- explain why sound waves travel only where there is matter to transmit them.
- explain the relationship between frequency and pitch.
- design an investigation to determine what factors affect the pitch of a vibrating object. This includes vibrating strings, rubber bands, beakers/bottles of air and water, tubes (as in wind chimes), and other common materials.
- compare and contrast sound traveling through a solid with sound traveling through the air. Explain how different media (solid, liquid, and gas) will affect the transmission of sound.
- compare and contrast the sound~~s~~ (voice) that humans make and hear to ~~that~~ those of other animals. This includes bats, dogs, and whales.
- compare and contrast how different kinds of musical instruments make sound. This includes string instruments, woodwinds, percussion instruments, and brass instruments.

5.2 The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include
a) compression waves;
b) vibration, compression, wavelength, frequency, amplitude;
c) the ability of different media (solids, liquids, and gases) to transmit sound; and
d) uses and applications of sound waves.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• The frequency of sound is the number of ~~vibrations~~ wavelengths in a given unit of time. • When we talk, sound waves travel in air. Sound also travels in liquids and solids. Sound waves must have a medium in which to travel. In a vacuum sound cannot travel because there is no matter for it to move through. • ~~Sound is a compression wave moving outward from its source.~~ The wavelength of sound is the distance between two compressions or between two rarefactions. The wavelength can be measured from any point on a wave as long as it is measured to the same point on the next wave. • Pitch is determined by the frequency of a vibrating object. Objects vibrating faster have a higher pitch than objects vibrating slower. A change in frequency of sound waves causes an audible sensation—a difference in pitch. • Amplitude is the amount of energy in a compression (longitudinal) wave and is related to intensity and volume. For example, when a loud sound is heard, it is because many molecules have been vibrated with much force. A soft sound is made with fewer molecules being vibrated with less force. • Sound travels more quickly through solids than through liquids and gases because the molecules of a solid are closer together. Sound travels ~~most slowly~~ the slowest through gases because the molecules of a gas are farthest apart. • Some animals make and hear ranges of sound vibrations different from those that humans can make and hear.	

5.2 The student will investigate and understand how sound is created and transmitted, and how it is used. Key concepts include a) compression waves; b) vibration, compression, wavelength, frequency, amplitude; c) the ability of different media (solids, liquids, and gases) to transmit sound; and d) uses and applications of sound waves.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
• Musical instruments vibrate to produce sound. There are many different types of musical instruments and each instrument causes the vibrations in different ways. The most widely accepted way to classify musical instruments is to classify them by the way in which the sound is produced by the instrument. The four basic classifications are percussion instruments (e.g., drums, cymbals), stringed instruments (e.g., violin, piano, guitar), wind instruments (e.g., flute, clarinet, trumpet, trombone), and electronic instruments (e.g., electronic organ, electric guitar).	

5.3	The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include a) transverse waves; b) the visible spectrum; c) opaque, transparent, and translucent; d) reflection of light from reflective surfaces; and e) refraction of light through water and prisms.

~~Understanding the Standard~~ Overview

Concepts related to light are introduced at the fifth-grade level. Standard 5.3 focuses on the characteristics of visible light~~,~~ and the tools that aid in the production and use of light~~, and the historical contributions of inventors and scientists~~. Instruction should center on the basic science concerning light energy and how we use light in our daily lives. A related science standard is 4.2, which focuses on forms of energy and provides a foundation for understanding that light is energy. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include

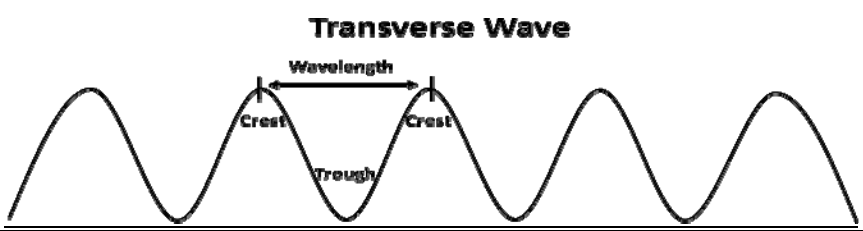
a) transverse waves;
b) the visible spectrum;
c) opaque, transparent, and translucent;
d) reflection of light from reflective surfaces; and
e) refraction of light through water and prisms.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- Light travels in waves. Light waves are transverse waves and travel through a vacuum at a speed of approximately 186,000 miles per second (2.99×10^8 meters per second). Compared to sound, light travels extremely fast. It takes light from the sun less than 8½ minutes to travel 93 million miles (150 million kilometers) to reach ~~the~~ Earth.
- Unlike sound, light waves travel in straight paths called rays and do not need a medium through which to move. A ray is the straight line that represents the path of light. A beam is a group of parallel rays.
- Light waves are characterized by their wavelengths and the frequency of their wavelengths. ~~In the visible spectrum, red has the longest wavelength, and violet has the shortest. Wavelengths get progressively shorter from red to violet.~~
- The size of a wave is measured as its wavelength, which is the distance between any two corresponding points on successive waves, usually crest-to-crest or trough-to-trough. The wavelength can be measured from any point on a wave as long as it is measured to the same point on the next wave.



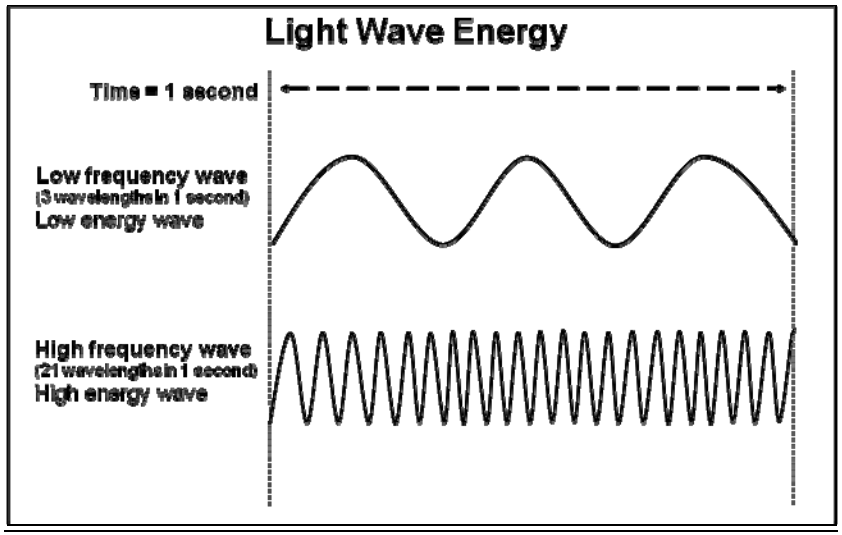
Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- diagram and label a representation of a light wave, including wavelength, ~~peak,~~ crest, and trough.
- explain the relationships between wavelength and the color of light. Name the colors of the visible spectrum.
- explain the terms transparent, translucent, and opaque, and give an example of each.
- compare and contrast reflection and refraction, using water, prisms, and mirrors.
- analyze the effects of a prism on white light and describe why this occurs. Explain why a rainbow occurs.

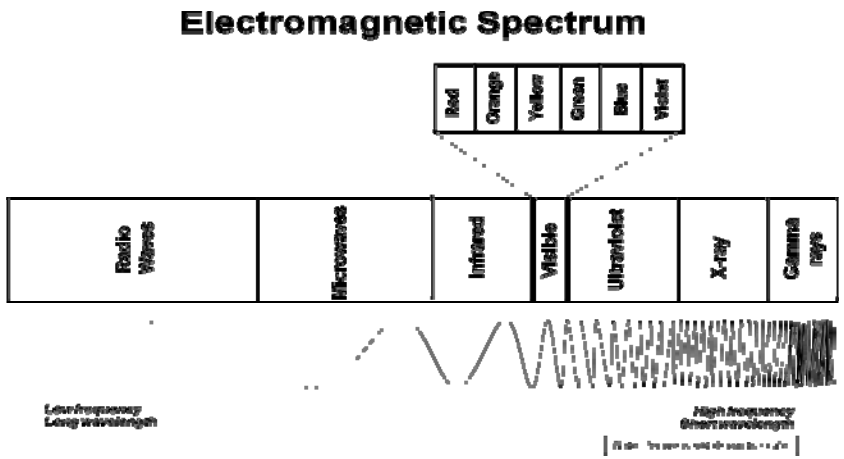
5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include

a) transverse waves;
b) the visible spectrum;
c) opaque, transparent, and translucent;
d) reflection of light from reflective surfaces; and
e) refraction of light through water and prisms.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• Frequency is the number of waves passing a given point every second. The greater the frequency, the greater the amount of energy. • Light waves are waves of energy. The amount of energy in a light wave is proportionally related to its frequency: high frequency light has high energy; low frequency light has low energy. The more wavelengths in a light wave in a given period of time, the higher the energy level. Thus gamma rays have the most energy, and radio waves have the least. Of visible light, violet has the most energy and red the least.  • The entire range of electromagnetic radiation (light) is called the electromagnetic spectrum.	

5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include

a) transverse waves;
b) the visible spectrum;
c) opaque, transparent, and translucent;
d) reflection of light from reflective surfaces; and
e) refraction of light through water and prisms.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
 • The only difference between the various types of electromagnetic radiation is the amount of energy. Sunlight consists of the entire electromagnetic spectrum. • The wavelengths detectible by the human eye represent only a very small part of the total electromagnetic spectrum. The part of the electromagnetic spectrum that is visible light is a very narrow part. • We see visible light waves as the colors of the rainbow. Each color has a different wavelength. Red has the longest wavelength and violet has the shortest wavelength. The colors of the visible spectrum from the longest wavelength to the shortest wavelength are: red, orange, yellow, green,	

5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include
a) transverse waves;
b) the visible spectrum;
c) opaque, transparent, and translucent;
d) reflection of light from reflective surfaces; and
e) refraction of light through water and prisms.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
blue, and violet (ROYGBV). Most scientists no longer include the color indigo, which used to be included between blue and violet. • Black and white are not spectral colors. Black is when a material absorbs all the visible light and no light is reflected back. Black is a total absence of light. White is a reflection of all visible light together. • Light travels in straight paths until it hits an object, where it bounces off (is reflected), is bent (is refracted), passes through the object (is transmitted), or is absorbed as heat. • The term reflected light refers to light waves that are neither transmitted nor absorbed, but are thrown back from the surface of the medium they encounter. If the surface of the medium contacted by the wave is smooth and polished (e.g., a mirror), each reflected wave will be reflected back at the same angle as the incident wave. The wave that strikes the surface of the medium (e.g., a mirror) is called the incident wave, and the one that bounces back is called the reflected wave. • ~~Visible light is a combination of several different wavelengths of light traveling together. These wavelengths are represented by the colors red, orange, yellow, green, blue, indigo, and violet (ROYGBIV).~~ • Refraction means the bending of a wave resulting from a change in its velocity (speed) as it moves from one medium to another (e.g., light moving from the air into water). The frequency of the wave does not change. • The amount of bending of the light wave (refraction) depends on: 1. The density of the material it is entering; 2. The wavelength of the light wave; and	

5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include
a) transverse waves;
b) the visible spectrum;
c) opaque, transparent, and translucent;
d) reflection of light from reflective surfaces; and
e) refraction of light through water and prisms.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
3. The angle at which the original light wave enters the new medium. • Some examples of refraction are when: 1. Refraction causes a setting sun to look flat. 2. A spoon appears to bend when it is immersed in a cup of water. The bending seems to take place at the surface of the water, or exactly at the point where there is a change of density. 3. Shadows on the bottom of a pool are caused because air and water have different densities. 4. A glass prism disperses white light into its individual colors. As visible light exits the prism, it is refracted and separated into a display of colors. • A rainbow is an example of both refraction and reflection. Sunlight is first refracted when it enters the surface of a raindrop, it is then reflected off the back of the raindrop, and once again refracted as it leaves the raindrop. • A prism can be used to refract and disperse visible light. When the different wavelengths of light in visible light pass through a prism, they are bent at different angles (refracted). Dispersion occurs when we see the light separated into a display of colors: ROYGBV. ~~The colors of light we see are red, orange, yellow, green, blue, indigo, and violet.~~ • Dispersion is the separation of light. Dispersion occurs with transparent surfaces that are not parallel to each other, such as a prism or gemstone facets. • Light passes through some materials easily (transparent materials),	

5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include a) transverse waves; b) the visible spectrum; c) opaque, transparent, and translucent; d) reflection of light from reflective surfaces; and e) refraction of light through water and prisms.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
through some materials partially (translucent materials), and through some not at all (opaque materials). The relative terms transparent, translucent, and opaque indicate the amount of light that passes through an object. 1. Examples of transparent materials include clear glass, clear plastic food wrap, clean water, and air. 2. Examples of translucent materials include wax paper, frosted glass, thin fabrics, some plastics, and thin paper. 3. Examples of opaque materials include metal, wood, bricks, aluminum foil, and thick paper.	

Grade Five
Science Strand

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, ~~states~~ phases of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure ~~of~~ and classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

5.4	The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules and compounds; and e) mixtures including solutions.

~~Understanding the Standard~~ Overview

This standard incorporates various characteristics of matter such as mass, volume, and the effect of ~~heat~~ temperature changes on the three ~~states~~ phases of matter. Instruction should center on the basic structure of matter and how it behaves. This standard builds on standard 3.3, which provides a basis for understanding the structure of matter. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

5.4 The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include

a) distinguishing properties of each phase of matter;
b) the effect of temperature on the phases of matter;
c) atoms and elements;
d) molecules and compounds; and
e) mixtures including solutions.

~~Overview~~ Understanding the Standard

(Background Information for Instructor Use Only)

~~The concepts developed in this standard include the following:~~

- Matter is anything that has mass and volume.
- Mass is the amount of matter in an object. The mass of an object does not change. (Weight of an object changes based on the gravitational pull on it. A person will have the same mass on Earth, Mars, and our moon. However, his or her weight on our moon will be 1/6 of what it is on Earth and will be 1/3 as much on Mars.)
- Matter can exist in several distinct forms which are called phases. The three basic phases of matter generally found on Earth are gas, liquid, and solid. (Though other phases of matter have been identified, these are the phases of matter that fifth-grade students are expected to know.)

Characteristics of Gases, Liquids, and Solids

gas	liquid	solid
Assumes the shape of its container	Assumes the shape of its container	Retains a fixed shape
Assumes the volume of its container – no definite volume	Has a definite volume	Has a definite volume
Compressible (lots of free space between particles)	Not easily compressible (little free space between particles)	Not easily compressible (little free space between particles)
Flows easily (particles can move past one another)	Flows easily (particles can move/slide past one another)	Does not flow easily (rigid-particles cannot move/slide past one another)

Essential Knowledge, Skills, and Processes

In order to meet this standard, it is expected that students ~~should be able to~~ will

- construct and interpret a sequence of models (diagrams) showing the activity of molecules in all three ~~states~~ phases of matter.
- construct and interpret models of atoms~~, elements,~~ and molecules~~, and compounds~~.
- identify substances as being an element or a compound.
- design an investigation to determine how ~~heat~~ a change in temperature affects the ~~states~~ phases of matter (e.g., water). Include in the design ways information will be recorded, what measures will be made, what instruments will be used, and ways the data will be graphed.
- compare and contrast mixtures and solutions~~, elements and compounds, and atoms and molecules~~.

5.4	The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules and compounds; and e) mixtures including solutions.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• As its temperature increases, many kinds of matter change from a solid to a liquid to a gas. As its temperature decreases, that matter changes from a gas to a liquid to a solid. • All matter, regardless of its size, shape, or color, is made of particles (atoms and molecules) that are too small to be seen by the unaided eye. • There are more than 100 known elements that make up all matter. A few of the more familiar elements include: hydrogen (H), oxygen (O), helium (H), carbon (C), sodium (Na), and potassium (K). The smallest part of an element is an atom. • A mixture is a combination of two or more substances that do not lose their identifying characteristics when combined. A solution is a mixture in which one substance dissolves in another. • When two or more elements combine to form a new substance, it is called a compound. There are many different types of compounds because atoms of elements combine in many different ways (and in different whole number ratios) to form different compounds. Examples include water (H_2O) and table salt (NaCl). The smallest part of a compound is a molecule. • Nanotechnology is the study of materials at the molecular (atomic) scale. Items at this scale are so small they are no longer visible with the naked eye. Nanotechnology has shown that the behavior and properties of some substances at the nanoscale (a nanometer is one-billionth of a meter) contradict how they behave and what their properties are at the visible scale. Many products on the market today are already benefiting from nanotechnology such as sunscreens, scratch-resistant coatings, and	

5.4 The student will investigate and understand that matter is anything that has mass and takes up space; and occurs as a solid, liquid, or gas. Key concepts include a) distinguishing properties of each phase of matter; b) the effect of temperature on the phases of matter; c) atoms and elements; d) molecules and compounds; and e) mixtures including solutions.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
medical procedures.	

Grade Five
Science Strand

Living Systems

This strand begins in second-grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of ~~kingdoms~~ characteristics common to various groups of living ~~things~~ organisms and ~~a~~ general and specific ~~classifying~~ classification of organisms based on the characteristics are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

5.5	The student will investigate and understand that organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism's ability to survive and thrive in its environment. Key concepts include a) basic cell structures and functions; b) classification of organisms using physical characteristics, body structures, and behavior of the organism; and c) traits of organisms that allow them to survive in their environment.

~~Understanding the Standard~~ Overview

This standard emphasizes the major categories of living ~~things~~ organisms and builds on science standards 2.4 and 4.4. The use of a microscope may be applied to the study of plants, animals, and cells. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

5.5 The student will investigate and understand that organisms are made of one or more cells and have distinguishing characteristics that play a vital role in the organism's ability to survive and thrive in its environment. Key concepts include

a) basic cell structures and functions;
b) classification of organisms using physical characteristics, body structures, and behavior of the organism; and
c) traits of organisms that allow them to survive in their environment.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Living things are made of cells. Cells carry out all life processes. New cells come from existing cells. Cells are too small to be seen with the eye alone. By using a microscope, many parts of a cell can be seen. • Though plant and animal cells are similar, they are also different in shape and in some of their parts. Plant cells tend to be rectangular, while animal cells tend to be spherical or at times irregular. • Organisms that share similar characteristics can be organized into groups in order to help understand similarities and differences. • ~~Living things can be categorized into kingdoms: monerans protists, fungi, plants, and animals.~~ • Plants can be categorized as vascular (having special tissues to transport food and water — for example, trees and flowering plants) and nonvascular (not having tissues to transport food and water — for example, moss, liverworts, and hornworts). Most plants are vascular. • Animals can be categorized as vertebrates (having backbones) or invertebrates (not having backbones).	In order to meet this standard, it is expected that students ~~should be able to~~ will • draw, label, and describe the essential structures and functions of plant and animal cells. For plants, include the nucleus, cell wall, cell membrane, vacuole, chloroplasts, and cytoplasm. For animals, include the nucleus, cell membrane, vacuole, and cytoplasm. • design an investigation to make observations of cells. • compare and contrast plant and animal cells and identify their major parts and functions. • group organisms into categories, using their characteristics: living things (kingdoms), plants (vascular and nonvascular), and animals (vertebrates or invertebrates). Name and describe two common examples of each group. • compare and contrast the distinguishing characteristics of ~~the kingdoms of~~ groups of organisms.

Grade Five
Science Strand

Interrelationships in Earth/Space Systems

This strand focuses on student understanding of how Earth systems are connected and how ~~the~~ Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and ~~the~~ Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards ~~K.7~~ K.8, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

5.6	The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics; b) physical characteristics; and c) ecological characteristics.

~~Understanding the Standard~~ Overview

This standard extends the study of ecosystems to the ocean environment. It focuses on the major descriptive characteristics of oceans. Among the concepts are the geological characteristics of the ocean floor, the physical characteristics of ocean water, and the ecological characteristics of communities of marine organisms. Connections can be made to standards 5.2, 5.3, 5.4, 5.5, and 5.7. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
a) geological characteristics;
b) physical characteristics; and
c) ecological characteristics.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Oceans cover about 70 percent of the surface of ~~the~~ Earth. • Important features of the ocean floor near the continents are the continental shelf, the continental slope, and the continental rise. These areas are covered with thick layers of sediments (sand, mud, rocks). • The depth of the ocean varies. Ocean trenches are very deep, and the continental shelf is relatively shallow. • Ocean water is a complex mixture of gases (air) and dissolved solids (salts, especially sodium chloride). Marine organisms are dependent on dissolved gases for survival. The salinity of ocean water varies in some places depending on rates of evaporation and amount of runoff from nearby land. • The basic motions of ocean water are the waves, currents, and tides. • Ocean currents, including the Gulf Stream, are caused by wind patterns and the differences in water densities (due to salinity and temperature differences). Ocean currents affect the mixing of ocean waters. This can affect plant and animal populations. Currents also affect navigation routes. • As the depth of ocean water increases, the temperature decreases, the pressure increases, and the amount of light decreases. These factors influence the type of life forms that are present at a given depth. • Plankton are tiny free-floating organisms that live in water. Plankton may be animal-like or plant-like. Animal-like plankton are called zooplankton. Plant-like plankton (phytoplankton) carry out most of the photosynthesis on Earth. Therefore, they provide much of Earth's oxygen. Phytoplankton form the base of the ocean food web. Plankton	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~explain key terminology related to the ocean environment.~~ • create and interpret a model of the ocean floor and label and describe each of the major features. • research and describe the variation in depths associated with ocean features, including the continental shelf, slope, rise, the abyssal plain, and ocean trenches. • design an investigation (including models and simulations) related to physical characteristics of the ocean environment (depth, salinity, formation of waves, causes of tides, and currents, such as the Gulf Stream). • interpret graphical data related to physical characteristics of the ocean. • explain the formation of ocean currents and describe and locate the Gulf Stream. • design an investigation (including models and simulations) related to ~~biologic characteristics~~ ecological relationships of the ocean environment ~~(ecological relationships)~~. • interpret graphical data related to the ~~biological~~ ecological characteristics of the ocean, such as the number of organisms vs. the depth of the water. • analyze how the physical characteristics (depth, salinity, and temperature) of the ocean affect where marine organism can live.

5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include a) geological characteristics; b) physical characteristics; and c) ecological characteristics.	
~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	**Essential Knowledge, Skills, and Processes**
flourish in areas where nutrient-rich water upwells from the deep. ~~Plant-like plankton (phytoplankton) produce much of the Earth's oxygen and serve as the base of the ocean ecosystem. Plankton flourish in areas where nutrient-rich water upwells from the deep. Phytoplankton are eaten by animal-like plankton, swimming organisms, and those things organisms that live on the ocean bottom.~~	• create and interpret a model of a basic marine food web, including floating organisms (plankton), swimming organisms, and organisms living on the ocean ~~bottom~~ floor.

Grade Five
Science Strand

Earth Patterns, Cycles, and Change

This strand focuses on student understanding of patterns in nature, natural cycles, and changes that occur both quickly and slowly over time. An important idea represented in this strand is the relationship among Earth patterns, cycles, and change and their effects on living things. The topics developed include noting and measuring changes, weather and seasonal changes, the water cycle, cycles in the Earth-moon-sun system, our solar system, and change in ~~the~~ Earth's surface over time. This strand includes science standards ~~K.8,~~ K.9, K.10, 1.7, 2.7, 3.8, 3.9, 4.7, 4.8, and 5.7.

5.7	The student will investigate and understand how Earth's surface is constantly changing. Key concepts include a) identification of rock types; b) the rock cycle and how transformations between rocks occur; c) Earth history and fossil evidence; d) the basic structure of Earth's interior; e) changes in Earth's crust due to plate tectonics; f) weathering, erosion, and deposition; and g) human impact.

~~Understanding the Standard~~ Overview

This standard focuses on the constantly changing nature of ~~the~~ Earth's surface and builds on concepts learned in standards 4.6 and 4.8. Among the important ideas presented in this standard are the rock cycle, fossil evidence of change over time, energy from within ~~the~~ Earth that drives tectonic plate movement, shifting tectonic plates that cause earthquakes and volcanoes, weathering and erosion, and human interaction with ~~the~~ Earth's surface. This standard can be related to several ideas found in science standard 5.6. It is intended that students will actively develop and utilize scientific investigation, reasoning, and logic skills (5.1) in the context of the key concepts presented in this standard.

5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include

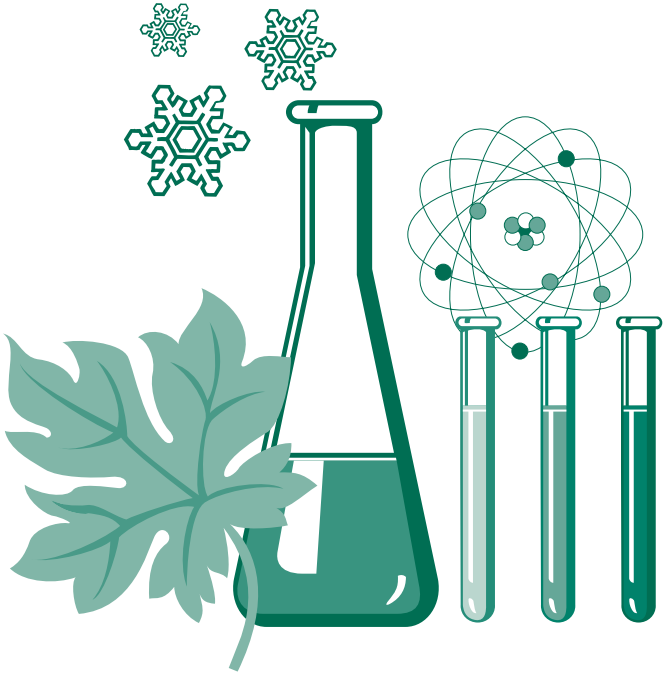
a) identification of rock types;
b) the rock cycle and how transformations between rocks occur;
c) Earth history and fossil evidence;
d) the basic structure of Earth's interior;
e) changes in Earth's crust due to plate tectonics;
f) weathering, erosion, and deposition; and
g) human impact.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
~~The concepts developed in this standard include the following:~~ • Rocks have properties that can be observed, tested, and described. Composition, grain size and textural features, color, and the presence of fossils help with identification. Classification keys (5.1) can aid this process. • Rocks move and change over time due to heat and pressure within ~~the~~ Earth and due to weathering, ~~and~~ erosion, and deposition at the surface. These and other processes constantly change rock from one type to another. • Depending on how rocks are formed, they are classified as sedimentary (layers of sediment cemented together), igneous (melted and cooled, e.g., lava and magma), and metamorphic (changed by heat and pressure). • Scientific evidence indicates ~~the~~ Earth is ~~very~~ ancient — approximately 4.6 billion years old. The age of many rocks can be determined very reliably. Fossils provide information about life and conditions of the past. • Scientific evidence indicates that ~~the~~ Earth is composed of four concentric layers — crust, mantle, ~~inner~~ outer core, and ~~outer~~ inner core — each with its own distinct characteristics. The outer two layers are composed primarily of rocky material. The innermost layers are composed mostly of iron and nickel. Pressure and temperature increase with depth beneath the surface.	In order to meet this standard, it is expected that students ~~should be able to~~ will • apply basic terminology ~~(italic print in overview)~~ to explain how ~~the~~ Earth's surface is constantly changing. • draw and label the rock cycle and describe the major processes and rock types involved. • compare and contrast the origin of igneous, sedimentary, and metamorphic rocks. • identify rock samples (granite, gneiss, slate, limestone, shale, sandstone, and coal), using a rock classification key. • make plausible inferences about changes in ~~the~~ Earth over time based on fossil evidence. This includes the presence of fossils of organisms in sedimentary rocks of Virginia found in the Appalachian~~s~~ Mountains, Piedmont, and Coastal Plain/Tidewater. • describe the structure of Earth in terms of its major layers — crust, mantle, and ~~inner~~ outer and ~~outer~~ inner cores — and how ~~the~~ Earth's interior affects the surface. • differentiate among the three types of plate tectonic boundaries (divergent, convergent, and sliding) and how these relate to the changing surface of ~~the~~ Earth and the ocean floor (5.6). • compare and contrast the origin of earthquakes and volcanoes and

5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include

a) identification of rock types;
b) the rock cycle and how transformations between rocks occur;
c) Earth history and fossil evidence;
d) the basic structure of Earth's interior;
e) changes in Earth's crust due to plate tectonics;
f) weathering, erosion, and deposition; and
g) human impact.

~~Overview~~ Understanding the Standard (Background Information for Instructor Use Only)	Essential Knowledge, Skills, and Processes
• ~~The~~ Earth's ~~heat~~ thermal energy causes movement of material within ~~the~~ Earth. Large continent-size blocks (plates) move slowly about ~~the~~ Earth's surface, driven by that ~~heat~~ thermal energy. • Most earthquakes and volcanoes are located at the boundar~~y~~ies of the plates (faults). Plates can move together (convergent boundaries), apart (divergent boundaries), or slip past each other horizontally (sliding boundaries, also called strike-slip or transform boundaries). • Geological features in the oceans (including trenches and mid-ocean ridges) and on the continents (mountain ranges, including the Appalachian Mountains) are caused by current and past plate movements. • Rocks and other materials on ~~the~~ Earth's surface are constantly being broken down both chemically and physically. The products of weathering include clay, sand, rock fragments, and soluble substances. • ~~Weathered rock m~~Material can be moved by water and wind (eroded) and deposited in new locations as sediment (deposition). • Humans have varying degrees of impact on ~~the~~ Earth's surface through their everyday activities. With careful planning, the impact on the land can be controlled.	how they affect ~~the~~ Earth's surface. • differentiate between weathering, ~~and~~ erosion, and deposition. • design an investigation to locate, chart, and report weathering, ~~and~~ erosion, and deposition at home and on the school grounds. Create a plan to solve erosion and/or deposition problems that may be found. • ~~design an investigation to determine the amount and kinds of weathered rock material found in soil.~~ • describe how people change ~~the~~ Earth's surface and how negative changes can be controlled.



Science Standards of Learning Curriculum Framework

Grade Six

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Grade Six
Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of inquiry skills that defines what a student ~~should~~will be able to do when conducting activities and investigations. The various skill categories are described in the "Investigate and Understand" section of the Introduction to the *Science Standards of Learning*, and the skills in science standards 6.1 represent more specifically what a student should be able to do as a result of science experiences in sixth grade. Across the grade levels, the skills in the "Scientific Investigation, Reasoning, and Logic" strand form a nearly continuous sequence of investigative skills. ~~(Please note Appendix, "Science Skills, Scope, & Sequence.")~~ It is important that the classroom teacher understand~~s~~ how the skills in standard 6.1 are a key part of this sequence (i.e., K.1, K.2, 1.1, 2.1, 3.1, 4.1, and 5.1). The sixth-grade curriculum should ensure that skills from preceding grades are continuously reinforced and developed.

6.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations are made involving fine discrimination between similar objects and organisms; b) precise and approximate measurements are recorded; c) scale models are used to estimate distance, volume, and quantity; d) hypotheses are stated in ways that identify the independent and dependent variables; e) a method is devised to test the validity of predictions and inferences; f) one variable is manipulated over time, using many repeated trials; g) data are collected, recorded, analyzed, and reported using metric measurements and tools; h) data are analyzed and communicated through graphical representation; i) models and simulations are designed and used to illustrate and explain phenomena and systems; and j) current applications are used to reinforce science concepts.
	~~Understanding the Standard~~ Overview The skills described in standard 6.1 are intended to define the "investigate" component of all of the other sixth-grade standards (6.2–6.9). The intent of standard 6.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed at the sixth grade. Standard 6.1 does not require a discrete unit on scientific investigation because the inquiry skills that make up the standard should be incorporated in all the other sixth-grade standards. It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science, as well as more fully grasp the content-related concepts in the standards. It is also intended that models, simulations and current applications are used throughout the course in order to learn and reinforce science concepts.

6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations are made involving fine discrimination between similar objects and organisms;
b) precise and approximate measurements are recorded;
c) scale models are used to estimate distance, volume, and quantity;
d) hypotheses are stated in ways that identify the independent and dependent variables;
e) a method is devised to test the validity of predictions and inferences;
f) one variable is manipulated over time, using many repeated trials;
g) data are collected, recorded, analyzed, and reported using metric measurements and tools;
h) data are analyzed and communicated through graphical representation;
i) models and simulations are designed and used to illustrate and explain phenomena and systems; and
j) current applications are used to reinforce science concepts.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts a) the natural world is understandable; b) science is based on evidence, both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • To communicate an observation accurately, one must provide critical details of exactly what is being observed. Using that information, students will be able to differentiate definitively between or among similar objects and/or organisms. • ~~In an effective classification system, accurate comparisons and contrasts are made.~~ • Systematic investigations require accurate measurements; however, in	In order to meet this standard, it is expected that students ~~should be able to~~ will • make connections between the components of the nature of science and their investigations and the greater body of scientific knowledge and research. • make observations that can be used to discriminate similar objects and organisms, paying attention to fine detail. • ~~develop a classification key that uses numerous characteristics.~~ • make precise and consistent measurements and estimations. • create approximate scale models to demonstrate an understanding of distance, volume, and quantity. • differentiate between independent ~~(manipulated)~~ and dependent ~~(responding)~~ variables in a hypothesis. • propose hypotheses or predictions from observed patterns. • compare and contrast predictions and inferences. Analyze and judge the evidence, observations, scientific principles, and data used in making predictions and inferences. • design an experiment in which one variable is manipulated over many

6.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations are made involving fine discrimination between similar objects and organisms;
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~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
the absence of precision tools, observers must record careful estimations. • Scale models must maintain relative values of size and/or quantity in order to maintain the integrity of the object or topic being modeled. • An experiment is a structured test of a hypothesis. A hypothesis is stated in terms of a testable relationship. • A scientific prediction is a forecast about what may happen in some future situation. It is based on the application of scientific principle and factual information. • ~~An inference is a conclusion based on evidence about events that have already occurred.~~ An inference is an explanation based on observations and background knowledge. A conclusion is formulated from collected data. For example, one might observe darkly colored pond water and make the inference that it is polluted. However, only after data are collected can a conclusion be formulated. • Patterns discerned from direct observations can be the basis for predictions or hypotheses that attempt to explain the mechanism responsible for the pattern. • Accurate observations and evidence are necessary to draw realistic and plausible conclusions. • In order to conduct an experiment, one must recognize all of the	trials. • collect, record, analyze, and report data, using metric terminology and tools. • ~~Organize~~ analyze and communicate data, using graphs (bar, line, and circle), charts, and diagrams. • design a model that explains a sequence, for example, ~~the sequence of events involved in the process of photosynthesis.~~ the sequence of events involved in the formation of a cloud.

6.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations are made involving fine discrimination between similar objects and organisms; b) precise and approximate measurements are recorded; c) scale models are used to estimate distance, volume, and quantity; d) hypotheses are stated in ways that identify the independent and dependent variables; e) a method is devised to test the validity of predictions and inferences; f) one variable is manipulated over time, using many repeated trials; g) data are collected, recorded, analyzed, and reported using metric measurements and tools; h) data are analyzed and communicated through graphical representation; i) models and simulations are designed and used to illustrate and explain phenomena and systems; and j) current applications are used to reinforce science concepts.

~~Overview~~ **Essential Understandings**	**Essential Knowledge, Skills, and Processes**
potential variables that can affect an outcome. • In a scientific investigation, data should be collected, recorded, analyzed, and reported using appropriate metric measurement and tools. • In a scientific investigation, data should be organized and communicated through appropriate graphical representation (graph, chart, table, and diagram). • Models provide a way of visually representing abstract concepts. The use of models permits students to order events or processes. • Science concepts are applied through observations and connections with everyday life and technology.	

Grade Six
Science Strand

Force, Motion, and Energy

The strand focuses on student understanding of what force, motion, and energy are and how the concepts are connected. The major topics developed in this strand include magnetism; types of motion; simple machines; and energy forms and transformations, especially electricity, sound, and light. This strand includes science standards K.3, 1.2, 2.2, 3.2, 4.2, 4.3, 5.2, 5.3, 6.2, and 6.3.

6.2	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; c) nonrenewable energy sources; d) renewable energy sources; and e) energy transformations.
	~~Understanding the Standard~~ Overview ~~Most~~ Many sources of energy on ~~the~~ Earth are the result of solar radiation~~,~~. ~~either~~ This can be energy the Earth is currently receiving or energy that has been stored as fossil fuels. ~~Heat energy also comes from the Earth's interior.~~ All energy exists in two basic forms, — kinetic and potential. Understanding the forms of energy and their transformations will provide the foundation for students to investigate the transfer of energy within living and Earth systems as well as to understand chemical reactions, force, and motion. This standard builds upon concepts of energy sources introduced in science standard 3.11. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.2 The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include
a) potential and kinetic energy;
b) the role of the sun in the formation of most energy sources on Earth;
c) nonrenewable energy sources;
d) renewable energy sources; and
e) energy transformations.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Potential energy is energy that is not "in use" and available to do work. Kinetic energy is energy that is "in use" — the energy a moving object has due to its motion. For example, moving water and wind have kinetic energy. The chemical energy in fossil fuels is potential energy until it is released. • ~~Some important sources of energy include fossil fuels, wood, wind, water (hydropower), the sun (solar energy), and the Earth's interior.~~ • Solar energy from the ancient past is stored in fossil fuels, such as coal ~~and~~, petroleum, and natural gas. Fossil fuels are rich in the elements carbon and hydrogen. These sources of energy take very long periods of time to form and once depleted, are essentially nonrenewable. Nuclear power is also a source of nonrenewable energy. • Many of ~~the~~ Earth's energy resources are available on a perpetual basis. These include solar, wind, water (hydropower, tidal and waves), biofuels and geothermal energy. Some energy sources can be replenished over relatively short periods of time. These include wood and other biomass. All are considered renewable. • Secondary sources of energy, such as electricity, are used to store, move, and deliver energy easily in usable form. Hydrogen is also a secondary source of energy, also called an energy carrier. • ~~Heat and light~~ Thermal and radiant energy can be converted into mechanical energy, chemical energy, and electrical energy and back again.	In order to meet this standard, it is expected that students ~~should be able~~ will • compare and contrast potential and kinetic energy through common examples found in the natural environment. • analyze and describe the transformations of energy involved with the formation and burning of coal and other fossil fuels. • compare and contrast renewable (solar, wind, water [hydropower, tidal and waves], biofuels, geothermal, and biomass) and nonrenewable energy sources (coal, petroleum, natural gas, nuclear power). • explain that hydrogen is not an energy source, but a means of storing and transporting energy. • design an application of the use of solar and wind energy. • chart and analyze the energy a person uses during a 24-hour period and determine the sources. • compare and contrast energy sources in terms of their origins, how they are utilized, and their availability. • analyze the advantages and disadvantages of using various energy sources and their impact on climate and the environment. • analyze and describe how the United States' energy use has changed over time. • analyze and describe sources of energy used in Virginia related to energy use nationally and globally.

6.2	The student will investigate and understand basic sources of energy, their origins, transformations, and uses. Key concepts include a) potential and kinetic energy; b) the role of the sun in the formation of most energy sources on Earth; c) nonrenewable energy sources; d) renewable energy sources; and e) energy transformations.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
	• predict the impact of unanticipated energy shortages. • comprehend and apply basic terminology related to energy sources and transformations. • create and interpret a model or diagram of an energy transformation. • design an investigation that demonstrates how light energy (radiant energy) can be ~~being~~ transformed into other forms of energy (mechanical, chemical and electrical).

6.3	The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on Earth's surface. Key concepts include a) Earth's energy budget; b) the role of radiation and convection in the distribution of energy; c) the motion of the atmosphere and the oceans; d) cloud formation; and e) the role of thermal energy in weather-related phenomena including thunderstorms and hurricanes.
	~~Understanding the Standard~~ Overview The key concepts defined in this standard are intended to expand student understanding of the effects of solar radiation entering ~~the~~ Earth's atmosphere on weather and ocean current patterns. The distribution of energy through convection and radiation are explored as students study cloud formation and movement patterns of the atmosphere and the world's oceans. This standard is closely related to standards 6.2 and 6.6 and builds on the weather concepts developed in standard 4.6 and concepts of visible light in standard 5.3. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.3 The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on Earth's surface. Key concepts include

a) Earth's energy budget;
b) the role of radiation and convection in the distribution of energy;
c) the motion of the atmosphere and the oceans;
d) cloud formation; and
e) the role of thermal energy in weather-related phenomena including thunderstorms and hurricanes.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • ~~The~~ Earth receives only a very small portion of the sun's energy, yet this energy is responsible for powering the motion of the atmosphere, the oceans, and many processes at ~~the~~ Earth's surface. • Solar radiation is made up of different types of radiation (including infrared, visible light, and ultraviolet). • Incoming solar radiation is in close balance with the energy that leaves the atmosphere; otherwise ~~the~~ Earth would heat up or cool down. Excess carbon dioxide and other gases may disrupt this balance, creating a ~~Greenhouse Effect~~ greenhouse effect. • About one-third of the sun's incoming energy is reflected back out to space. About one-half of the energy striking the Earth is absorbed by ~~the~~ Earth's surface. • ~~The~~ Earth's surface is heated unequally. • When air or water is heated, the molecules move faster and farther apart, reducing their density and causing them to rise. Cooler air or water molecules move more slowly and are denser than warm air or water. Warm air or water rising coupled with cooler air or water descending forms a cyclic rising/falling pattern called *convection*. • Radiation and convection from ~~the~~ Earth's surface transfer ~~heat~~ thermal energy. This energy powers the global circulation of the atmosphere and the oceans on our planet. • As bodies of water (oceans, lakes, rivers, etc.) absorb ~~heat~~ thermal energy, the water evaporates ~~forming clouds~~ causing the air to be warm	In order to meet this standard, it is expected that students ~~should be able to~~ will • comprehend and apply basic terminology related to solar energy, including wavelength; ultraviolet, visible, and infrared radiation; and reflection and absorption. • analyze and interpret a chart or diagram showing ~~the~~ Earth's energy budget. • analyze, model, and explain the ~~G~~greenhouse ~~E~~effect in terms of the energy entering and leaving the atmosphere. • design an investigation to determine the effect of sunlight on the heating of a surface. • analyze and explain how convection currents occur and how they distribute ~~heat~~ thermal energy in the atmosphere and oceans. • analyze the role of heating and cooling in the formation of clouds. • order the sequence of events that takes place in the formation of a cloud. • describe the relationship between thermal energy and the formation of hurricanes and thunderstorms.

6.3	The student will investigate and understand the role of solar energy in driving most natural processes within the atmosphere, the hydrosphere, and on Earth's surface. Key concepts include a) Earth's energy budget; b) the role of radiation and convection in the distribution of energy; c) the motion of the atmosphere and the oceans; d) cloud formation; and e) the role of thermal energy in weather-related phenomena including thunderstorms and hurricanes.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
and moist. Warm, moist air is less dense than cold, dry air, so it rises relative to colder, drier air. As warm, moist air rises, it ~~actually~~ gives off some ~~heat~~ thermal energy as the moisture condenses, forming clouds. Clouds are not gaseous water vapor; rather they are minute, condensed water particles. • Some thunderstorms are formed where the land is strongly heated. Hurricanes form over warm, tropical water and are fed by the energy of that water.	

Matter

This strand focuses on the description, physical properties, and basic structure of matter. The major topics developed in this strand include concepts related to the basic description of objects, states of matter (solids, liquids, and gases – especially water), phase changes, mass and volume, and the structure of classification of matter. This strand includes science standards K.4, K.5, 1.3, 2.3, 3.3, 5.4, 6.4, 6.5, and 6.6.

6.4	The student will investigate and understand that all matter is made up of atoms. Key concepts include a) atoms consist of particles, including electrons, protons, and neutrons; b) atoms of a particular element are alike but are different from atoms of other elements; c) elements may be represented by chemical symbols; d) two or more atoms interact to form new substances, which are held together by electrical forces (bonds); e) compounds may be represented by chemical formulas; f) chemical equations can be used to model chemical changes; and g) a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.
	~~Understanding the Standard~~ Overview Standard 6.4 focuses on an understanding of the basic structure of the atom, including electrons, protons, and neutrons. The concepts defined in standard 6.4 build on students' basic understanding of the ~~structure~~ concept of matter as introduced in science standards 3.3 and 5.4. Knowledge of basic chemistry concepts is fundamental to understanding the physical sciences, life processes, and Earth and environmental science ideas. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (6.1) in the context of the key concepts presented in this standard.

6.4 The student will investigate and understand that all matter is made up of atoms. Key concepts include

a) atoms consist of particles, including electrons, protons, and neutrons;
b) atoms of a particular element are alike but are different from atoms of other elements;
c) elements may be represented by chemical symbols;
d) two or more atoms interact to form new substances, which are held together by electrical forces (bonds);
e) compounds may be represented by chemical formulas;
f) chemical equations can be used to model chemical changes; and
g) a limited number of elements comprise the largest portion of the solid Earth, living matter, the oceans, and the atmosphere.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The basic structural components of ~~the~~ a typical atom are electrons, protons, and neutrons. Protons and neutrons comprise the nucleus of an atom. • An element is a form of matter made up of one type of atom. The atoms of an element are basically alike, though the number of neutrons may vary. • The atoms of one element differ from those of another element in the number of protons. • Elements can be represented by chemical symbols. • Two or more atoms of different elements may combine to form a compound. • Compounds can be represented by chemical formulas. Each different element in the compound is represented by its unique symbol. The number of each type of element in the compound (other than 1) is represented by a small number (the subscript) to the right of the element symbol. • Chemical equations can be used to model chemical changes, illustrating how elements become rearranged in a chemical reaction. • A limited number of elements, including silicon, aluminum, iron, sodium, calcium, potassium, magnesium, hydrogen, oxygen, nitrogen, and carbon, form the largest portion of the Earth's crust, living matter, the oceans, and the atmosphere.	In order to meet this standard, it is expected that students ~~should be able to~~ will • create and interpret a simplified modern model of the structure of an atom. • compare and contrast the atomic structure of two different elements. • explain that elements are represented by symbols. • identify the name and number of each element present in a simple molecule or compound, such as O_2, H_2O, CO_2, or $CaCO_3$. • model a simple chemical change with an equation and account for all atoms. Distinguish the types of elements and number of each element in the chemical equation. (Balancing equations will be further developed in Physical Science.)~~.~~ • name some of the predominant elements found in the atmosphere, the oceans, living matter, and ~~the~~ Earth's crust.

6.5	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include a) water as the universal solvent; b) the properties of water in all three phases; c) the action of water in physical and chemical weathering; d) the ability of large bodies of water to store thermal energy and moderate climate; e) the importance of water for agriculture, power generation, and public health; and f) the importance of protecting and maintaining water resources.

~~Understanding the Standard~~ Overview

Standard 6.5 is intended to develop student understanding of the unique properties of water and the importance of protecting and managing water resources. Understanding the structure, properties, and behavior of the water molecule is fundamental to understanding more complex environmental systems. Concepts like solubility, surface tension, cohesion, adhesion, density, condensation, and evaporation can be investigated to appreciate why the properties of water are critical to life processes and living things. This standard also introduces the concept of the ability of large bodies of water to moderate the climate on land. The connections between water resources and agriculture, power generation, and public health are also investigated. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include

a) water as the universal solvent;
b) the properties of water in all three phases;
c) the action of water in physical and chemical weathering;
d) the ability of large bodies of water to store thermal energy and moderate climate;
e) the importance of water for agriculture, power generation, and public health; and
f) the importance of protecting and maintaining water resources.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Among water's unique properties is that one side of each water molecule is slightly negative and the other is slightly positive. Individual water molecules, therefore, attract other water molecules like little magnets as the slightly positive portion of a water molecule is attracted to the slightly negative portion of an adjacent water molecule. In this way, water molecules "stick together." • Due to water's polar nature, ~~A~~ a large number of substances will "dissolve" in water. For this reason, water is often called the universal solvent. • Water is the only compound that commonly exists in all three states (solid, liquid, gas) on Earth. The unique properties of water are a major factor in the ability of our planet to sustain life. • Additional properties of water are its high surface tension and the large range of temperature (0–100 degrees Celsius) in which it can be found in the liquid state, as well as the fact that, unlike other substances, ~~it expands when it freezes. Ice~~ solid water is less dense than liquid water. • Water is able to absorb ~~heat~~ thermal energy without showing relatively large changes in temperature. Large bodies of water act to moderate the climate of surrounding areas by absorbing ~~heat~~ thermal energy in summer and slowly releasing that ~~heat~~ energy in the winter. For this reason, the climate near large bodies of water is slightly milder than areas without large bodies of water. • Water (rain, ice, snow) has shaped our environment by physically and	In order to meet this standard, it is expected that students ~~should be able to~~ will • comprehend and apply key terminology related to water and its properties and uses. • model and explain the shape and composition of a water molecule. • design an investigation to demonstrate the ability of water to dissolve materials. • ~~design an investigation to determine the relative density of liquid and solid water at various temperatures.~~ • ~~compare the relative densities of liquid and solid water.~~ • comprehend the adhesive and cohesive properties of water. • ~~design an investigation to determine~~ compare the effects of ~~heat on~~ adding thermal energy to the states of water. • ~~model and~~ explain why ice is less dense than liquid water. • relate the three states of water to the water cycle. • design an investigation to model the action of freezing water on rock material. • design an investigation to determine the presence of water in plant material (e.g., a fruit). • infer how the unique properties of water are key to the life processes of organisms.

6.5 The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include

a) water as the universal solvent;
b) the properties of water in all three phases;
c) the action of water in physical and chemical weathering;
d) the ability of large bodies of water to store thermal energy and moderate climate;
e) the importance of water for agriculture, power generation, and public health; and
f) the importance of protecting and maintaining water resources.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
chemically weathering rock and soil and transporting sediments. Freezing water can break rock without any change in the minerals that form the rock (physical weathering). This usually produces small particles and sand. Water with dissolved gases and other chemicals causes the minerals in rocks to be changed, leading to the deterioration of the rock (chemical weathering). • ~~Scientific evidence indicates that the Earth formed about four-and-a-half billion years ago from the dust and debris orbiting the sun. Due to gravity, this debris became compacted and grew quite hot, creating hot gases, including water vapor and carbon dioxide. Over millions of years, the Earth and its gases cooled, and seas are believed to have formed when the Earth cooled enough for water vapor in the atmosphere to condense.~~ • Most of Earth's water is salt water in the oceans (97 percent). ~~Available n~~Nonfrozen, fresh water makes up less than 1 percent of the water on Earth. • ~~Water occurs on Earth in oceans, lakes, rivers, streams, and in rock layers underground called aquifers. A large amount of water is also found in the bodies of living things.~~ • ~~The first human settlements were established near springs, rivers, and lakes. Reliable fresh water sources and irrigation systems allowed civilizations to grow and flourish. As cities grew, different strategies (tunnels, aqueducts, wells, cisterns, pumps, reservoirs) were employed to collect water.~~ • Water is essential for agriculture. Crops watered by reliable irrigation systems are more productive~~,~~ and harvests more dependable.	• design an investigation to model the action of acidified water on building materials such as concrete, limestone, or marble. • chart, record, and describe evidence of chemical weathering in the local environment. • analyze and explain the difference in average winter temperatures among areas in central and western Virginia and cities and counties along the Chesapeake Bay and Atlantic coast. • explain the role of water in power generation. • describe the importance of careful management of water resources.

6.5	The student will investigate and understand the unique properties and characteristics of water and its roles in the natural and human-made environment. Key concepts include a) water as the universal solvent; b) the properties of water in all three phases; c) the action of water in physical and chemical weathering; d) the ability of large bodies of water to store thermal energy and moderate climate; e) the importance of water for agriculture, power generation, and public health; and f) the importance of protecting and maintaining water resources.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
• Water is an important resource used in power generation. Hydroelectric power plants make use of the kinetic energy of water as it flows through turbines. Water is also heated in power plants and turned to steam. The steam is used to turn turbines, which generate electricity. • In the past, streams and rivers were often used to dispose of human waste, and open sewers were common. During the mid-1800s, public health officials recognized the connection between disease outbreaks and contamination of public wells and drinking water. Advances in water treatment and sanitary sewers have helped eliminate diseases associated with human waste. • Due to water's importance in power generation, agriculture, and human health, it is important to conserve water resources.	

6.6	The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. Key concepts include a) air as a mixture of gaseous elements and compounds; b) pressure, temperature, and humidity; c) atmospheric changes with altitude; d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality; e) the relationship of atmospheric measures and weather conditions; and f) basic information from weather maps, including fronts, systems, and basic measurements.
	Understanding the Standard Standard 6.6 is intended to provide students with a basic understanding of the properties of air, the structure of the atmosphere, weather, and air quality. Students need to understand there are both natural and human-caused changes to the atmosphere and that the results of these changes are not yet fully known. A basic understanding of weather and weather prediction builds on the key concepts in standard 4.6. Standard 6.6 also focuses on student understanding of air quality as an important parameter of human and environmental health. It is important to make the obvious connections between this standard and the other sixth-grade standards. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.6 The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. Key concepts include
a) air as a mixture of gaseous elements and compounds;
b) pressure, temperature, and humidity;
c) atmospheric changes with altitude;
d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality;
e) the relationship of atmospheric measures and weather conditions; and
f) basic information from weather maps, including fronts, systems, and basic measurements.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Air is a mixture of gaseous elements and compounds. These include nitrogen, oxygen, water, argon and carbon dioxide. Nitrogen makes up the largest proportion of air. • Air exerts pressure. Air pressure decreases as altitude increases. • Moisture in the air is called humidity. • The atmosphere is made up of layers (troposphere, stratosphere, mesosphere, and thermosphere) that have distinct characteristics. • Temperature decreases as altitude increases in the lowest layer of the atmosphere. • Most of the air that makes up the atmosphere is found in the troposphere (the lowest layer). Virtually all weather takes place there. • Forest fires and volcanic eruptions are two natural processes that affect ~~the~~ Earth's atmosphere. Many gaseous compounds and particles are released into the atmosphere by human activity. All of the effects of these materials are not yet fully understood. • The amounts of ~~heat~~ thermal energy and water vapor in the air and the pressure of the air largely determine what the weather conditions are. • Clouds are important indicators of atmospheric conditions. Clouds are found at various levels within the troposphere. Three major types of clouds are cumulus, stratus, and cirrus. • Ozone, a form of oxygen, can form near the surface when exhaust pollutants react with sunlight. This pollutant can cause health problems.	In order to meet this standard, it is expected that students ~~should be able to~~ will • comprehend and apply basic terminology related to air and the atmosphere. • identify the composition and physical characteristics of the atmosphere. • analyze and interpret charts and graphs of the atmosphere in terms of temperature and pressure. • measure and record air temperature, air pressure, and humidity, using appropriate units of measurement and tools. • analyze and explain some of the effects that natural events and human activities may have on weather, atmosphere, and climate. • evaluate their own roles in protecting air quality. • design an investigation to relate temperature, barometric pressure, and humidity to changing weather conditions. • compare and contrast cloud types and relate cloud types to weather conditions. • compare and contrast types of precipitation. • compare and contrast weather-related phenomena, including thunderstorms, tornadoes, hurricanes, and drought. • interpret basic weather maps and make forecasts based on the information presented.

6.6	The student will investigate and understand the properties of air and the structure and dynamics of Earth's atmosphere. Key concepts include a) air as a mixture of gaseous elements and compounds; b) pressure, temperature, and humidity; c) atmospheric changes with altitude; d) natural and human-caused changes to the atmosphere and the importance of protecting and maintaining air quality; e) the relationship of atmospheric measures and weather conditions; and f) basic information from weather maps, including fronts, systems, and basic measurements.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
Naturally occurring ozone is also found in the upper atmosphere and helps to shield ~~the~~ Earth from ultraviolet radiation. • Maintaining good air quality is a crucial goal for modern society, and it is everyone's responsibility to work toward it. • Weather maps show much useful information about descriptive air measurements, observations, and boundaries between air masses (fronts). The curved lines showing areas of equal air pressure and temperature are key features of weather maps. Weather maps are important for understanding and predicting the weather.	• map the movement of cold and warm fronts and interpret their effects on observable weather conditions.

Grade Six
Science Strand

Living Systems

The strand begins in second grade and builds from basic to more complex understandings of a system, both at the ecosystem level and at the level of the cell. The concept of kingdoms of organisms and a general classification of organisms are also presented. The other major topics developed in the strand include the types of relationships among organisms in a food chain, different types of environments and the organisms they support, and the relationship between organisms and their nonliving environment. This strand includes science standards 2.5, 3.5, 3.6, 4.5, 5.5, and 6.7.

6.7	The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include a) the health of ecosystems and the abiotic factors of a watershed; b) the location and structure of Virginia's regional watershed systems; c) divides, tributaries, river systems, and river and stream processes; d) wetlands; e) estuaries; f) major conservation, health, and safety issues associated with watersheds; and g) water monitoring and analysis using field equipment including hand-held technology.
	~~Understanding the Standard~~ Overview Standard 6.7 is intended to provide students with a basic understanding of how natural processes and human interactions impact watershed systems. This includes an understanding of the physical geography of Virginia's portions of the three major watershed systems (the Chesapeake Bay, the North Carolina sounds, and the Gulf of Mexico) and the various features associated with moving water (surface and groundwater). Wetlands have become an important focus of scientists as we learn their role in flood and erosion control as well as their importance as habitat for many species of living things. Students are introduced to major safety and conservation issues associated with watersheds and become familiar with the testing parameters and tools used in the field. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include

a) the health of ecosystems and the abiotic factors of a watershed;
b) the location and structure of Virginia's regional watershed systems;
c) divides, tributaries, river systems, and river and stream processes;
d) wetlands;
e) estuaries;
f) major conservation, health, and safety issues associated with watersheds; and
g) water monitoring and analysis using field equipment including hand-held technology.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • An ecosystem is made up of the biotic (living) community and the abiotic (nonliving) factors that affect it. The health of an ecosystem is directly related to water quality. • Abiotic factors determine ecosystem type and its distribution of plants and animals as well as the usage of land by people. Abiotic factors include water supply, topography, landforms, geology, soils, sunlight, and air quality/O_2 availability. • Human activities can alter abiotic components and thus accelerate or decelerate natural processes. For example, people can affect the rate of natural erosion. Plowing cropland can cause greater erosion, while planting trees can prevent it. Flood protection/wetland loss is another example. • A watershed is the land that water flows across or through on its way to a stream, lake, wetland, or other body of water. Areas of higher elevations, such as ridgelines and divides, separate watersheds. • The three major regional watershed~~s~~ systems in Virginia lead to the Chesapeake Bay, the North Carolina sounds, or the Gulf of Mexico. • River systems are made up of tributaries of smaller streams that join along their courses. Rivers and streams generally have wide, flat, border areas, called flood plains, onto which water spills out at times of high flow. • Rivers and streams carry and deposit sediment. As water flow decreases	In order to meet this standard, it is expected that students ~~should be able to~~ will • comprehend and apply basic terminology related to watersheds. • use topographic maps to determine the location and size of Virginia's regional watershed systems. • locate their own local watershed and the rivers and streams associated with it. • design an investigation to model the effects of stream flow on various slopes. • analyze and explain the functioning of wetlands and appraise the value of wetlands to humans. • ~~describe an example of a wetland.~~ • explain what an estuary is and why it is important to people. • propose ways to maintain water quality within a watershed. • explain the factors that affect water quality in a watershed and how those factors can affect an ecosystem. • forecast potential water-related issues that may become important in the future. • locate and critique a media article or editorial (print or electronic) concerning water use or water quality. Analyze and evaluate the science concepts involved.

6.7 The student will investigate and understand the natural processes and human interactions that affect watershed systems. Key concepts include

a) the health of ecosystems and the abiotic factors of a watershed;
b) the location and structure of Virginia's regional watershed systems;
c) divides, tributaries, river systems, and river and stream processes;
d) wetlands;
e) estuaries;
f) major conservation, health, and safety issues associated with watersheds; and
g) water monitoring and analysis using field equipment including hand-held technology.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
in speed, the size of the sediment it carries decreases. • Wetlands form the transition zone between dry land and bodies of water such as rivers, lakes, or bays. Both tidal and nontidal wetlands perform important water quality functions, including regulating runoff by storing flood waters; reducing erosion by slowing down run-off; maintaining water quality by filtering sediments, trapping nutrients, and breaking down pollutants; and recharging groundwater. They also provide food and shelter for wildlife and fish and nesting and resting areas for migratory birds. • Estuaries perform important functions, such as providing habitat for many organisms and serving as nurseries for their young. • The Chesapeake Bay is an estuary where fresh and salt water meet and are mixed by tides. It is the largest estuary in the contiguous United States and one of the most productive. • Water quality monitoring is the collection of water samples to analyze chemical and/or biological parameters. Simple parameters include pH, temperature, salinity, dissolved oxygen, turbidity, and the presence of macroinvertebrate organisms.	• argue for and against commercially developing a parcel of land containing a large wetland area. Design and defend a land-use model that minimizes negative impact. • measure, record, and analyze a variety of water quality indicators and describe what they mean to the health of an ecosystem.

Grade Six
Science Strand

Interrelationships in Earth/Space Systems

The strand focuses on student understanding of how Earth systems are connected and how ~~the~~ Earth interacts with other members of the solar system. The topics developed include shadows; relationships between the sun and ~~the~~ Earth; weather types, patterns, and instruments; properties of soil; characteristics of the ocean environment; and organization of the solar system. This strand includes science standards K.7, 1.6, 2.6, 3.7, 4.6, 4.7, 4.8, 5.6, and 6.8.

6.8	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet; g) the relationship of Earth's tilt and the seasons; h) the cause of tides; and i) the history and technology of space exploration.
	~~Understanding the Standard~~ Overview Standard 6.8 is intended to provide students with a basic understanding of the solar system~~, how it is organized,~~ and the relationships among bodies within the solar system. This standard develops an understanding of ~~the~~ Earth as part of the solar system and builds significantly on standards 3.8 ~~and,~~ 4.7, and 4.8. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and an understanding of the nature of science (6.1) in the context of the key concepts presented in this standard.

6.8 The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include

a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets;
b) relative size of and distance between planets;
c) the role of gravity;
d) revolution and rotation;
e) the mechanics of day and night and the phases of the moon;
f) the unique properties of Earth as a planet;
g) the relationship of Earth's tilt and the seasons;
h) the cause of tides; and
i) the history and technology of space exploration.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The solar system consists of the sun, moon, Earth, other planets and their moons, meteors, asteroids, and comets. Each body has its own characteristics and features. • The distance between planets and sizes of the planets var~~ies~~y greatly. The outer, "gas" planets are very large, and the four inner planets are comparatively small and rocky. • Gravity is a force that keeps the planets in motion around the sun. Gravity acts everywhere in the universe. • Planets revolve around the sun, and moons revolve around planets. A planet rotates upon an axis. • A dwarf planet revolves around the sun, and can maintain a nearly round shape as planets do, but it cannot move other objects away from its orbital neighborhood. • As ~~the~~ Earth rotates, different sides of ~~the~~ Earth face toward or away from the sun, thus causing day and night, respectively. • The phases of the moon are caused by its position relative to ~~the~~ Earth and sun. • ~~The~~ Earth is a rocky planet, extensively covered with large oceans of liquid water and having frozen ice caps in its polar regions. ~~The~~ Earth	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the ~~nine~~ planets and their relative positions from the sun. • compare the characteristics of Pluto to the planets and explain its designation as a dwarf planet. • design and interpret a scale model of the solar system. (A scale model may be a physical representation of an object or concept. It can also be a mathematical representation that uses factors such as ratios, proportions, and percentages.) • explain the role of gravity in the solar system. • compare and contrast revolution and rotation and apply these terms to the relative movements of planets and ~~moons~~ their moons. • model and describe how day and night and the phases of the moon occur. • model and describe how ~~the~~ Earth's axial tilt and its annual orbit around the sun cause the seasons. • describe the unique characteristics of planet Earth. • discuss the relationship between the gravitational pull of the moon and the cycle of tides.

6.8	The student will investigate and understand the organization of the solar system and the interactions among the various bodies that comprise it. Key concepts include a) the sun, moon, Earth, other planets and their moons, dwarf planets, meteors, asteroids, and comets; b) relative size of and distance between planets; c) the role of gravity; d) revolution and rotation; e) the mechanics of day and night and the phases of the moon; f) the unique properties of Earth as a planet; g) the relationship of Earth's tilt and the seasons; h) the cause of tides; and i) the history and technology of space exploration.

~~Overview~~ **Essential Understandings**	**Essential Knowledge, Skills, and Processes**
has a protective atmosphere consisting predominantly of nitrogen and oxygen and has a magnetic field. The atmosphere and the magnetic field help shield ~~the~~ Earth's surface from harmful solar radiation. Scientific evidence indicates that ~~the~~ Earth is about 4.5 billion years old. • Seasons are caused by a combination of the tilt of ~~the~~ Earth on its axis, the curvature of Earth's surface and, thus, the angle at which sunlight strikes the surface of ~~the~~ Earth during its annual revolution around the sun. • Tides are the result of the gravitational pull of the moon and sun on the surface waters of ~~the~~ Earth. • The ideas of Ptolemy, Aristotle, Copernicus, and Galileo contributed to the development of our understanding of the solar system. • With the development of new technology over the last half-century, our knowledge of the solar system has increased substantially.	• compare and contrast the ideas of Ptolemy, Aristotle, Copernicus, and Galileo related to the solar system. • create and interpret a timeline highlighting the advancements in solar system exploration over the past half century. This should include information on the first modern rockets, artificial satellites, orbital missions, missions to the moon, Mars robotic explorers, and exploration of the outer planets.

Grade Six
Science Strand

Earth Resources

The strand focuses on student understanding of the role of resources in the natural world and how people can utilize those resources in a sustainable way. An important idea represented in this strand is the ~~concept of management of resource use~~ importance of managing resources. This begins with basic ideas of conservation and proceeds to more abstract consideration of costs and benefits. The topics developed include conservation of materials, soil and plants as resources, energy use, water, Virginia's resources, and how public policy impacts the environment. This strand includes science standards ~~K.10~~ K.11, 1.8, 2.8, 3.10, 3.11, ~~4.8~~ 4.9, and 6.9.

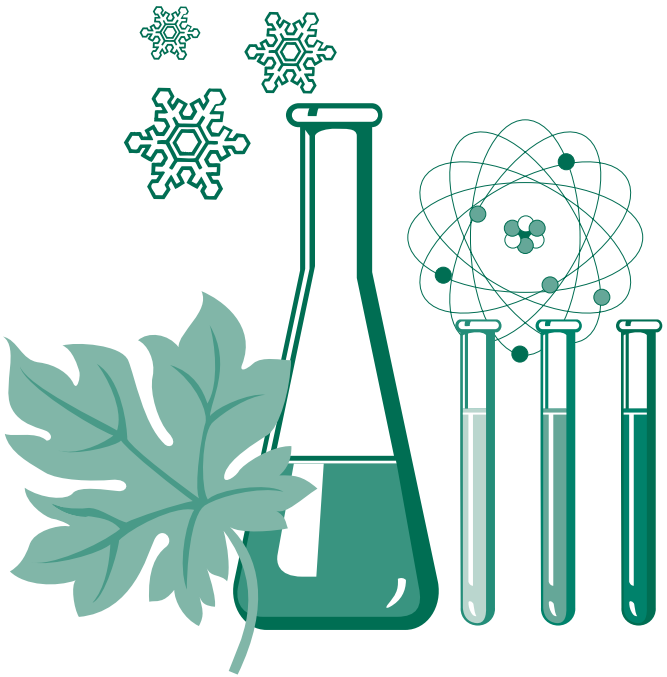
6.9	The student will investigate and understand public policy decisions relating to the environment. Key concepts include a) management of renewable resources; b) management of nonrenewable resources; c) the mitigation of land-use and environmental hazards through preventive measures; and d) cost/benefit tradeoffs in conservation policies.
	~~Understanding the Standard~~ Overview Standard 6.9 is intended to develop student understanding of the importance of ~~the~~ Earth's natural resources, the need to manage them, how they are managed, and the analysis of costs and benefits in making decisions about those resources. It applies and builds on the concepts described in several lower grades, especially science standard 4.~~8~~9. Knowledge gained from this standard will be important to understanding numerous concepts in Life Science and Earth Science. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (6.1) in the context of the key concepts presented in this standard.

6.9 The student will investigate and understand public policy decisions relating to the environment. Key concepts include
a) management of renewable resources;
b) management of nonrenewable resources;
c) the mitigation of land-use and environmental hazards through preventive measures; and
d) cost/benefit tradeoffs in conservation policies.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • People, as well as other living organisms, are dependent upon the availability of clean water and air and a healthy environment. • Local, state, and federal governments have significant roles in managing and protecting air, water, plant, and wildlife resources. • ~~Modern society is dependent upon many finite resources, including coal, oil, natural gas, and nuclear power.~~ • Modern industrial society is dependent upon energy. Fossil fuels are the major sources of energy in developed and industrialized nations and should be managed to minimize adverse impacts. • Many renewable and nonrenewable resources are managed by the private sector (private individuals and corporations). • Renewable resources should be managed so that they produce continuously. Sustainable development makes decisions about long-term use of the land and natural resources for maximum community benefit for the longest time and with the least environmental damage. • Regulations, incentives, and voluntary efforts help conserve resources and protect environmental quality. • Conservation of resources and environmental protection begin with ~~the~~ individual acts of stewardship. • Use of renewable (water, air, soil, plant life, animal life) and nonrenewable resources (coal, oil, natural gas, nuclear power, and mineral resources) must be considered in terms of their cost/benefit tradeoffs. • Preventive measures, such as pollution prevention or thoughtfully	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between renewable and nonrenewable resources. • describe the role of local and state conservation professionals in managing natural resources. These include wildlife protection; forestry and waste management; and air, water, and soil conservation. • analyze resource-use options in everyday activities and determine how personal choices have costs and benefits related to the generation of waste. • analyze how renewable and nonrenewable resources are used and managed within the home, school, and community. • analyze reports, media articles, and other narrative materials related to waste management and resource use to determine various perspectives concerning the costs/benefits in real-life situations. • evaluate the impact of resource use, waste management, and pollution prevention in the school and home environment.

6.9	The student will investigate and understand public policy decisions relating to the environment. Key concepts include a) management of renewable resources; b) management of nonrenewable resources; c) the mitigation of land-use and environmental hazards through preventive measures; and d) cost/benefit tradeoffs in conservation policies.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
planned and enforced land-use restrictions, can reduce the impact of potential problems in the future. • Pollution prevention and waste management are less costly than cleanup.	



Science Standards of Learning Curriculum Framework

Life Science

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

School divisions should use the Science Curriculum Framework as a resource for developing sound curricular and instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard LS.1

LS.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) data are organized into tables showing repeated trials and means; b) a classification system is developed based on multiple attributes; c) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data; d) models and simulations are constructed and used to illustrate and explain phenomena; e) sources of experimental error are identified; f) dependent variables, independent variables, and constants are identified; g) variables are controlled to test hypotheses and trials are repeated; h) data are organized, communicated through graphical representation, interpreted, and used to make predictions; i) patterns are identified in data and are interpreted and evaluated; and j) current applications are used to reinforce life science concepts.
	~~Understanding the Standard~~ Overview The skills described in standard LS.1 are intended to define the "investigate" component of all of the other Life Science standards (LS.2–LS.14). The intent of standard LS.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed in the Life Science course. This does not preclude explicit instruction on a particular inquiry skill or skills, but standard LS.1 does not require a discrete unit on scientific investigation. It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science, as well as more fully grasp the content-related concepts. Models, simulations and current applications should be used throughout the course in order to learn and reinforce science concepts. Across the grade levels, kindergarten through high school, the skills in the first standards form a nearly continuous sequence. ~~(Please note Appendix, "Science Skills Scope & Sequence.")~~ It is very important that the Life Science teacher be familiar with the skills in the sequence leading up to standard LS.1 (6.1, 5.1, 4.1).

Standard LS.1

LS.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) data are organized into tables showing repeated trials and means; b) a classification system is developed based on multiple attributes; c) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data; d) models and simulations are constructed and used to illustrate and explain phenomena; e) sources of experimental error are identified; f) dependent variables, independent variables, and constants are identified; g) variables are controlled to test hypotheses and trials are repeated; h) data are organized, communicated through graphical representation, interpreted, and used to make predictions; i) patterns are identified in data and are interpreted and evaluated; and j) current applications are used to reinforce life science concepts.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts a) the natural world is understandable; b) science is based on evidence - both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • Expected results are reflected in the organization of ~~the~~ a data table, which includes areas to record the number of repeated trials, levels of the independent variable, measured results for the dependent variable, and analysis of the results by calculation of ~~the~~ mathematical means. • Scientists create and apply classification systems to organize information and discern patterns.	In order to meet this standard, it is expected that students ~~should be able to~~ will • make connections between the components of the nature of science and their investigations and the greater body of scientific knowledge and research. • design a data table ~~that includes space~~ to organize all components of an investigation in a meaningful way ~~including levels of the independent variable, measured responses of the dependent variable, number of trials, and mathematical means~~. • develop and use a classification system that uses numerous attributes to organize information and discern patterns. • select and use appropriate tools and techniques for collecting qualitative and quantitative data ~~and record measurements (volume, mass, and distance) in metric units~~ in classroom and field investigations. • create and use mental and physical ~~and mental~~ models (including simulations) as ways to visualize explanations of ideas and phenomena. • identify potential sources of error in the design of an experiment. • evaluate the design of an experiment and the events that occur during an investigation to determine which factors may affect the results of the experiment. This requires students to examine the experimental procedure and decide where or if they have made mistakes.

Standard LS.1

LS.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) data are organized into tables showing repeated trials and means; b) a classification system is developed based on multiple attributes; c) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data; d) models and simulations are constructed and used to illustrate and explain phenomena; e) sources of experimental error are identified; f) dependent variables, independent variables, and constants are identified; g) variables are controlled to test hypotheses and trials are repeated; h) data are organized, communicated through graphical representation, interpreted, and used to make predictions; i) patterns are identified in data and are interpreted and evaluated; and j) current applications are used to reinforce life science concepts.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
• Appropriate tools and techniques are used to gather data during scientific investigations. Measurements are collected using the ~~Investigations will use~~ International System of Units (metric units) of measurement. • Mental and physical models, including computer and other simulations, can be helpful in explaining events or sequences of events that occur. They can be used as part of scientific explanations to support data or represent phenomena, especially those that are not easily seen directly or must be inferred from data. • Potential sources of error in the experimental design must be identified. • To communicate the plan of an experiment accurately, the independent variable, dependent variable, and constants must be explicitly defined. • ~~Systematic investigations require a hypothesis stated in such a way that it identifies the independent variable (parameter that is deliberately changed), the dependent variable (the response that can be measured or observed because of changes in the independent variable), and the relationship between them.~~ • To establish that the events of an experiment are the result of manipulating the independent variable, the experiment must be controlled by observing the effects without the application of the	• identify what is deliberately changed in the experiment and what is to be measured as the dependent ~~(responding)~~ variable. • analyze the variables in an experiment and decide which ones must be held constant (not allowed to change) in order for the investigation to represent a fair test. This requires students to comprehend what "variables" are and to apply that idea in new situations related to the Life Science SOL concepts. • determine the specific component of an experiment to be changed as an independent variable and control the experiment by conducting trials for the experiment in which the independent variable is *not* applied. This requires the student to set up a standard to which the experimental results can be compared. The student must use the results of the controlled trials to determine whether the hypothesized results were indeed due to the independent variable. • construct appropriate graphs, using data sets from experiments. This requires the student to recognize that a line graph is most appropriate for reporting continuous or real-time data. This also requires a student to comprehend that points along the line that are not actual data points can be used to make predictions. Students should be able to interpret and analyze these graphs. • distinguish between observational and experimental investigations. • develop conclusions based on a data set and verify whether the data set

Standard LS.1

LS.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) data are organized into tables showing repeated trials and means; b) a classification system is developed based on multiple attributes; c) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, and probeware are used to gather data; d) models and simulations are constructed and used to illustrate and explain phenomena; e) sources of experimental error are identified; f) dependent variables, independent variables, and constants are identified; g) variables are controlled to test hypotheses and trials are repeated; h) data are organized, communicated through graphical representation, interpreted, and used to make predictions; i) patterns are identified in data and are interpreted and evaluated; and j) current applications are used to reinforce life science concepts.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
independent variable. The results can be compared with this standard or control. Not all experiments have a control. • Multiple trials of an experiment must be conducted to verify the results. • Analysis of observed results of systematic investigations includes construction and interpretation of graphs. Such interpretation can be used to make predictions about the behavior of the dependent variable in other situations and to explore potential sources of error in the experiment. This analysis can be used to support conclusions about the results of the investigation. • Investigations can be classified as *observational* (descriptive) *studies* (intended to generate hypotheses), or *experimental studies* (intended to test hypotheses). • ~~Experimental studies sometimes follow a sequence of steps known as the Scientific Method: stating the problem, forming a hypothesis, testing the hypothesis, recording and analyzing data, stating a conclusion. However, there is no single scientific method. Science requires different abilities and procedures depending on such factors as the field of study and type of investigation.~~ • Science concepts are applied through observations and connections with everyday life and technology.	truly supports the conclusion. This requires students to cite references to the data that specifically support their conclusions. • ~~identify, describe, and apply the generalized steps of experimental (scientific) methodology.~~

Standard LS.2

LS.2	The student will investigate and understand that all living things are composed of cells. Key concepts include a) cell structure and organelles; b) similarities and differences between plant and animal cells; c) development of cell theory; and d) cell division.
	~~Understanding the Standard~~ Overview This standard builds on the general concept in science standard 5.5 that states that living things are made of cells ~~that have different parts~~. The emphasis here is on the concept that cells are the unit of structure and function of living things and on the concept of subcellular components, or organelles, each with a particular structure and function. The historical contributions of many scientists to the establishment of the cell theory are also important for students to understand. This standard also introduces students to the concept of cell division. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.2

LS.2	The student will investigate and understand that all living things are composed of cells. Key concepts include a) cell structure and organelles; b) similarities and differences between plant and animal cells; c) development of cell theory; and d) cell division.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The structure of a cell organelle ~~reflects~~ is suited to the ~~job or~~ function carried out by that organelle. Division of labor within a cell is essential to the overall successful function of the cell. • Similarities and differences in plants and animals are evident at the cellular level. Plant and animal cells contain some of the same organelles and some that differ. • The original cell theory includes the following components: all living things are composed of cells~~,~~; cells are the smallest unit (structure) of living things that can perform the processes (functions) necessary for life~~,~~; and living cells come only from other living cells. (Although it is appropriate for students at this level to understand the three points of the original cell theory, an exploration of the revised cell theory should be reserved for high school Biology.) • The development of the original cell theory can be attributed to the major discoveries of many notable scientists. The development of the cell theory has been dependent upon improvements in the microscope and microscopic techniques throughout the last four centuries. • Continuing advances in microscopes and instrumentation have increased the understanding of cell organelles and their functions. Many of these organelles can now be observed with a ~~compound light~~ microscope (light, electron). • Cells go through a life cycle known as the cell cycle. The phases of the cell cycle are interphase, mitosis, and cytokinesis. (Although it is appropriate for students at this level to learn to recognize the stages of the cell cycle and mitosis, an exploration of the individual stages of meiosis may be reserved for high school Biology.)	In order to meet this standard, it is expected that students ~~should be able to~~ will • distinguish among the following: cell membrane, cytoplasm, nucleus, cell wall, vacuole, mitochondrion, endoplasmic reticulum, and chloroplast. • correlate the structures of cell organelles with their ~~jobs~~ functions ~~and analyze how organelles perform particular jobs~~. • compare and contrast examples of plant and animal cells, using the light microscope and images obtained from other microscopes. • describe and sequence the major points in the development of the cell theory. • identify the three components of the original cell theory. • sequence the steps in the cell cycle, including the phases of mitosis. • differentiate between the purpose of mitosis and meiosis. • design an investigation from a testable question related to animal and plant cells. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. An example of such a question is: "Do onion cells vary in shape or structure depending on where they are found in the plant?" • ~~analyze and critique the experimental design of basic investigations related to animal and plant cells. This analysis and critique should focus on the skills developed in LS.1. Major emphases should include the following: the clarity of predictions and hypotheses, the organization of data tables, the use of metric measures, adequacy of~~

Standard LS.2

LS.2	The student will investigate and understand that all living things are composed of cells. Key concepts include a) cell structure and organelles; b) similarities and differences between plant and animal cells; c) development of cell theory; and d) cell division.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
• The purpose of mitosis is to produce new cells for growth and repair that are identical to the parent cell. The purpose of meiosis is to produce reproductive (sex) cells that carry half the genetic material of the parent.	~~trials and samples, the identification and use of variables, the identification of constants, the use of controls, displays of graphical data, and the support for conclusions.~~

Standard LS.3

LS.3	The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; and b) patterns of cellular organization and their relationship to life processes in living things.
	~~Understanding the Standard~~ Overview This standard emphasizes the fact that among living organisms, there is a universality of the functions that maintain life. This standard continues to build upon students' knowledge of these functions and introduces students to the process of cellular transport. With the exception of the structures associated with plant reproduction, which are highlighted in 4.4, this is the students' introduction to the specific structures of plants and animals that enable them to perform life functions. Students are introduced to the concepts of unicellular and multicellular organisms and division of labor. This standard is not intended to require student understanding of the details of human body systems. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.3

LS.3	The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; and b) patterns of cellular organization and their relationship to life processes in living things.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Cells that have the same function group together to form tissues. Tissues that have the same function group together to form organs. Organs with similar functions group to work together in an organ system. • Unicellular organisms are made of only one cell. Multicellular organisms are made of many cells. • Multicellular organisms exhibit a hierarchy of cellular organization. They are complex in that there is a division of labor among the levels of this hierarchy for carrying out necessary life processes. • Cells perform numerous functions and processes including cellular respiration, waste breakdown and removal, growth and division, ~~irritability~~, and ~~reproduction~~ cellular transport. • Osmosis is the passive transport of water molecules across a cell membrane. Diffusion is the passive transport of substances other than water across a cell membrane. Cell membranes are selectively permeable to various substances. (A discussion of facilitated diffusion, tonicity, and active transport should be reserved for high school Biology.) • Living things carry out life processes including ingestion, digestion and removal of waste, stimulus response, growth and repair, gas exchange, and reproduction. • Numerous factors can strongly influence the life processes of organisms.	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~differentiate~~ explain the relationship among cells, tissue, organs, and organ~~s~~ systems. • differentiate between unicellular organisms and multicellular organisms and name common examples of each. • compare and contrast how unicellular and multicellular organisms perform various life functions. This includes the application of knowledge about systems in organisms. • ~~compare and contrast the various basic life functions of an organism, including ingestion and digestion, gas exchange respiration, waste removal, growth and repair, irritability, and reproduction~~ explain the role that each life function serves for an organism: ingestion, digestion and removal of waste, stimulus response, growth and repair, gas exchange, and reproduction. • explain that there is a specific range or continuum of conditions that will meet the needs of organisms. • model how materials move into and out of cells in the processes of osmosis, diffusion, and ~~active transport~~ selective permeability. This includes creating and interpreting three-dimensional models and/or illustrations demonstrating the processes involved. Students should be able to analyze the components of these models and diagrams and communicate their observations and conclusions. • create plausible hypotheses about the effects that changes in available materials might have on particular life processes in plants and in animals. • ~~analyze and critique the experimental design of~~ conduct basic investigations related to understanding cellular organization, with

Standard LS.3

LS.3	The student will investigate and understand that living things show patterns of cellular organization. Key concepts include a) cells, tissues, organs, and systems; and b) patterns of cellular organization and their relationship to life processes in living things.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
	emphasis on observations of cells and tissue. This ~~analysis and critique~~ investigation should focus on the skills developed in LS.1. ~~Major emphases should include the following: the clarity of predictions and hypotheses, the organization of data tables, the use of metric measures, adequacy of trials and samples, the identification and use of variables, the identification of constants, the use of controls, displays of graphical data, and the support for conclusions.~~

Standard LS.4

LS.4	The student will investigate and understand how organisms can be classified. Key concepts include a) the distinguishing characteristics of domains of organisms; b) the distinguishing characteristics of kingdoms of organisms; c) the distinguishing characteristics of major animal phyla and plant divisions; and d) the characteristics that define a species.

~~Understanding the Standard~~ Overview

Classifying and grouping is a key inquiry skill, as described in the K–12 "Investigate and Understand" section of the Introduction to the *Science Standards of Learning.* Classifying is an important skill in the K–6 "Scientific Investigation, Reasoning and Logic" strand. The use of a classification key is introduced in 5.1. A key concept of 5.5 is the idea of using characteristics to group organisms into the currently recognized kingdoms.

This standard focuses on students continuing to practice classification skills within a hierarchical biological classification system. This is accomplished by analyzing similarities and differences between the structures and functions of organisms. Students should understand that scientists use classification as a tool to organize information about organisms and to gain information about related organisms. This standard does not require a detailed survey of each domain, kingdom or phylum, but rather a general overview of how organisms are grouped and a focus on a few key groups. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.4

LS.4	The student will investigate and understand how organisms can be classified. Key concepts include a) the distinguishing characteristics of domains of organisms; b) the distinguishing characteristics of kingdoms of organisms; c) the distinguishing characteristics of major animal phyla and plant divisions; and d) the characteristics that define a species.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Information about physical features and activities is arranged in a hierarchy of increasing specificity. The levels in the accepted hierarchy include domain, kingdom, phylum, class, order, family, genus and species. • Current classification systems now generally recognize the categorization of organisms into three domains, Archaea, Bacteria and Eukarya. • As living things are constantly being investigated, new attributes (physical and chemical) are revealed that affect how organisms are placed in a standard classification system. This system is the basis for scientific binomial nomenclature. • Any grouping of organisms into domains or kingdoms is based on several factors, including the presence or absence of cellular structures, such as the nucleus, mitochondria, or a cell wall; whether the organisms exist as single cells or are multicellular; and how the organisms get their food. For example, simple, single-celled organisms that are able to survive in extreme environments ~~do not have a nucleus~~ are believed to be fundamentally different from other organisms and may be classified in ~~one or even two different kingdoms~~ their own domain (Archaea). ~~Six~~ Four different kingdoms of the Eukarya domain of organisms are generally recognized by scientists today (Protista, Fungi, Plants, and Animals). • Some important animal groups (phyla) are the cnidarians, mollusks, annelids, arthropods, echinoderms, and chordates. • Four important plant groups (divisions) are the mosses, ferns, conifers, and flowering plants.	In order to meet this standard, it is expected that students ~~should be able to~~ will • ~~compare and contrast key features and activities between organisms.~~ • classify organisms based on a comparison of key physical features and activities. • arrange organisms in a hierarchy according to similarities and differences in features. • categorize examples of organisms as representative of the kingdoms and recognize that the number of kingdoms is subject to change as new data are collected. • categorize examples of organisms as representative of the three domains (Archaea, Bacteria and Eukarya) and recognize that the number of domains is subject to change as new data are collected. • ~~recognize that the number of kingdoms is subject to change.~~ • recognize examples of major animal phyla. • recognize examples of major plant ~~phyla~~ ~~(~~divisions~~)~~. • recognize scientific names as part of a binomial nomenclature.

Standard LS.4

LS.4	The student will investigate and understand how organisms can be classified. Key concepts include a) the distinguishing characteristics of domains of organisms; b) the distinguishing characteristics of kingdoms of organisms; c) the distinguishing characteristics of major animal phyla and plant divisions; and d) the characteristics that define a species.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
• A group of similar-looking organisms that can interbreed under natural conditions and produce offspring that are capable of reproduction defines a species.	

Standard LS.5

LS.5	The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include a) energy transfer between sunlight and chlorophyll; b) transformation of water and carbon dioxide into sugar and oxygen; and c) photosynthesis as the foundation of virtually all food webs.
	~~Understanding the Standard~~ Overview Students learn in 4.4 that photosynthesis is a basic life process of plants requiring chlorophyll and carbon dioxide. This standard pulls these ideas together to demonstrate the complexity and importance of photosynthesis. Energy enters food webs through photosynthesis and is then transferred throughout the food web. It is crucial that students understand the importance of plants (and other photosynthesizing organisms) in this role of providing energy to all other living things. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.5

LS.5	The student will investigate and understand the basic physical and chemical processes of photosynthesis and its importance to plant and animal life. Key concepts include a) energy transfer between sunlight and chlorophyll; b) transformation of water and carbon dioxide into sugar and oxygen; and c) photosynthesis as the foundation of virtually all food webs.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Chlorophyll is a chemical in chloroplasts that can absorb or trap light energy. • Photosynthesis is the necessary life process that transforms light energy into chemical energy. It involves a series of chemical reactions in which the light energy is used to change raw materials (carbon dioxide and water) into products (sugar and oxygen). The energy is stored in the chemical bonds of the glucose (sugar) molecules. • Plants perform cellular respiration as well as photosynthesis. • Plants convert the sugars they produce into other raw materials that are used by plants and animals for growth, repair, and energy needs. • Energy is a basic need of all living things. Photosynthesizing organisms obtain their energy from the sun~~. Plants and other photosynthesizing organisms~~ and are often called producers because of their ability to produce glucose (sugar). • Photosynthesizing organisms are ~~at the base of the energy pyramid~~ the foundation of virtually all food webs.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the process of photosynthesis in terms of raw materials and products generated. • identify and describe the cellular organelles involved in the process of photosynthesis. • explain how organisms utilize the energy stored from the products of photosynthesis. • compare and contrast the processes of photosynthesis and cellular respiration. • relate the importance of photosynthesis to the role of producers as the foundation of food webs. • design an investigation from a testable question related to photosynthesis. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. • ~~analyze and critique the experimental design of basic investigations related to photosynthesis. This analysis and critique should focus on the skills developed in LS.1. Major emphases should include the following: the clarity of predictions and hypotheses, the organization of data tables, the use of metric measures, adequacy of trials and samples, the identification and use of variables, the identification of constants, the use of controls, displays of graphical data, and the support for conclusions.~~

Standard LS.6

LS.6	The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include a) the carbon, water, and nitrogen cycles; b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; and d) energy flow in food webs and energy pyramids.
	~~Understanding the Standard~~ Overview This standard explores the *application* of the concept of interdependence between organisms and their physical environment. This concept is covered thoroughly in the K–6 standards of the Living Systems strand. The K–6 standards include the concept of interdependence (2.5)~~,~~; relationships in aquatic and terrestrial food chains, trophic levels ~~(3.5 and 6.9),~~ food webs, food pyramids and cycles (~~6.9~~ 3.5 and 4.5)~~,~~; and interactions between the living and nonliving components of an ecosystem (4.5). Terminology used in previous standards includes producer, consumer, decomposer ~~(3.5 and 6.9)~~, herbivore, omnivore, carnivore (3.5), and niche (4.5). It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.6

LS.6	The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include a) the carbon, water, and nitrogen cycles; b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; and d) energy flow in food webs and energy pyramids.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Many important elements and compounds cycle through the living and nonliving components of the environment as a chain of events that continuously repeats. • Materials are recycled and made available through the action of decomposers. • In order to understand how an ecosystem functions, one must understand the concept of a system and be able to envision models of systems. • To analyze the interactions resulting in a flow of energy and matter throughout the ecosystem, one must identify the elements of the system and interpret how energy and matter are used by each organism. • Energy enters an ecosystem through the process of photosynthesis and is passed through the system as one organism eats and is, in turn, eaten. This energy flow can be modeled through relationships expressed in food webs. • The amount of energy available to each successive trophic level (producer, first-order consumer, second-order consumer, third-order consumer) decreases. This can be modeled through an energy pyramid, in which the producers provide the broad base that supports the other interactions in the system.	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate among key processes in the water, carbon, and nitrogen cycles and ~~analyze~~ relate how organisms, from bacteria and fungi to third-order consumers, function in these cycles. • observe and identify common organisms in ecosystems and collect, record, and chart data concerning the interactions of these organisms (from observations and print and electronic resources). • classify organisms found in local ecosystems as producers or first-, second-, or third-order consumers. Design and construct models of food webs with these organisms. • observe local ecosystems and identify, measure, and classify the living and nonliving components. • identify examples of interdependence in terrestrial, freshwater, and marine ecosystems. • determine the relationship between a population's position in a food web and its size. • apply the concepts of food chains, food webs, and energy pyramids to analyze how energy and matter flow through an ecosystem. • design an investigation from a testable question related to food webs. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. • analyze and critique the experimental design of basic investigations

Standard LS.6

LS.6	The student will investigate and understand that organisms within an ecosystem are dependent on one another and on nonliving components of the environment. Key concepts include a) the carbon, water, and nitrogen cycles; b) interactions resulting in a flow of energy and matter throughout the system; c) complex relationships within terrestrial, freshwater, and marine ecosystems; and d) energy flow in food webs and energy pyramids.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
	related to food webs.

Standard LS.7

LS.7	The student will investigate and understand that interactions exist among members of a population. Key concepts include a) competition, cooperation, social hierarchy, territorial imperative; and b) influence of behavior on a population.

~~Understanding the Standard~~ Overview

This standard applies the concept that each organism exists as a member of a population and interacts with other members of that population in a variety of ways. The term population is introduced in standard 3.6 ("Living Systems" strand). Individuals of a population demonstrate various behavioral adaptations (competition, cooperation, establishment of a social hierarchy, territorial imperative), which allow the population to survive. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.7

LS.7	The student will investigate and understand that interactions exist among members of a population. Key concepts include a) competition, cooperation, social hierarchy, territorial imperative; and b) influence of behavior on a population.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Individual members of a population interact with each other. These interactions include competing with each other for basic resources, mates, ~~and~~ territory, and cooperating with each other to meet basic needs. • The establishment of a social order in a population may ~~insure~~ ensure that labor and resources are adequately shared. • The establishment of a territory ensures that members of a population have adequate habitat to provide for basic resources. • Individual behaviors and group behaviors can influence a population. • Animals exhibit needs for food, water, gases, shelter and space for which they compete. These needs may often be met in a range of conditions. Too much may be as harmful as too little (e.g., too much food or too little water).	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between the needs of the individual and the needs of a population. • interpret, analyze, and evaluate data from systematic studies and experiments concerning the interactions among members of a population. • determine the relationship between a population's position in a food web and the types of interactions seen among the individuals of the population. • observe and identify populations in ecosystems and collect, record, chart, and interpret data concerning the interactions of these organisms (from observations and print and electronic resources). • categorize behaviors as examples of competition, cooperation, social hierarchy, or territorial imperative. • ~~analyze and critique the experimental design of basic investigations related to interactions within a population. This analysis and critique should focus on the skills developed in LS.1. Major emphases should include the following: the clarity of predictions and hypotheses, the organization of data tables, the use of metric measures, adequacy of trials and samples, the identification and use of variables, the identification of constants, the use of controls, displays of graphical data, and the support for conclusions.~~

Standard LS.8

LS.8	The student will investigate and understand interactions among populations in a biological community. Key concepts include a) the relationships among producers, consumers, and decomposers in food webs; b) the relationship between predators and prey; c) competition and cooperation; d) symbiotic relationships; and e) niches.
	~~Understanding the Standard~~ Overview Life Science standard LS.~~9~~8 applies the concept of interactions between populations of different species. This standard extends the concepts of prior K–6 standards, including those concerning producers, consumers, and decomposers (3.5); predator and prey (3.6); and niches (4.5). This standard introduces the concept of symbiosis and focuses on the symbiotic relationship between parasite and host. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.8

LS.8	The student will investigate and understand interactions among populations in a biological community. Key concepts include a) the relationships among producers, consumers, and decomposers in food webs; b) the relationship between predators and prey; c) competition and cooperation; d) symbiotic relationships; and e) niches.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Organisms or populations that rely on each other for basic needs form interdependent communities. • Energy resources of a community are shared through the interactions of producers, consumers, and decomposers. • The interaction between a consumer that hunts for another consumer for food is the predator-prey relationship. • In a community, populations interact with other populations by exhibiting a variety of behaviors that aid in the survival of the population. • Organisms may exist as members of a population; populations interact with other populations in a community~~; and communities together with the physical environment form ecosystems~~. • Populations of one species may compete with populations of other species for resources. Populations of one species may also cooperate with populations of other species for resources. • A symbiotic relationship may exist between two or more organisms of different species when they live and work together. • Symbiotic relationships include mutualism (in which both organisms benefit), commensalism (in which one organism benefits and the other is unaffected), and parasitism (in which one organism benefits and the other is harmed). • Each organism fills a specific role or niche in its community.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify the populations of producers, consumers, and decomposers and describe the roles they play in their communities. • interpret, analyze, and evaluate data from systematic studies and experiments concerning the interactions of populations in an ecosystem. • predict the effect of population changes on the food web of a community. • generate predictions based on graphically represented data of predator-prey populations. • generate predictions based on graphically represented data of competition and cooperation between populations. • differentiate between the types of symbiosis and explain examples of each. • infer the niche of organisms from their physical characteristics. • design an investigation from a testable question related to interactions among populations. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis.

Standard LS.9

LS.9	The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include a) differences between ecosystems and biomes; b) characteristics of land, marine, and freshwater ecosystems; and c) adaptations that enable organisms to survive within a specific ecosystem.
	~~Understanding the Standard~~ Overview In standard LS.~~10~~9, students explore the scheme of the Earth as a group of living systems. Students are asked to distinguish between ecosystems and biomes. The teacher should be aware that in previous standards, students have explored environments as discrete units or have examined individual components. In standard 3.6 students are introduced to the concept of water environments (pond, marshland, swamp, stream, river, and ocean) and land environments (desert, grassland, rainforest, and forest). It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.9

LS.9	The student will investigate and understand how organisms adapt to biotic and abiotic factors in an ecosystem. Key concepts include a) differences between ecosystems and biomes; b) characteristics of land, marine, and freshwater ecosystems; and c) adaptations that enable organisms to survive within a specific ecosystem.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The living organisms within a specific area and their physical environment define an ecosystem. • Characteristics of land, marine, and freshwater ecosystems vary with respect to biotic and abiotic factors. • The major terrestrial ecosystems are classified into units called biomes — large regions characterized by certain conditions, including a range of climate and ecological communities adapted to those conditions. • Organisms have specific structures, functions, and behaviors that enable them to survive the biotic and abiotic conditions of the particular ecosystem in which they live. • Organisms ~~adapt~~ possess adaptations to both biotic and abiotic factors in their ecosystem that increase their chance of survival.	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between ecosystems and biomes. • recognize and give examples of major biomes: desert, forest, grassland, and tundra. • compare and contrast the biotic and abiotic characteristics of land, marine, and freshwater ecosystems. • ~~observe and describe examples of specific adaptations that organisms have which enable them to survive in a particular ecosystem.~~ • analyze and describe how specific adaptations enable ~~of~~ organisms to ~~determine how they help the species~~ survive in ~~it's~~ a particular ecosystem. • design an investigation from a testable question related to how specific adaptations of organisms allow them to survive in the presence of the ~~adapt to~~ biotic and abiotic factors in an ecosystem~~s~~. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. • ~~analyze and critique the experimental design of basic investigations related to how organisms adapt to biotic and abiotic factors in ecosystems.~~

Standard LS.10

LS.10	The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include a) phototropism, hibernation, and dormancy; b) factors that increase or decrease population size; and c) eutrophication, climate changes, and catastrophic disturbances.
	~~Understanding the Standard~~ Overview In standard LS.~~11~~10, students apply the concept of change over time to several specific situations. As conditions change, organisms, populations, communities, and ecosystems respond to those changes in order to survive. The key concepts are given in a sequence from responses of individual organisms (phototropism, hibernation, and dormancy) to responses of populations (factors that increase or decrease population size) to responses of communities or ecosystems (eutrophication, climate change, and catastrophic disturbances). The concepts of standard LS.~~11~~10 focus on the theme of change. Living units respond in various ways to change. A key concept is the understanding of the dynamic nature of living systems as they constantly respond to change. Change is referenced several times in the K–6 standards. In the "Earth Patterns, Cycles, and Change" strand, the following concepts are introduced: natural and human-made things may change over time (K.~~9~~10); temperature, light, and precipitation bring about changes (1.7); and weather and seasonal changes affect plants, animals, and their surroundings (2.7). ~~In t~~The "Life Processes" strand, ~~the following concepts are introduced: animals respond to life needs through hibernation, migration, camouflage, etc. (3.4); and basic plant processes include the responses of reproduction, photosynthesis, dormancy~~ introduces the concept that plants (3.4) and animals (4.4) satisfy life needs and respond to the environment. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.10

LS.10	The student will investigate and understand that ecosystems, communities, populations, and organisms are dynamic, change over time, and respond to daily, seasonal, and long-term changes in their environment. Key concepts include a) phototropism, hibernation, and dormancy; b) factors that increase or decrease population size; and c) eutrophication, climate changes, and catastrophic disturbances.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Organisms may exist as members of a population; populations interact with other populations in a community; and communities together with the physical environment form ecosystems. • Changes that affect organisms over time may be daily, seasonal, or long-term. • Plants may respond to light by growing toward it or away from it, a behavior known as phototropism. • Animals may respond to cold conditions with a period of lowered metabolism, a behavior known as hibernation. • Organisms may respond to adverse conditions with a period of lowered or suspended metabolism, a behavior known as dormancy. • A variety of environmental factors may cause the size of a population to increase or decrease. (This requires students to brainstorm examples of factors and predict the possible effects.) • ~~Large-scale~~ Long-term changes may affect entire communities and ecosystems. Such large-scale changes include the addition of excess nutrients to the system (eutrophication), which alters environmental balance; dramatic changes in climate; and catastrophic events, such as fire, drought, flood, and earthquakes.	In order to meet this standard, it is expected that students ~~should be able to~~ will • relate the responses of organisms to daily, seasonal, or long-term events. • differentiate between ecosystems, communities, populations, and organisms. • predict the effect of climate change on ecosystems, communities, populations, and organisms. • predict the effect of ~~large scale changes~~ eutrophication on ecosystems, communities, populations, and organisms. • compare and contrast the factors that increase or decrease population size. • classify the various types of changes that occur over time in ecosystems, communities, populations, and organisms, as long term, short term, or seasonal. • design an investigation from a testable question related to change over time in ecosystems, communities, populations, or organisms. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. • analyze and critique the experimental design of basic investigations related to change over time in ecosystems, communities, populations, and organisms.

Standard LS.11

LS.11	The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include a) food production and harvest; b) change in habitat size, quality, or structure; c) change in species competition; d) population disturbances and factors that threaten or enhance species survival; and e) environmental issues.
	~~Understanding the Standard~~ Overview In this standard, students are called upon to apply their knowledge of human interactions to interpret how these interactions affect ecosystem dynamics. In prior standards in the "Resources" strand of the K–6 standards, students explore a variety of ways in which humans interact with the environment. These include the concepts of waste management (K.~~10~~11, 1.8)~~,~~; limitations of natural resources and factors that affect environmental quality (1.8, 3.10)~~,~~; Virginia's natural resources (4.8)~~,~~; and public policy decisions relating to the environment (6.9). In this Life Science standard, the student must interpret how human populations can change the balance of nature in ecosystems. They must use their prior knowledge of resources as well as the concepts and skills learned in Life Science standards ~~LS.7 – LS.11~~ LS.6 – LS.10. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.11

LS.11	The student will investigate and understand the relationships between ecosystem dynamics and human activity. Key concepts include a) food production and harvest; b) change in habitat size, quality, or structure; c) change in species competition; d) population disturbances and factors that threaten or enhance species survival; and e) environmental issues.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • Ecosystems are dynamic systems. Humans are a natural part of the ecosystem. Humans use the ecosystem to meet their basic needs, such as to obtain food. • Human interaction can directly alter habitat size, the quality of available resources in a habitat, and the structure of habitat components. Such interactions can be positive and/or negative. • Human input can disturb the balance of populations that occur in a stable ecosystem. These disturbances may lead to a decrease or increase in a population. Since populations in an ecosystem are interdependent, these disturbances have a ripple effect throughout the ecosystem. • The interaction of humans with the dynamic ecosystem may lead to issues of concern for continued ecosystem health in areas such as water supply, air quality, energy production, and waste management.	In order to meet this standard, it is expected that students ~~should be able to~~ will • identify examples of ecosystem dynamics. • describe the relationship between human food harvest and the ecosystem. • debate the pros and cons of human land use versus ecosystem stability. • compare and contrast population disturbances that threaten and those that enhance species survival. • describe ways that human interaction has altered habitats positively and negatively. • observe the effect of human interaction in local ecosystems and collect, record, chart, and interpret data concerning the effect of interaction (from observations and print and electronic resources). • design an investigation from a testable question related to the relationships between ecosystem dynamics and human activity. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. • analyze and critique the experimental design of basic investigations related to the relationships between ecosystem dynamics and human activity.

Standard LS.12

LS.12	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; and f) historical contributions and significance of discoveries related to genetics.
	~~Understanding the Standard~~ Overview In science standard 2.7, students are introduced to the general notion that plants and animals resemble their parents. This Life Science standard is the students' introduction to genetics. It is important for the teacher to understand that the intent of this standard is to provide students with a general overview of the nature of DNA, genes, and chromosomes and the important role they play in the transmission of traits from one generation to another. Students are not expected to understand the specific chemical composition of DNA or the mechanics of transcription and translation. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.12

LS.12	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; and f) historical contributions and significance of discoveries related to genetics.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • DNA is a double helix molecule. • DNA is a molecule that includes different components — sugars, nitrogenous bases, and phosphates. The arrangement of the nitrogenous bases within the double helix forms a chemical code. • Chromosomes are strands of tightly wound DNA. Genes are sections of a chromosome that carry the code for a particular trait. An allele is an alternate form of a gene. • The basic laws of Mendelian genetics explain the transmission of most traits that can be inherited from generation to generation. • A Punnett square is a model used to predict the possible combinations of inherited factors resulting from single trait crosses. (An investigation of dihybrid crosses, multiple alleles, and incomplete dominance should be reserved for high school Biology.) • Dominant traits mask the expression (phenotype) of recessive traits. Genotype is the specific combination of dominant and recessive gene forms. • Traits that are expressed through genes can be inherited. Characteristics that are acquired through environmental influences, such as injuries or practiced skills, cannot be inherited. • In genetic engineering, the genetic code is manipulated to obtain a desired product. • Genetic engineering has numerous practical applications in medicine,	In order to meet this standard, it is expected that students ~~should be able to~~ will • recognize the appearance of DNA as double helix in shape. • explain that DNA contains coded instructions that store and pass on genetic information from one generation to the next. • explain the necessity of DNA replication for the continuity of life. • explain the relationship between genes, chromosomes, and alleles. • demonstrate variation within a single genetic trait. • distinguish between dominant and recessive traits. • distinguish between genotype and phenotype. • use Punnett squares to predict the possible combinations of inherited factors resulting from single trait crosses. • differentiate between characteristics that can be inherited and those that cannot be inherited. • identify aspects of genetic engineering and supply examples of applications. Evaluate the examples for possible controversial aspects. • describe the contributions of Mendel, Franklin, ~~and~~ Watson, and Crick to our basic understanding of genetics.

Standard LS.12

LS.12	The student will investigate and understand that organisms reproduce and transmit genetic information to new generations. Key concepts include a) the structure and role of DNA; b) the function of genes and chromosomes; c) genotypes and phenotypes; d) characteristics that can and cannot be inherited; e) genetic engineering and its applications; and f) historical contributions and significance of discoveries related to genetics.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
agriculture, and biology. • A series of contributions and discoveries led to the current level of genetic science.	

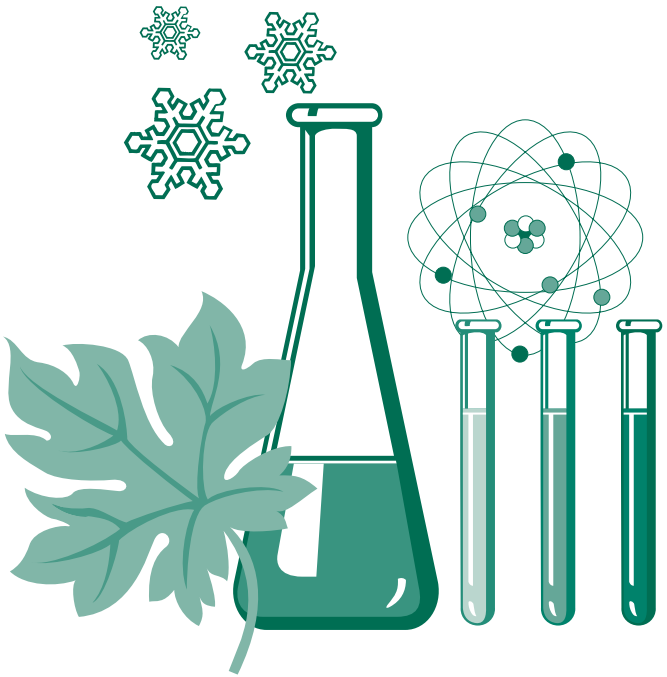
Standard LS.13

LS.13	The student will investigate and understand that populations of organisms change over time. Key concepts include a) the relationships of mutation, adaptation, natural selection, and extinction; b) evidence of evolution of different species in the fossil record; and c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.
	~~Understanding the Standard~~ Overview Standard LS.~~14~~13 explores the concept of evolution through natural selection. Species respond to changes in their environments through adaptations~~. This~~ and is a gradual process that occurs over long periods of time. The progression of these long-term changes is well documented in the fossil record. Evolution, as a big organizing principle of the life sciences, establishes order among the great variety of living things. There are many misconceptions about evolution; therefore, teachers must be careful to be accurate in their presentation of this scientific theory. One common misconception among students is that they believe that environmental influences on an organism produce changes in that organism that can be passed on to offspring. However, natural selection can only work through the genetic variation that is already present in the population. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (LS.1) in the context of the key concepts presented in this standard.

Standard LS.13

LS.13	The student will investigate and understand that populations of organisms change over time. Key concepts include a) the relationships of mutation, adaptation, natural selection, and extinction; b) evidence of evolution of different species in the fossil record; and c) how environmental influences, as well as genetic variation, can lead to diversity of organisms.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The concepts developed in this standard include the following: • The mechanisms through which evolution takes place are a related set of processes that include mutation, adaptation, natural selection, and extinction. This results in changes in populations of organisms over time. • Mutations are inheritable changes because a mutation is a change in the DNA code. • Adaptations are structures, functions, or behaviors that enable a species to survive. • Natural selection is the survival and reproduction of the individuals in a population that exhibit the traits that best enable them to survive in their environment. • A mutation may result in a favorable change or adaptation in genetic information that improves a species' ability to exist in its environment, or a mutation may result in an unfavorable change that does not improve or impedes a species' ability to exist in its environment. • The evidence for evolution is drawn from a variety of sources of data, including the fossil record, radiometric dating, genetic information, the distribution of organisms, and anatomical and developmental similarities across species. • Individuals of a population each exhibit a range of variations in a trait as a result of the variations in their genetic codes. These variations may or may not help them survive and reproduce in their environment. • If a species does not include traits that enable it to survive in its environment or to survive changes in the environment, then the species may become extinct.	In order to meet this standard, it is expected that students ~~should be able to~~ will • interpret data from simulations that demonstrate selection for a trait belonging to species in various environments. • describe how changes in the environment can bring about changes in a species (adaptation, extinction) through natural selection~~, adaptation, and extinction~~. • describe and explain how fossils are records of organisms and events in ~~the~~ Earth's history. • explain the evidence for evolution from a variety of sources of scientific data. • explain how genetic variations in offspring, which lead to variations in successive generations, can result from the same two parents. • analyze and evaluate data from investigations on variations within a local population. • explain how environmental influences, as well as genetic variation, can lead to diversity of organisms.



Science Standards of Learning Curriculum Framework

Physical Science

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard PS.1

PS.1	The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which a) chemicals and equipment are used safely; b) length, mass, volume, density, temperature, weight, and force are accurately measured; c) conversions are made among metric units, applying appropriate prefixes; d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data; e) numbers are expressed in scientific notation where appropriate; f) independent and dependent variables, constants, controls, and repeated trials are identified; g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted; h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted; i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted; j) valid conclusions are made after analyzing data; k) research methods are used to investigate practical problems and questions; l) experimental results are presented in appropriate written form; m) models and simulations are constructed and used to illustrate and explain phenomena; and n) current applications of physical science concepts are used.
	~~**Understanding the Standard**~~ **Overview** The skills described in standard PS.1 are intended to define the "investigate" component of all of the other Physical Science standards (PS.2 – PS.11). The intent of standard PS.1 is that students will continue to develop a range of inquiry skills and achieve proficiency with those skills in the context of the concepts developed in the Physical Science curriculum. Standard PS.1 does not require a discrete unit on scientific investigation because the inquiry skills that make up the standard should be incorporated in all the other Physical Science standards. It is also intended that by developing these skills, students will achieve greater understanding of scientific inquiry and the nature of science, as well as more fully grasp the content-related SOL concepts. Models, simulations, and current applications are used throughout the course in order to learn and reinforce science concepts. Across the grade levels, kindergarten through high school, the skills in the first standards form a nearly continuous sequence. ~~(Please note Appendix, "Science Skills Scope & Sequence.")~~ It is very important that the Physical Science teacher be familiar with the skills in the sequence leading up to standard PS.1 (LS.1, 6.1, 5.1, 4.1).

Standard PS.1

PS.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which

a) chemicals and equipment are used safely;
b) length, mass, volume, density, temperature, weight, and force are accurately measured;
c) conversions are made among metric units, applying appropriate prefixes;
d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data;
e) numbers are expressed in scientific notation where appropriate;
f) independent and dependent variables, constants, controls, and repeated trials are identified;
g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted;
h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted;
i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted;
j) valid conclusions are made after analyzing data;
k) research methods are used to investigate practical problems and questions;
l) experimental results are presented in appropriate written form;
m) models and simulations are constructed and used to illustrate and explain phenomena; and
n) current applications of physical science concepts are used.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts of a) the natural world is understandable; b) science is based on evidence - both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • Systematic investigations require standard measures and consistent and reliable tools. International System of Units (SI or metric) measures,	In order to meet this standard, it is expected that students ~~should be able to~~ will • make connections between the components of the nature of science and their investigations and the greater body of scientific knowledge and research. • select appropriate equipment (probeware, triple beam balances, thermometers, metric rulers, graduated cylinders, electronic balances, or spring scales) and utilize correct techniques to measure length, mass, density, weight, volume, temperature, and force. • design a data table that includes space to organize all components of an investigation in a meaningful way, including levels of the independent variable, measured responses of the dependent variable, number of trials, and mathematical means. • record measurements, using the following metric (SI) units: liter, milliliter (cubic centimeters), meter, centimeter, millimeter, grams, degrees Celsius, and newtons.

Standard PS.1

PS.1	The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which a) chemicals and equipment are used safely; b) length, mass, volume, density, temperature, weight, and force are accurately measured; c) conversions are made among metric units, applying appropriate prefixes; d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data; e) numbers are expressed in scientific notation where appropriate; f) independent and dependent variables, constants, controls, and repeated trials are identified; g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted; h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted; i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted; j) valid conclusions are made after analyzing data; k) research methods are used to investigate practical problems and questions; l) experimental results are presented in appropriate written form; m) models and simulations are constructed and used to illustrate and explain phenomena; and n) current applications of physical science concepts are used.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
recognized around the world, are a standard way to make measurements. • Systematic investigations require organized reporting of data. The way the data are displayed can make it easier to see important patterns, trends, and relationships. Frequency distributions, ~~scattergrams~~, scatterplots, line plots, and histograms are powerful tools for displaying and interpreting data. • Investigation not only involves the careful application of systematic (scientific) methodology, but also includes the review and analysis of prior research related to the topic. Numerous sources of information are available from print and electronic sources, and the researcher needs to judge the authority and credibility of the sources. • To communicate the plan of an experiment accurately, the independent variable, dependent variable, and constants must be explicitly defined. • The number of repeated trials needs to be considered in the context of the investigation. Often "controls" are used to establish a standard for comparing the results of manipulating the independent variable. Controls receive no experimental treatment. Not all experiments have a control, however.	• recognize metric prefix units and make common metric conversions between the same base metric unit (for example, nanogram to milligram ~~to gram~~ or kilometer to meter). • use a variety of graphical methods to display data; create an appropriate graph for a given set of data; and select the proper type of graph for a given set of data, identify and label the axes, and plot the data points. ~~*(Note: Frequency distributions, scattergrams, line plots, and histograms are described in the Mathematics Curriculum Framework, standard 7.17, pp. 27–29.)*~~ • gather, evaluate, and summarize information, using multiple and variable resources, and detect bias from a given source. • identify the key components of controlled experiments: hypotheses, independent and dependent variables, constants, controls, and repeated trials. • formulate conclusions that are supported by the gathered data. • apply the methodology of scientific inquiry: begin with a question, design an investigation, gather evidence, formulate an answer to the

Standard PS.1

PS.1 The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which

a) chemicals and equipment are used safely;
b) length, mass, volume, density, temperature, weight, and force are accurately measured;
c) conversions are made among metric units, applying appropriate prefixes;
d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data;
e) numbers are expressed in scientific notation where appropriate;
f) independent and dependent variables, constants, controls, and repeated trials are identified;
g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted;
h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted;
i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted;
j) valid conclusions are made after analyzing data;
k) research methods are used to investigate practical problems and questions;
l) experimental results are presented in appropriate written form;
m) models and simulations are constructed and used to illustrate and explain phenomena; and
n) current applications of physical science concepts are used.

~~Overview~~ **Essential Understandings**	**Essential Knowledge, Skills, and Processes**
• The analysis of data from a systematic investigation may provide the researcher with a basis to reach a reasonable conclusion. Conclusions should not go beyond the evidence that supports them. Additional scientific research may yield new information that affects previous conclusions. • Different kinds of problems and questions require differing approaches and research. Scientific methodology almost always begins with a question, is based on observation and evidence, and requires logic and reasoning. Not all systematic investigations are experimental. • It is important to communicate systematically the design and results of an investigation so that questions, procedures, tools, results, and conclusions can be understood and replicated. • ~~Scientists rely on creativity and imagination during all stages of their investigations.~~ • Some useful applications of physical science concepts are in the area of materials science (e.g., metals, ceramics, semi-conductors). • New discoveries based on nanoscience investigations have allowed the	original question, ~~and~~ communicate the investigative process and results~~.~~, and realize this methodology does not always follow a prescribed sequence. • communicate in written form the following information about investigations: the purpose/problem of the investigation, procedures, materials, data and/or observations, graphs, and an interpretation of the results. • describe how creativity comes into play during various stages of scientific investigations. • use current technologies to model and simulate experimental conditions.

Standard PS.1

PS.1	The student will demonstrate an understanding of scientific reasoning, logic and the nature of science by planning and conducting investigations in which a) chemicals and equipment are used safely; b) length, mass, volume, density, temperature, weight, and force are accurately measured; c) conversions are made among metric units, applying appropriate prefixes; d) triple beam and electronic balances, thermometers, metric rulers, graduated cylinders, probeware, and spring scales are used to gather data; e) numbers are expressed in scientific notation where appropriate; f) independent and dependent variables, constants, controls, and repeated trials are identified; g) data tables showing the independent and dependent variables, derived quantities, and the number of trials are constructed and interpreted; h) data tables for descriptive statistics showing specific measures of central tendency, the range of the data set, and the number of repeated trials are constructed and interpreted; i) frequency distributions, scatterplots, line plots, and histograms are constructed and interpreted; j) valid conclusions are made after analyzing data; k) research methods are used to investigate practical problems and questions; l) experimental results are presented in appropriate written form; m) models and simulations are constructed and used to illustrate and explain phenomena; and n) current applications of physical science concepts are used.

~~Overview~~ **Essential Understandings**	**Essential Knowledge, Skills, and Processes**
production of superior new materials with improved properties (e.g., computers, cell phones).	

Standard PS.2

PS.2	The student will investigate and understand the nature of matter. Key concepts include a) the particle theory of matter; b) elements, compounds, mixtures, acids, bases, and salts; c) solids, liquids, and gases; d) physical properties; e) chemical properties; and f) characteristics of types of matter based on physical and chemical properties.
	~~Understanding the Standard~~ Overview The concepts in PS.2 build upon several science standards from previous grades, including K.4, 1.3, 2.3, 3.3, 5.4, and 6.4. These standards introduce and develop basic ideas about the characteristics and structure of matter. In PS.2, the ideas and terminology continue to be expanded and treated in greater depth, including more mathematical application. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.2

PS.2 The student will investigate and understand the nature of matter. Key concepts include

a) the particle theory of matter;
b) elements, compounds, mixtures, acids, bases, and salts;
c) solids, liquids, and gases;
d) physical properties;
e) chemical properties; and
f) characteristics of types of matter based on physical and chemical properties.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Matter is anything that has mass and occupies space. All matter is made up of small particles called atoms. Matter can exist as a solid, a liquid, ~~or~~ a gas, or plasma. • Matter can be classified as elements, compounds, and mixtures. The atoms of any element are alike but are different from atoms of other elements. Compounds consist of two or more elements that are chemically combined in a fixed ratio. Mixtures also consist of two or more substances, but the substances are not chemically combined. • Compounds can be classified in several ways, including: - acids, bases, salts - inorganic and organic compounds. • Acids make up an important group of compounds that contain hydrogen ions. When acids dissolve in water, hydrogen ions (H^+) are released into the resulting solution. A base is a substance that releases hydroxide ions (OH^-) into solution. pH is a measure of the hydrogen ion concentration in a solution. The pH scale ranges from 0–14. Solutions with a pH lower than 7 are acidic; solutions with a pH greater than 7 are basic. A pH of 7 is neutral. When an acid reacts with a base, a salt is formed, along with water. • Matter can be described by its physical properties, which include shape, density, solubility, odor, melting point, boiling point, and color. Some physical properties, such as density, boiling point, and solubility, are characteristic of a specific substance and do not depend on the size of the sample. Characteristic properties can be used to identify unknown	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the particle theory of matter. • describe how to determine whether a substance is an element, compound, or mixture. • define compounds as inorganic or organic. (All organic compounds contain carbon). • describe what a salt is and explain how salts form. • describe the properties of ~~the states of matter (~~solids, liquids, and gases~~)~~. • distinguish between physical properties (i.e., shape, density, solubility, odor, melting point, boiling point, and color) and chemical properties (i.e., acidity, basicity, combustibility, and reactivity). • find the mass and volume of substances and calculate and compare their densities. • analyze the pH of a solution and classify it as acidic, basic, or neutral. • determine the identity of an unknown substance by comparing its properties to those of known substances. • design an investigation from a testable question related to physical and chemical properties of matter. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. (Students should be able to use the inquiry skills represented

Standard PS.2

PS.2	The student will investigate and understand the nature of matter. Key concepts include a) the particle theory of matter; b) elements, compounds, mixtures, acids, bases, and salts; c) solids, liquids, and gases; d) physical properties; e) chemical properties; and f) characteristics of types of matter based on physical and chemical properties.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
substances. • Equal volumes of different substances usually have different masses. • Matter can also be described by its chemical properties, which include acidity, basicity, combustibility, and reactivity. A chemical property indicates whether a substance can undergo a chemical change.	in PS.1 and LS.1 to compose a clear hypothesis, create an organized data table, identify variables and constants, record data correctly, construct appropriate graphs, analyze data, and draw reasonable conclusions.)

Standard PS.3

PS.3	The student will investigate and understand the modern and historical models of atomic structure. Key concepts include a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and b) the modern model of atomic structure.
	~~Understanding the Standard~~ Overview PS.3 builds upon science standards 3.3, 5.4, and 6.4, which introduce basic concepts and terminology related to the atom. PS.3 focuses more specifically on the basic structure of the atom and how models have been and are used to explain atomic structure. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.3

PS.3	The student will investigate and understand the modern and historical models of atomic structure. Key concepts include a) the contributions of Dalton, Thomson, Rutherford, and Bohr in understanding the atom; and b) the modern model of atomic structure.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Many scientists have contributed to our understanding of atomic structure. • The atom is the basic building block of matter and consists of subatomic particles (proton, neutron, ~~and~~ electron, and quark) that differ in their location, charge, and relative mass. Protons and neutrons are made up of smaller particles called quarks. • Size at the atomic level is measured on the nanoscale. • Scientists use models to help explain the structure of the atom. Their understanding of the structure of the atom continues to evolve. Two models commonly used are the Bohr and the "electron cloud" (Quantum Mechanics) models. The Bohr model does not depict the three-dimensional aspect of an atom, and it implies that electrons are in static orbits. The "electron cloud" model better represents our current understanding of the structure of the atom.	In order to meet this standard, it is expected that students ~~should be able to~~ will • describe the historical development of the concept of the atom and the contributions of Dalton, Thomson, Rutherford, ~~and~~ Bohr and other scientists (Schrödinger). • ~~use the Bohr model to~~ differentiate among the three basic particles in the atom (proton, neutron, and electron) and their charges, relative masses, and locations. • compare the Bohr atomic model to the electron cloud model with respect to ~~their~~ its ability to represent accurately the three-dimensional structure of the atom.

Standard PS.4

PS.4	The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include a) symbols, atomic number, atomic mass, chemical families (groups), and periods; b) classification of elements as metals, metalloids, and nonmetals; and c) formation of compounds through ionic and covalent bonding.
	~~Understanding the Standard~~ Overview PS.4 formally introduces the periodic table of elements. This standard builds upon concepts of the atom presented in science standard 6.4. Standard PS.4 focuses on a student's ability to look at the organization of the periodic table and obtain ~~learn what~~ information ~~can be obtained~~ from it. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.4

PS.4	The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include a) symbols, atomic number, atomic mass, chemical families (groups), and periods; b) classification of elements as metals, metalloids, and nonmetals; and c) formation of compounds through ionic and covalent bonding.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • There are more than 110 known elements. No element with an atomic number greater than 92 is found naturally in measurable quantities on Earth. The remaining elements are artificially produced in a laboratory setting. Elements combine in many ways to produce compounds that make up all other substances on Earth. • The periodic table of elements is a tool used to organize information about the elements. Each box in the periodic table contains information about the structure of an element. • An atom's identity is directly related to the number of protons in its nucleus. This is the basis for the arrangement of atoms on the periodic table of elements. • The vertical columns in the table are called groups or families. ~~Elements in each group have similar properties because they have the same number of electrons in the outermost energy level~~. The horizontal rows are called periods. • Elements in the same column (family) of the periodic table contain the same number of electrons in their outer energy levels. This gives rise to their similar properties and is the basis of periodicity — the repetitive pattern of properties such as boiling point across periods on the table. • The periodic table of elements is an arrangement of elements according to atomic number and properties. The information can be used to predict chemical reactivity. The boxes for all of the elements are arranged in increasing order of atomic number. The elements have an increasing nonmetallic character as one reads from left to right	In order to meet this standard, it is expected that students ~~should be able to~~ will • use the periodic table to obtain the following information about the atom of an element: - symbol - atomic number - atomic mass - state of matter at room temperature - number of outer energy level (valence) electrons. • describe the organization of the periodic table in terms of - atomic number - metals, metalloids, and nonmetals - groups/families vs. periods. • recognize that an atom's identity is related to the number of protons in its nucleus. • categorize a given element as metal, nonmetal, or metalloid. • given a chemical formula of a compound, identify the elements and the number of atoms of each that comprise the compound. • recognize that the number of electrons in the outermost energy level determines an element's chemical properties or chemical reactivity. • describe the difference between ionic and covalent bonding. • predict what kind of bond (ionic or covalent) will likely form when metals and nonmetals are chemically combined ~~chemically~~.

Standard PS.4

PS.4	The student will investigate and understand the organization and use of the periodic table of elements to obtain information. Key concepts include a) symbols, atomic number, atomic mass, chemical families (groups), and periods; b) classification of elements as metals, metalloids, and nonmetals; and c) formation of compounds through ionic and covalent bonding.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
across the table. Along the stair-step line are the metalloids, which have properties of both metals and nonmetals. • The nonmetals are located to the right of the stair-step line on the periodic table. • Metals tend to lose electrons in chemical reactions, forming positive ions. Nonmetals tend to gain electrons in chemical reactions, forming negative ions. • Gaining or losing electrons makes an atom an ion. Gaining or losing neutrons makes an atom an isotope. However, gaining or losing a proton makes an atom into a completely different element. • Atoms react to form chemically stable substances that are held together by chemical bonds and are represented by chemical formulas. To become chemically stable, atoms gain, lose, or share electrons. • Compounds are formed when elements react chemically. When a metallic element reacts with a nonmetallic element, their atoms gain and lose electrons respectively, forming ionic bonds. Generally, when two nonmetals react, atoms share electrons, forming covalent (molecular) bonds.	

Standard PS.5

PS.5	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include a) physical changes; b) chemical changes; and c) nuclear reactions.
	~~Understanding the Standard~~ Overview This standard focuses on the concept that matter and energy can be changed in different ways, but the total amount of mass and energy is conserved. Students have previously investigated physical and chemical changes. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.5

PS.5	The student will investigate and understand changes in matter and the relationship of these changes to the Law of Conservation of Matter and Energy. Key concepts include a) physical changes; b) chemical changes; and c) nuclear reactions.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Matter can undergo physical and chemical changes. In physical changes, the chemical composition of the substances does not change. In chemical changes, different substances are formed. Chemical changes are often affected by the surface area/volume ratio of the materials involved in the change. • The Law of Conservation of Matter (Mass) states that regardless of how substances within a closed system are changed, the total mass remains the same. The Law of Conservation of Energy states that energy cannot be created or destroyed but only changed from one form to another. • A chemical equation represents the changes that take place in a chemical reaction. The chemical formulas of the reactants are written on the left, an arrow indicates a change to new substances, and the chemical formulas of the products are written on the right. Chemical reactions are classified into two broad types: ones in which energy is released (exothermic) and ones in which energy is absorbed (endothermic). (The study of synthesis, decomposition, and replacement reactions can be reserved for high school ~~C~~chemistry.) • Another type of change occurs in nuclear reactions. Nuclear energy is the energy stored in the nucleus of an atom. This energy can be released by joining nuclei together (fusion) or by splitting nuclei (fission), resulting in the conversion of minute amounts of matter into energy. In nuclear reactions, a small amount of matter produces a large amount of energy. However, there are potential negative effects of using nuclear energy, including radioactive nuclear waste storage and disposal.	In order to meet this standard, it is expected that students ~~should be able to~~ will • compare and contrast physical, chemical, and nuclear changes. • identify the reactants and products in a given chemical equation formula. • design an investigation that illustrates physical and chemical changes. • given chemical formulas, write and balance simple chemical equations. • analyze experimental data to determine whether it supports the Law of Conservation of Mass. • recognize that some types of chemical reactions require continuous input of energy (endothermic) and others release energy (exothermic). • describe, in simple terms, the processes that release nuclear energy (i.e., nuclear fission and nuclear fusion). Create a simple diagram to summarize and compare and contrast these two types of nuclear energy. • evaluate the positive and negative effects of using nuclear energy.

Standard PS.6

PS.6	The student will investigate and understand forms of energy and how energy is transferred and transformed. Key concepts include a) potential and kinetic energy; and b) mechanical, chemical, electrical, thermal, radiant and nuclear energy.
	~~Understanding the Standard~~ Overview The concepts in PS.6 build upon several science standards from previous grades, including 4.2, 4.3, ~~5.3~~, 6.~~3~~2, and 6.4. These standards introduce and develop basic ideas about states and forms of energy. At the sixth-grade level, this sequence culminates with the idea about energy transformations. In PS.6, concepts about energy forms, energy transformations, and potential and kinetic energy continue to be expanded and treated in greater depth, including more mathematical application. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.6

PS.6	The student will investigate and understand forms of energy and how energy is transferred and transformed. Key concepts include a) potential and kinetic energy; and b) mechanical, chemical, electrical, thermal, radiant and nuclear energy.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Energy is the ability to do work. • Energy exists in two states. Potential energy is stored energy based on position or chemical composition. Kinetic energy is energy of motion. Students should know that the amount of potential energy associated with an object depends on its position. The amount of kinetic energy depends on the mass and velocity of the moving object. • Important forms of energy include ~~light~~ radiant, ~~heat~~ thermal, chemical, electrical, mechanical, and nuclear energy. Visible light is a form of radiant energy and ~~S~~sound is a form of mechanical energy. • Energy can be transformed from one type to another. In any energy conversion, some of the energy is lost to the environment as ~~heat~~ thermal energy.	In order to meet this standard, it is expected that students ~~should be able to~~ will • differentiate between potential and kinetic energy. • use diagrams or concrete examples to compare relative amounts of potential and kinetic energy. • identify and give examples of common forms of energy. • design an investigation or create a diagram to illustrate energy transformations.

Standard PS.7

PS.7	The student will investigate and understand temperature scales, heat, and thermal energy transfer. Key concepts include a) Celsius and Kelvin temperature scales and absolute zero; b) phase change, freezing point, melting point, boiling point, vaporization, and condensation; c) conduction, convection, and radiation; and d) applications of thermal energy transfer.
	~~**Understanding the Standard**~~ **Overview** This standard focuses on how ~~heat affects matter and how heat~~ thermal energy is transferred. Concepts introduced in previous grades and related to the states of matter are presented in standards 2.3 and 5.4. More complex concepts and terminology related to phase changes are introduced in PS.7, including the distinction between heat and temperature. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.7

PS.7 The student will investigate and understand temperature scales, heat, and thermal energy transfer. Key concepts include

a) Celsius and Kelvin temperature scales and absolute zero;
b) phase change, freezing point, melting point, boiling point, vaporization, and condensation;
c) conduction, convection, and radiation; and
d) applications of thermal energy transfer.

Overview	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Heat and temperature are not the same thing. Heat is the transfer of thermal energy between substances of different temperature. As thermal energy is added, the temperature of a substance increases. • Temperature is a measure of the average kinetic energy of the molecules of a substance. Increased temperature means greater average kinetic energy of the molecules in the substance being measured, and most substances expand when heated. The temperature of absolute zero (–273°C/0°K) is the theoretical point at which molecular motion stops. • Atoms and molecules are perpetually in motion. • The transfer of ~~heat~~ thermal energy occurs in three ways: by conduction, by convection, and by radiation. • As ~~heat~~ thermal energy is added to or taken away from a system, the temperature does not always change. There is no change in temperature during a phase change (freezing, melting, condensing, boiling, and vaporizing) as this energy is being used to make or break bonds between molecules.	In order to meet this standard, it is expected that students ~~should be able to~~ will • distinguish between heat and temperature. • compare and contrast Celsius and Kelvin temperature scales and describe absolute zero. • illustrate and explain the effect of the addition or subtraction of heat thermal energy on the motion of molecules. • analyze a time/temperature graph of a phase change experiment to determine the temperature at which the phase change occurs (freezing point, melting point, or boiling point). • compare and contrast methods of thermal energy transfer (conduction, convection, and radiation) and provide and explain common examples. • explain, in simple terms, how the principle of ~~heat~~ thermal energy transfer applies to heat engines, thermostats, ~~and~~ refrigerators, ~~and~~ heat pumps, and geothermal systems. • design an investigation from a testable question related to ~~heat~~ thermal energy transfer. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis.

Standard PS.8

PS.8	The student will investigate and understand the characteristics of sound waves. Key concepts include a) wavelength, frequency, speed, amplitude, rarefaction, and compression; b) resonance; c) the nature of compression waves; and d) technological applications of sound.
	~~Understanding the Standard~~ Overview The focus of this standard is the mechanical wave-like nature of sound and some examples of its application. Sound is introduced in science standard 5.2, and it is expected that standard PS.8 will build upon and expand the concepts of the earlier standard. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.8

PS.8	The student will investigate and understand the characteristics of sound waves. Key concepts include a) wavelength, frequency, speed, amplitude, rarefaction, and compression; b) resonance; c) the nature of compression waves; and d) technological applications of sound.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Sound is produced by vibrations and is a type of mechanical energy. Sound travels in compression waves and at a speed much slower than light. It needs a medium (solid, liquid, or gas) in which to travel. In a compression wave, matter vibrates in the same direction in which the wave travels. • All waves exhibit certain characteristics: wavelength, frequency, and amplitude. As wavelength increases, frequency decreases. • The speed of sound depends on two things: the medium through which the waves travel and the temperature of the medium. • Resonance is the tendency of a system to vibrate at maximum amplitude at certain frequencies. • A compression (longitudinal) wave consists of a repeating pattern of compressions and rarefactions. Wavelength is measured as the distance from one compression to the next compression or the distance from one rarefaction to the next rarefaction. • Reflection and interference patterns are used in ultrasonic technology, including sonar and medical diagnosis.	In order to meet this standard, it is expected that students ~~should be able to~~ will • determine the relationship between frequency and wavelength. • analyze factors that determine the speed of sound through various materials and interpret graphs and charts that display this information. • identify examples illustrating resonance (e.g., musical instruments, Tacoma Narrows Bridge, wine glasses). • model a compression (longitudinal) wave and diagram, label, and describe the basic components: wavelength, compression, rarefaction, and frequency. • describe technological applications of sound waves and generally how each application functions. • design an investigation from a testable question related to sound. The investigation may be a complete experimental design or may focus on systematic observation, description, measurement, and/or data collection and analysis. ~~(Students should be able to use the inquiry skills represented in PS.1 and LS.1 to compose a clear hypothesis, create an organized data table, identify variables and constants, record data correctly, construct appropriate graphs, analyze data, and draw reasonable conclusions.)~~

Standard PS.9

PS.9	The student will investigate and understand the characteristics of transverse waves. Key concepts include a) wavelength, frequency, speed, amplitude, crest, and trough; b) the wave behavior of light; c) images formed by lenses and mirrors; d) the electromagnetic spectrum; and e) technological applications of light.
	~~Understanding the Standard~~ Overview This standard focuses on the nature of light and its applications. It builds upon standard 5.3, in which students investigate the characteristics of visible light. Standard PS.9 introduces students to the wave behavior of light. The speed of light in a vacuum is a constant. Light can change speed and direction as a result of moving from one medium to another. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.9

PS.9	The student will investigate and understand the characteristics of transverse waves. Key concepts include a) wavelength, frequency, speed, amplitude, crest, and trough; b) the wave behavior of light; c) images formed by lenses and mirrors; d) the electromagnetic spectrum; and e) technological applications of light.

~~Overview~~ **Essential Understandings**	**Essential Knowledge, Skills, and Processes**
The critical scientific concepts developed in this standard include the following: • Visible light is a form of radiant energy that moves in transverse waves. • All transverse waves exhibit certain characteristics: wavelength, crest, trough frequency, and amplitude. As wavelength increases, frequency decreases. There is an inverse relationship between frequency and wavelength. • ~~Light~~ Radiant energy travels in straight lines until it strikes an object where it can be reflected, absorbed, or transmitted. As light waves travel through different media, they undergo a change in speed that may result in refraction. • Electromagnetic waves are arranged on the electromagnetic spectrum by wavelength. All types of electromagnetic radiation travel at the speed of light, but differ in wavelength. The electromagnetic spectrum includes gamma rays, X-rays, ultraviolet, visible light, infrared, and radio and microwaves. • Radio waves are the lowest energy waves and have the longest wavelength and the lowest frequency. Gamma rays are the highest energy waves and have the shortest wavelength and the highest frequency. Visible light lies in between and makes up only a small portion of the electromagnetic spectrum.	In order to meet this standard, it is expected that students ~~should be able~~ will • model a transverse wave and draw and label the basic components. Explain wavelength, amplitude, and frequency, crest and trough. • describe the wave ~~theories~~ behavior of visible light (refraction, reflection, diffraction, and interference). • design an investigation to illustrate the behavior of visible light – reflection and refraction. Describe how reflection and refraction occur. • identify the images formed by lenses and mirrors. • compare the various types of electromagnetic waves in terms of wavelength, frequency, and energy. • describe an everyday application of each of the major forms of electromagnetic energy.

Standard PS.10

PS.10	The student will investigate and understand the scientific principles of work, force, and motion. Key concepts include a) speed, velocity, and acceleration; b) Newton's laws of motion; c) work, force, mechanical advantage, efficiency, and power; and d) technological applications of work, force, and motion.
	~~**Understanding the Standard**~~ **Overview** PS.10 builds upon the concepts of simple machines, force, and work introduced in science standards 3.2 and 4.2. Standard PS.10 reviews and expands these basic ideas and introduces students to more mathematical concepts of motion. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.10

PS.10	The student will investigate and understand the scientific principles of work, force, and motion. Key concepts include a) speed, velocity, and acceleration; b) Newton's laws of motion; c) work, force, mechanical advantage, efficiency, and power; and d) technological applications of work, force, and motion.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Acceleration is the change in velocity per unit of time. An object moving with constant velocity has no acceleration. A decrease in velocity is negative acceleration or deceleration. A distance-time graph for acceleration is always a curve. Objects moving with circular motion are constantly accelerating because direction (and hence velocity) is constantly changing. • Newton's three laws of motion describe the motion of all common objects. • Mass and weight are not equivalent. Mass is the amount of matter in a given substance. Weight is a measure of the force due to gravity acting on a mass. Weight is measured in newtons. • A force is a push or pull. Force is measured in newtons. Force can cause objects to move, stop moving, change speed, or change direction. Speed is the change in position of an object per unit of time. Velocity may have a positive or a negative value depending on the direction of the change in position, whereas speed always has a positive value and is nondirectional. • Work is done when an object is moved through a distance in the direction of the applied force. • A simple machine is a device that makes work easier. Simple machines have different purposes: to change the effort needed (mechanical advantage), to change the direction or distance through which the force is applied, to change the speed at which the resistance moves, or a combination of these. Due to friction, the work put into a machine is always greater than the work output. The ratio of work output to work	In order to meet this standard, it is expected that students ~~should be able to~~ will • make measurements to calculate the speed of a moving object. • apply the concepts of speed, velocity, and acceleration when describing motion. • differentiate between mass and weight. • identify situations that illustrate each Law of Motion. • explain how force, mass, and acceleration are related. • apply the concept of mechanical advantage to test and explain how a machine makes work easier. • make measurements to calculate the work done on an object. • make measurements to calculate the power of an object. • solve basic problems given the following formulas: Speed = distance/time ($s = d/t$) Force = mass × acceleration ($F = ma$) Work = force × distance ($W = Fd$) Power = work/time ($P = W/t$). • explain how the concepts of work, force, and motion apply to ~~car safety technology, machines, and rockets~~ everyday uses and current technologies.

Standard PS.10

PS.10	The student will investigate and understand the scientific principles of work, force, and motion. Key concepts include a) speed, velocity, and acceleration; b) Newton's laws of motion; c) work, force, mechanical advantage, efficiency, and power; and d) technological applications of work, force, and motion.
~~Overview~~ Essential Understandings	**Essential Knowledge, Skills, and Processes**
input is called efficiency. • Mathematical formulas are used to calculate speed, force, work, and power.	

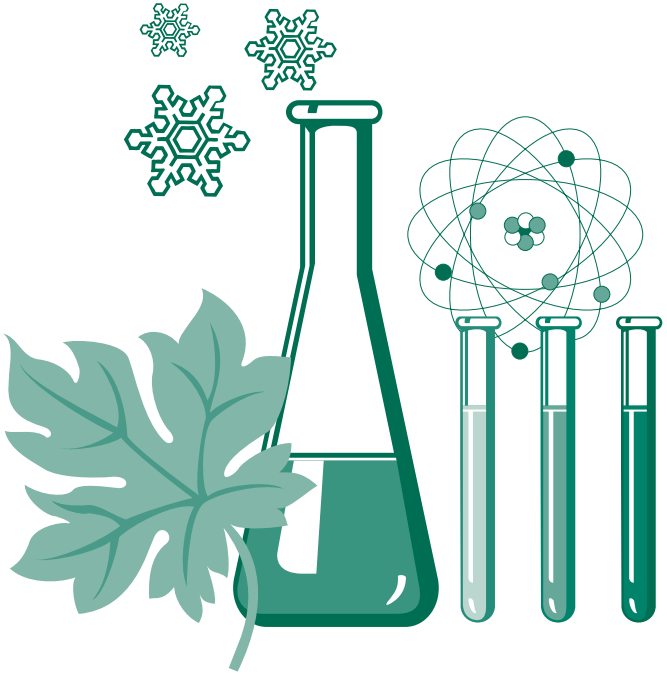
Standard PS.11

PS.11	The student will investigate and understand basic principles of electricity and magnetism. Key concepts include a) static electricity, current electricity, and circuits; b) relationship between a magnetic field and an electric current; c) electromagnets, motors, and generators and their uses; and d) conductors, semiconductors, and insulators.
	~~Understanding the Standard~~ Overview Science standards 4.3 provide students with a strong foundation in the characteristics of electricity and simple circuits. Students in fourth grade construct series and parallel circuits and make electromagnets. Standard PS.11 is intended to provide a more in-depth and mathematical focus on circuits, current, static electricity, and the relationship between electricity and magnetism. It is intended that students will actively develop scientific investigation, reasoning, and logic skills, and the nature of science (PS.1) in the context of the key concepts presented in this standard.

Standard PS.11

PS.11	The student will investigate and understand basic principles of electricity and magnetism. Key concepts include a) static electricity, current electricity, and circuits; b) relationship between a magnetic field and an electric current; c) electromagnets, motors, and generators and their uses.; and d) conductors, semiconductors, and insulators.

~~Overview~~ Essential Understandings	Essential Knowledge, Skills, and Processes
The critical scientific concepts developed in this standard include the following: • Several factors affect how much electricity can flow through a system. Resistance is a property of matter that affects the flow of electricity. Some substances have more resistance than others. • Friction can cause electrons to be transferred from one object to another. These static electrical charges can build up on an object and be discharged slowly or rapidly. This is often called static electricity. • Electricity is related to magnetism. Magnetic fields can produce electrical current in conductors. Electricity can produce a magnetic field and cause iron and steel objects to act like magnets. • Electromagnets are temporary magnets that lose their magnetism when the electric current is removed. Both a motor and a generator have magnets (or electromagnets) and a coil of wire that creates another magnetic field. • A generator is a device that converts mechanical energy into electrical energy. Most of the electrical energy we use comes from generators. Electric motors convert electrical energy into mechanical energy that is used to do work. Examples of motors include those in many household appliances, such as blenders and washing machines. • A conductor is a material that transfers an electric current well. An insulator is material that does not transfer an electric current. A semiconductor is in-between a conductor and an insulator.	In order to meet this standard, it is expected that students ~~should be able to~~ will • design an investigation to illustrate the effects of static electricity. • construct and compare series and parallel circuits. • create an electromagnet and explain how it works. • explain the relationship between a magnetic field and an electric current. • construct simple circuits to determine the relationship between voltage, resistance, and current. • compare and contrast generators and motors and how they function. • identify situations in everyday life in which motors and generators are used. • provide examples of materials that are good conductors, semiconductors, and insulators. • explain how diodes and transistors work.



Science Standards of Learning Curriculum Framework

Earth Science

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

The Curriculum Framework serves as a guide for *Standards of Learning* assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from *Standards of Learning* presented in previous grades as they build scientific expertise.

Each topic in the Science Standards of Learning Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard ES.1

ES.1 The student will plan and conduct investigations in which

a) volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools;
b) technologies, including computers, probeware, and geospatial technologies, are used to collect, analyze, and report data and to demonstrate concepts and simulate experimental conditions;
c) scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted;
d) maps and globes are read and interpreted, including location by latitude and longitude;
e) variables are manipulated with repeated trials; and
f) current applications are used to reinforce Earth science concepts.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Density expresses the relationship between mass and volume. • Information and data collected can be organized and expressed in the form of charts, graphs, and diagrams. • Scale relates to actual distance. • Topographic maps and satellite imagery are two-dimensional models that provide information defining three-dimensional landforms. They contain extensive information related to geographic as well as human structures and changes to the land surface, and are useful in understanding geologic processes. • Grid systems of latitude and longitude are used to define locations and directions on maps, globes, and charts.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • measure mass and volume of regular and irregular shaped objects and materials using common laboratory tools, including metric scales and graduated cylinders. • apply the concept of mass per unit volume and calculate density without being given a formula. • record data in systematic, properly-labeled, multicell tables, and using data, construct and interpret continuous line graphs, frequency distributions, bar graphs, and other explicating graphics that present a range of parameters, relationships, and pathways. • interpret data from a graph or table that shows changes in temperature or pressure with depth or altitude. • interpret landforms, water features, map scale, horizontal distance between points, elevation and elevation changes, latitude and longitude, human-made structures and other pertinent features on 7.5 minute quadrangles on topographic maps. • construct profiles from topographic contours. • ~~compare topographic maps of different scales.~~ • use latitude and longitude down to minutes, with correct north-south and east-west designations, to locate points on a map. • ~~construct a graph, table, chart, and/or diagram from data.~~

Standard ES.1

ES.1	The student will plan and conduct investigations in which a) volume, area, mass, elapsed time, direction, temperature, pressure, distance, density, and changes in elevation/depth are calculated utilizing the most appropriate tools; b) technologies, including computers, probeware, and geospatial technologies, are used to collect, analyze, and report data and to demonstrate concepts and simulate experimental conditions; c) scales, diagrams, charts, graphs, tables, imagery, models, and profiles are constructed and interpreted; d) maps and globes are read and interpreted, including location by latitude and longitude; e) variables are manipulated with repeated trials; and f) current applications are used to reinforce Earth science concepts.

Essential Understandings	Essential Knowledge and Skills
	• ~~interpret graphs and diagrams.~~ • ~~use scientific methodology to design and test a hypothesis.~~ • ~~locate points and directions on maps and globes, using latitude and longitude.~~ • ~~determine distance and elevation on a map.~~ • ~~identify a hilltop, stream, and valley on a topographic map.~~

Standard ES.2

ES.2 The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include

a) science explains and predicts the interactions and dynamics of complex Earth systems;
b) evidence is required to evaluate hypotheses and explanations;
c) observation and logic are essential for reaching a conclusion; and
d) evidence is evaluated for scientific theories.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the concepts a) the natural world is understandable; b) science is based on evidence - both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • Earth is a dynamic system, and all atmospheric, ~~geological~~ lithospheric, and ~~oceanographic~~ hydrospheric processes interrelate and influence one another. • A hypothesis is a tentative explanation that accounts for a set of facts and can be tested by further investigation. ~~Any valid hypothesis can be tested.~~ Only hypotheses that are testable are valid. A hypothesis can be supported, modified, or rejected based on collected data. Experiments are designed to test hypotheses. • Scientific theories are systematic sets of concepts that offer explanations for observed patterns in nature. Theories provide frameworks for relating data and guiding future research. Theories may change as new data become available. Any valid scientific theory has passed tests designed to invalidate it.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • analyze how natural processes explain multiple aspects of Earth systems and their interactions (e.g., storms, earthquakes, volcanic eruptions, floods, climate, mountain chains and landforms, geological formations and stratigraphy, fossils) can be used to make predictions of future interactions and allow scientific explanations for what has happened in the past. • make predictions, using scientific data and data analysis. • use data to support or reject a hypothesis. • differentiate between systematically-obtained, verifiable data and unfounded claims. • evaluate statements to determine if systematic science is used correctly, consistently, thoroughly, and in the proper context. • distinguish between examples of observations and inferences. • explain how ~~the scientific method~~ scientific methodology is used to ~~validate~~ support, refute, or improve scientific theories. • contrast the formal, scientific use of the term "theory" with the everyday nontechnical usage of "theory." • compare and contrast hypotheses, theories, and scientific laws. For example, students should be able to compare/contrast the Law of Superposition and the Theory of Plate Tectonics.

Standard ES.2

ES.2	The student will demonstrate an understanding of the nature of science and scientific reasoning and logic. Key concepts include a) science explains and predicts the interactions and dynamics of complex Earth systems; b) evidence is required to evaluate hypotheses and explanations; c) observation and logic are essential for reaching a conclusion; and d) evidence is evaluated for scientific theories.

Essential Understandings	Essential Knowledge and Skills
• There can be more than one scientific explanation for ~~any~~ phenomena. However, with competing explanations, generally one idea will eventually supersede the other as new tools, new observations, and verified data become available. • Changing relevant variables will generally change the outcome. • Scientific laws are generalizations of observational data that describe patterns and relationships. Laws may change as new data become available.	

Standard ES.3

ES.3 The student will investigate and understand the characteristics of Earth and the solar system. Key concepts include

a) position of Earth in the solar system;
b) sun-Earth-moon relationships (seasons, tides, and eclipses);
c) characteristics of the sun, planets and their moons, comets, meteors, and asteroids; and
d) the history and contributions of space exploration.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • ~~Earth is one of nine planets in the solar system~~. • The solar system consists of many types of celestial bodies. Earth is the third planet from the sun and is located between the sun and the asteroid belt. It has one natural satellite, the moon. Water occurs on Earth as a solid (ice), a liquid, or a gas (water vapor) due to Earth's position in the solar system. • Earth revolves around the sun, tilted on its axis~~,~~. The axial tilt is responsible for the incidence and duration of sunlight striking a given hemisphere, that varies during the Earth's revolution around the Sun, thus causing seasons. ~~(e~~Equinoxes and solstices~~)~~ represent four distinct quarterly points signaling the cyclic change of seasons. • The moon revolves around Earth creating the moon phases and eclipses. Solar eclipses occur when the moon blocks sunlight from Earth's surface, while lunar eclipses occur when Earth blocks sunlight from reaching the moon's surface. • The tides are the ~~daily,~~ periodic rise and fall of water level caused by the gravitational pull of the sun and moon. • The sun consists largely of hydrogen gas. Its energy comes from nuclear fusion of hydrogen to helium. • There are essentially two types of planets in our solar system. The four inner (terrestrial) planets consist mostly of solid rock. Four of the outer planets are gas giants, consisting of thick outer layers of gaseous materials, perhaps with small rocky cores. • The ~~fifth outer~~ dwarf planet, Pluto, has an unknown composition but appears to be solid. It is part of the Kuiper Belt.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~Draw a diagram of the solar system, and label the planets~~ • analyze the role of 1) the position of Earth in the Solar System; 2) the size of Earth and sun; and 3) Earth's axial tilt in affecting the evolution of the planet and life on the planet. • analyze historical explanations for the origin of the moon. • create a model showing the position of Earth, the moon, and the resulting moon phases. • explain why there is not a solar and lunar eclipse each month. • create a model showing the position of Earth, moon, and sun during a solar and lunar eclipse. • differentiate between the inner (terrestrial) planets and the outer (gaseous) planets and their corresponding atmospheric characteristics. • compare and contrast the internal makeup of the four inner planets and explain why they vary so significantly. • compare and contrast the atmospheres, planetary makeup, surface conditions, and rotation of the planets. • compare the classification of the dwarf planet Pluto to the planets in relation to its orbit, and its similarity to other objects in the Kuiper Belt. • compare and contrast the defining characteristics among moons, comets, meteoroids, and asteroids.

Standard ES.3

ES.3 The student will investigate and understand the characteristics of Earth and the solar system. Key concepts include

a) position of Earth in the solar system;
b) sun-Earth-moon relationships (seasons, tides, and eclipses);
c) characteristics of the sun, planets and their moons, comets, meteors, and asteroids; and
d) the history and contributions of space exploration.

Essential Understandings	Essential Knowledge and Skills
• Moons are natural satellites of planets ~~that~~ and vary widely in composition. • Comets orbit the sun and consist mostly of frozen gases. • ~~Asteroids are rocky or metallic iron objects ranging in size from millimeters to kilometers. They are the source of most meteorites~~. • A meteoroid is debris located outside Earth's atmosphere; a meteor is debris located within Earth's atmosphere; and a meteorite is debris that has broken apart into smaller pieces before reaching Earth's surface. • Asteroids are usually leftover debris of the formation of the solar system, or creations of the collisions of other asteroids. • ~~Apollo 11 was the first manned landing on the moon.~~ • ~~The Hubble Space Telescope has greatly improved our understanding of the universe.~~ • The atmosphere of Venus is mostly carbon dioxide and very dense. The atmosphere of Mars is very thin and mostly carbon dioxide. • Much of our knowledge about the solar system is a result of space exploration efforts. These efforts continue to improve our understanding of the solar system.	• compare and contrast the characteristics of Venus, Earth, Mercury, and Mars, and interpret various reasons why each planet has such characteristics. • predict what conditions we would need to have in place for another celestial object to support life. • compare the various types of evidence obtained from the Apollo moon landings and other lunar exploration and how this is used to inform thinking about the moon. • analyze the role of telescopes from Galileo's telescope to the Hubble telescope and evaluate these scientific tools as instruments of social and scientific change and enlightenment. • create a timeline of key events in space exploration.

Standard ES.4

ES.4	The student will investigate and understand how to identify major rock-forming and ore minerals based on physical and chemical properties. Key concepts include a) hardness, color and streak, luster, cleavage, fracture, and unique properties; and b) uses of minerals.

Essential Understandings	Essential Knowledge and Skills
• There is a difference between rocks and minerals. Most rocks are made of one or more minerals. • A mineral is a naturally occurring, inorganic, solid substance with a definite chemical composition and structure~~. Minerals~~ and can be identified based on specific chemical and physical properties. • The major elements found in Earth's crust are oxygen, silicon, aluminum, and iron. The most abundant group of minerals is the silicates, which contain silicon and oxygen. • Minerals are important to human wealth and welfare.	~~Knowledge Skills~~ In order to meet this standard, it is expected that students will • analyze the relationship between the qualities of cleavage, fracture, and hardness and the molecular structure and chemistry of silicates and other common minerals. • analyze why certain common metallic elements (iron, aluminum, silicon) are rarely, if ever, found in the native state. • recognize in hand sample common members of the silicate groups and carbonate rock forming minerals. • recognize accessory minerals often found in common rocks. • analyze the distribution and persistence of minerals at or near Earth's surface in terms of Earth's general structure, plate tectonics, and chemical and physical weathering. • identify minerals ~~may be identified~~ by their physical properties, such as hardness, color, luster, and streak. • recognize some major rock-forming minerals ~~are~~ such as quartz, feldspar, calcite, and mica. • recognize ore minerals includ~~e~~ing pyrite, magnetite, hematite, galena, graphite, and sulfur.

Standard ES.5

ES.5	The student will investigate and understand the rock cycle as it relates to the origin and transformation of rock types and how to identify common rock types based on mineral composition and textures. Key concepts include a) igneous rocks; b) sedimentary rocks; and c) metamorphic rocks.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Rocks can be identified on the basis of mineral content and texture. • The processes by which rocks are formed define the three major groups of rocks. • The rock cycle is the process by which all rocks are formed and how basic Earth materials are recycled through time. • Igneous rock forms from molten rock that cools and hardens either below or on Earth's surface. Extrusive igneous rocks have small or no crystals, resulting in fine-grained or glassy textures~~ Extrusive igneous rocks~~ and include pumice, obsidian, and basalt. Intrusive igneous rocks have larger crystals and a coarser texture ~~Intrusive igneous rocks~~ and include granite. • Sedimentary rocks may be formed either by rock fragments or organic matter being bound together or by chemical precipitation. ~~Sedimentary rocks are clastic or chemical.~~ Clastic sedimentary rocks are made up of fragments of other rocks and include sandstone, conglomerate, and shale. Non-clastic sedimentary rocks include limestone and rock salt. • Metamorphic rocks form when any rock is changed by the effects of heat, pressure, or chemical action.~~ Metamorphic rocks can be foliated or unfoliated (non-foliated).~~ Foliated metamorphic rocks have bands of different minerals and include ~~S~~slate, schist, and gneiss ~~are foliated metamorphic rocks~~. Unfoliated metamorphic rocks have little or no banding and are relatively homogenous throughout and include ~~M~~marble and quartzite ~~are unfoliated metamorphic rocks~~.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • comprehend and identify various igneous rock textural features and mineral components with a hand sample or by description, and analyze the significance of these features in terms of mode of origin and history. • analyze and identify various sedimentary rocks in terms of mode of origin and history, using sedimentary features (grain size, texture, and composition). • analyze the major groups of metamorphic rocks for mineral composition and textural features and determine the potential parent rock and in terms of the rock cycle. • analyze a sequence of rocks in terms of types, textures, composition, fossils, structural, and weathering features in order to infer the history of the sequence over time. • integrate the rock cycle with Plate Tectonics Theory and determine how this is reflected in the geology of Virginia's five physiographic provinces. • ~~interpret the rock cycle diagram.~~ • classify the following rock types as igneous, metamorphic, or sedimentary: pumice, obsidian, basalt, granite, sandstone, conglomerate, shale, limestone, slate, schist, gneiss, marble, and quartzite. • differentiate between clastic and non-clastic sedimentary rocks. • compare and contrast distinguishing characteristics of the crystal

Standard ES.5

ES.5	The student will investigate and understand the rock cycle as it relates to the origin and transformation of rock types and how to identify common rock types based on mineral composition and textures. Key concepts include a) igneous rocks; b) sedimentary rocks; and c) metamorphic rocks.

Essential Understandings	Essential Knowledge and Skills
	structure and textures of extrusive and intrusive igneous rocks. • describe the structure of foliated and unfoliated metamorphic rocks.

Standard ES.6

ES.6 The student will investigate and understand the differences between renewable and nonrenewable resources. Key concepts include

a) fossil fuels, minerals, rocks, water, and vegetation;
b) advantages and disadvantages of various energy sources;
c) resources found in Virginia; and
d) environmental costs and benefits.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Resources are limited and are either renewable or nonrenewable. • There are advantages and disadvantages to using any energy source. • Virginia has many natural resources. • Modern living standards are supported by extensive use of both renewable and nonrenewable resources. • Extraction and use of any resource carries an environmental cost that must be weighed against economic benefit. • Renewable resources can be replaced by nature at a rate close to the rate at which they are used. Renewable resources include vegetation, sunlight, and surface water. • Nonrenewable resources are ~~renewed~~ replenished very slowly or not at all. Nonrenewable resources include coal, oil, and minerals. • Fossil fuels are nonrenewable and may cause pollution, but they are relatively cheap and easy to use once they are extracted. • In Virginia, major rock and mineral resources include coal for energy, gravel and crushed stone for road construction, silica for electronics, zirconium and titanium for advanced metallurgy, and limestone for making concrete. • Clean water resources, while renewable, are directly impacted by human activity through extraction and pollution.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • analyze the formation of fossil fuels in terms of the rock cycle and Plate Tectonics Theory, and relate the formation of fossil fuels to ancient biologic and atmospheric conditions and changes and locations within Virginia. • analyze how Virginia's production and use of various natural resources has changed over time. Define and cite differences over time especially in the last 150 years. • evaluate Virginia's potential as a producer of renewable energy sources. • assess the role of fossil fuels and renewable energy sources in the future and compare and contrast the environmental benefits and costs among the various options. • analyze the advantages and disadvantages of various energy sources. • analyze a range of emerging energy and mineral resources in Virginia in terms of costs and benefits. • determine the sources of clean water in their community and analyze consumption and supply data.

Standard ES.7

ES.7 The student will investigate and understand geologic processes including plate tectonics. Key concepts include
a) geologic processes and their resulting features; and
b) tectonic processes.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Virginia has a billion-year-long tectonic and geologic history. • Virginia has five physiographic provinces produced by past episodes of tectonic activity and continuous geologic activity. • Each province has unique physical characteristics resulting from its geologic past. • Geologic processes produce characteristic structures and features. • The five physiographic provinces of Virginia are Coastal Plain, Piedmont, Blue Ridge, Valley and Ridge, and Appalachian Plateau. • The Coastal Plain is a flat area ~~underlain by~~ composed of young, unconsolidated sediments underlain by older crystalline basement rocks. These layers of sediment were produced by erosion of the Appalachian Mountains and Piedmont and then deposited on the Coastal Plain when sea levels were higher in the past. • The Piedmont is an area of rolling hills underlain by mostly ancient igneous and metamorphic rocks. The igneous rocks are the roots of volcanoes formed during an ancient episode of subduction that occurred before the formation of the Appalachian Mountains. • The Blue Ridge is a high ridge separating the Piedmont from the Valley and Ridge Province. The billion-year-old igneous and metamorphic rocks of the Blue Ridge are the oldest in the state. ~~Some metamorphism of these rocks occurred during the formation of the Appalachian Mountains.~~ • The Valley and Ridge province is an area with long parallel ridges and valleys underlain by ancient folded and faulted sedimentary rocks. The folding and faulting of the sedimentary rocks occurred during a collision between Africa and North America. The collision, which occurred in the	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • label on a map ~~and recognize the major features of~~ the physiographic provinces of Virginia. • comprehend the topographic, rock-type and geologic-structural characteristics of each physiographic province of Virginia. • analyze the geologic history of Virginia in terms of the structures, rock types, and topography represented in the five physiographic provinces. • integrate and interpret the rock cycle, plate tectonics, and Virginia's geology in an interacting diagram. • analyze how multiple continental collisions and rifting events over the last billion years have created the current physiography of Virginia. • comprehend and apply the details of Plate Tectonics Theory to the formation of continents, mountain chains, island arcs, deep open trenches, earthquake zones, and continental and mid-ocean volcanism. • analyze the composition and structure of the continental and oceanic lithosphere in terms of topographic features, density, thickness, and rates of motion. • compare and contrast various types of volcanism and geothermal activity (i.e., Hawaii, Iceland, Mount St. Helens, Catoctin Greenstone, Tambora, the Deccan Traps, and Yellowstone). • compare and contrast different types of current and ancient plate boundaries (i.e., Japan, California, New Madrid, Missouri, the Appalachian system, Iceland, and Tonga). • analyze how seismic waves provide evidence of the structure of the deep Earth including the inner and outer core in terms of composition,

Standard ES.7

ES.7	The student will investigate and understand geologic processes including plate tectonics. Key concepts include a) geologic processes and their resulting features; and b) tectonic processes.
Essential Understandings	**Essential Knowledge and Skills**
late Paleozoic era, produced the Appalachian Mountains. • The Appalachian Plateau has rugged, irregular topography and is underlain by ancient, flat-lying sedimentary rocks. The area is actually a series of plateaus separated by faults and erosional down-cut valleys. Most of Virginia's coal resources are found in the plateau province. • ~~The core, mantle, and crust of Earth are dynamic systems, constantly in motion.~~ • Earth consists of a solid, mostly iron inner core; a liquid, mostly iron outer core; a ~~rocky~~ crystalline but largely plastic mantle; and a rocky, brittle crust. • Earth's lithosphere is divided into plates that are in motion with respect to one another. The lithosphere is composed of the crust and upper portion of the mantle. There are two different types of ~~crust~~ lithospheres — oceanic and continental — that have very different physical and mineralogic characteristics. The ocean ~~crust~~ lithosphere is relatively thin, young, and dense. The continental ~~crust~~ lithosphere is relatively thick, old, and less dense. • Most large scale, high-energy events of geologic activity (e.g., earthquakes, volcanoes, and mountain building) occur~~s~~ as a result of relative motion along plate boundaries. • Plate motion occurs as a consequence of convection in Earth's mantle, including upwelling of material from the deep mantle in rift zones, the lateral movement of tectonic plates, and the sinking dense, old plates at subduction zones. ~~Plate tectonics is driven by convection in the mantle~~. • Weathering, erosion, and deposition are interrelated processes. Weathering is the process by which rocks are broken down chemically and physically by the action of water, air, and organisms. Erosion is the process by which Earth materials are ~~transported~~ physically incorporated by moving water, ice, or wind for transportation. Deposition is the process by which Earth materials carried by wind, water, or ice settle out	density, and viscosity. • analyze the body of evidence for Plate Tectonics Theory (i.e., seafloor age, magnetic information, seismic profiles, laser-measured motion studies, fossil evidence, rock types associated with particular tectonic environments). • analyze the various structures produced in convergent plate boundaries. • offer interpretations of the tectonic history of an area based on the range and type of rocks found in that area. • compare and contrast the tectonic activity of the east coast and the west coast of North America.

Standard ES.7

ES.7	The student will investigate and understand geologic processes including plate tectonics. Key concepts include a) geologic processes and their resulting features; and b) tectonic processes.
Essential Understandings	**Essential Knowledge and Skills**
and are ~~deposited~~ left in a location when energy levels decrease. The size of the material deposited is proportional to the available energy of the medium of transport. • Relative plate motions and plate boundaries are convergent (subduction and continental collision), divergent (seafloor spreading), or transform. Major features of convergent boundaries include collision zones (folded and thrust-faulted mountains) and subduction zones (volcanoes and trenches). Major features of divergent boundaries include mid-ocean ridges, rift valleys, ~~and~~ fissure volcanoes, and flood lavas. Major features of transform boundaries include strike-slip faults. • Earthquake activity of varying energy levels and depths is associated with all plate boundaries. • A volcano is an opening where magma erupts onto Earth's surface. Most volcanic activity is associated with subduction, rifting, or seafloor spreading. Hot spot volcanic activity, such as volcanic islands, is exceptional in that it is not related to plate boundaries but derived from a deep, localized heat source. • A fault is a break or crack in Earth's crust along which movement has occurred. • ~~Most active faults are located at or near plate boundaries. Earthquakes result when movement occurs along a fault.~~ • ~~When rocks are compressed horizontally, their layers may be deformed into wave-like forms called folds. This commonly occurs during continental collisions.~~ • Plate tectonic processes serve as the major driver of the rock cycle. Plate tectonics drive the evolution of Earth's surface features and materials by fractionating material by chemical, mineralogic, and physical properties. Continental drift is a consequence of plate tectonics.	

Standard ES.8

ES.8 The student will investigate and understand how freshwater resources are influenced by geologic processes and the activities of humans. Key concepts include

a) processes of soil development;
b) development of karst topography;
c) relationships between groundwater zones, including saturated and unsaturated zones, and the water table;
d) identification of sources of fresh water including rivers, springs, and aquifers, with reference to the hydrologic cycle;
e) dependence on freshwater resources and the effects of human usage on water quality; and
f) identification of the major watershed systems in Virginia, including the Chesapeake Bay and its tributaries.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Soil is formed from the weathering of rocks and organic activity~~. Soil~~ and is composed of loose rock fragments and clay derived from weathered rock mixed with organic material. • Karst topography is developed in areas underlain by carbonate rocks, including limestone and dolomite. Karst topography includes features like caves and sinkholes~~. Karst topography~~ and forms when limestone is slowly dissolved away by slightly acidic groundwater. Where limestone is abundant in the Valley and Ridge province of Virginia, karst topography is common. • Permeability is a measure of the ability of a rock or sediment to transmit water or other liquids. Water does not pass through impermeable materials. A substantial amount of water is stored in permeable soil and rock underground. • Earth's fresh water supply is finite. Geological processes, such as erosion, and human activities, such as waste disposal, can pollute water supplies. • Water is continuously being passed through the hydrologic cycle. Fresh water is necessary for survival and most human activities. • The three major regional watershed systems in Virginia lead to the Chesapeake Bay, the North Carolina sounds, and the Gulf of Mexico.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • interpret a simple groundwater diagram showing the zone of aeration, the zone of saturation, the water table, and an aquifer. • interpret a simple hydrologic cycle diagram, including evaporation, condensation, precipitation, and runoff. • locate the major Virginia watershed systems on a map (Chesapeake Bay, Gulf of Mexico, and North Carolina sounds). • analyze the formation of karst in terms of rock type, solubility and permeability, uplift, the water table, and chemical and physical weathering. • analyze the presence of groundwater in various types of rock terrains, including areas found in each of the physiographic provinces of Virginia. • analyze the relationship between salt-water intrusion in the ground water in certain areas of eastern Virginia and buried crater structures.

Standard ES.9

ES.9 The student will investigate and understand that many aspects of the history and evolution of Earth and life can be inferred by studying rocks and fossils. Key concepts include

a) traces and remains of ancient, often extinct, life are preserved by various means in many sedimentary rocks;
b) superposition, cross-cutting relationships, index fossils, and radioactive decay are methods of dating bodies of rock;
c) absolute and relative dating have different applications but can be used together to determine the age of rocks and structures; and
d) rocks and fossils from many different geologic periods and epochs are found in Virginia.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The history of Earth and the ages of rocks can be investigated and understood by studying rocks and fossils. • Evidence of ancient, often extinct life is preserved in many sedimentary rocks. A fossil is the remains, impression, or other evidence preserved in rock of the former existence of life. Fossil evidence indicates that life forms have changed and become more complex over geologic time. Some ways in which fossils can be preserved are molds, casts, and original bone or shell. • ~~Nearly all fossils are found in sedimentary rocks.~~ • Relative time places events in a sequence without assigning any numerical ages. Fossils, superposition, and cross-cutting relations are used to determine the relative ages of rocks. Absolute time places a numerical age on an event. Radioactive decay is used to determine the absolute age of rocks. • ~~Earth is very ancient — about 4.6 billion years old.~~ The age of Earth is about 4.6 billion years. • In Virginia, fossils are found mainly in the Coastal Plain, Valley and Ridge, and Appalachian Plateau provinces. Most Virginia fossils are of marine organisms. This indicates that large areas of the state have been periodically covered by seawater. • Paleozoic, Mesozoic, and Cenozoic fossils are found in Virginia.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • describe how life has changed and become more complex over geologic time. • interpret a simple geologic history diagram, using superposition and cross-cutting relations. • analyze how radioactive decay provides a reliable method to determine the age of many types of organic and inorganic materials. • analyze the impact and role of global catastrophies (including asteroid/comet impacts, volcanism, continental collisions, climate collapse) on extinctions and evolution. • analyze and interpret complex cross sections using both relative and absolute dating to unravel and define the geologic history of the section.

Standard ES.10

ES.10 The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include

a) physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations;
b) importance of environmental and geologic implications;
c) systems interactions;
d) features of the seafloor as reflections of tectonic processes; and
e) economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The ocean is a dynamic system in which many chemical, biological, and physical changes are taking place. The oceans are an important source of food and mineral resources as well as a venue for recreation and transportation. Sea level falls when glacial ice caps grow and rises when the ice caps melt. • Most waves on the ocean surface are generated by wind. • There are large current systems in the oceans that carry warm water towards the poles and cold water towards the equator. • Upwellings bring cold, nutrient-rich water from the deep ocean to the surface and are areas of rich biological activity. • The tides are the ~~daily,~~ periodic rise and fall of water level caused by the gravitational pull of the sun and moon. • The oceans' resources are finite and should be utilized with care. • Algae in the oceans are an important source of atmospheric oxygen. • The ocean is the single largest reservoir of heat at Earth's surface. The stored heat in the ocean drives much of Earth's weather~~. The stored heat in the ocean~~ and causes climate near the ocean to be milder than climate in the interior of continents. • Convection is the major mechanism of energy transfer in the oceans, atmosphere, and Earth's interior. • The topography of the seafloor is at least as variable as that on the continents. Features of the seafloor that are related to plate tectonic processes include mid-ocean ridges and trenches (continental margins,	~~Knowledge Skills~~ In order to meet this standard, it is expected that students will • identify the effects of human activities on the oceans. • analyze the potential impact of a major environmental disaster on the base of the food web and vertebrate organisms; economics; cultures; and future productivity. • analyze the relationship between moving continents, the presence of ice caps, and ocean circulation over long periods of time. • relate important ocean conditions, including El Niño, to weather on the continents. • evaluate the role of the marine environment in the extraction of carbon dioxide in carbonates and the production of oxygen. • analyze the role of ocean currents in the distribution of heat from the equatorial regions to the poles, and predict what changes may occur as continents move and atmospheric conditions and climate vary. • compare Atlantic Ocean and Gulf of Mexico water temperatures during the yearly cycle, and relate this to the formation of storms. • describe how different types of pollution can pollute the Chesapeake Bay even though the pollutant source may be hundreds of miles from the Bay.

Standard ES.10

ES.10	The student will investigate and understand that oceans are complex, interactive physical, chemical, and biological systems and are subject to long- and short-term variations. Key concepts include a) physical and chemical changes related to tides, waves, currents, sea level and ice cap variations, upwelling, and salinity variations; b) importance of environmental and geologic implications; c) systems interactions; d) features of the seafloor as reflections of tectonic processes; and e) economic and public policy issues concerning the oceans and the coastal zone including the Chesapeake Bay.

Essential Understandings	Essential Knowledge and Skills
trenches, and mid ocean ridges). Other major topographic features of the oceans are continental shelves, continental slopes, abyssal plains, and seamounts. • The oceans are environmentally and economically important. Human activities and public policy have important consequences for the oceans. The impact of human activities, such as waste disposal, construction, and agriculture, affect the water quality within watershed systems and ultimately the ocean. Pollution and overfishing can harm or deplete valuable resources. • Estuaries, like the Chesapeake Bay, are areas where fresh and salt water mix, producing variations in salinity and high biological activity. Chemical pollution and sedimentation are great threats to the ~~chemical and biological~~ well-being of estuaries and oceans.	

Standard ES.11

ES.11	The student will investigate and understand the origin and evolution of the atmosphere and the interrelationship of geologic processes, biologic processes, and human activities on its composition and dynamics. Key concepts include a) scientific evidence for atmospheric composition changes over geologic time; b) current theories related to the effects of early life on the chemical makeup of the atmosphere; c) atmospheric regulation mechanisms including the effects of density differences and energy transfer; and d) potential changes to the atmosphere and climate due to human, biologic, and geologic activity.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The composition of Earth's atmosphere has changed over geologic time. Earth's atmosphere is unique in the solar system in that it contains substantial oxygen. • ~~The early atmosphere contained little oxygen and more carbon dioxide than the modern atmosphere.~~ The most primitive atmosphere was comprised of mainly helium and hydrogen. After the moon was formed, the early atmosphere contained mostly CO_2, CO and water vapor. This atmosphere was then modified by early photosynthetic life. • Early photosynthetic life such as cyanobacteria (blue-green algae) consumed carbon dioxide and generated oxygen. It was only after early photosynthetic life generated oxygen that animal life became possible. • Earth's atmosphere is 21 percent oxygen, 78 percent nitrogen, and 1 percent trace gases. The composition of the atmosphere can change due to human, biologic, and geologic activity. Human activities have increased the carbon dioxide content of the atmosphere. Man-made chemicals have decreased the ozone concentration in the upper atmosphere. Volcanic activity and meteorite impacts can inject large quantities of dust and gases into the atmosphere. • The ability of Earth's atmosphere to absorb and retain heat is affected by the presence of gases like water vapor and carbon dioxide.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • analyze the array of climate feedback mechanisms that control the Earth's temperature over time, and compare and contrast these feedback mechanisms to those operating on inner planets and the gas giants. • analyze the evidence for atmospheric compositional change over geologic time including oxygen and carbon sinks and the role of photosynthetic organisms. • explain how volcanic activity or meteor impacts could affect the atmosphere and life on Earth. • explain how biologic activity, including human activities, may influence global temperature and climate.

Standard ES.12

ES.12 The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. Key concepts include

a) observation and collection of weather data;
b) prediction of weather patterns;
c) severe weather occurrences, such as tornadoes, hurricanes, and major storms; and
d) weather phenomena and the factors that affect climate including radiation, conduction, and convection.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Energy transfer between Earth's surface and the atmosphere creates the weather. • Weather and climate are different. Both weather and climate are measurable and, to a certain extent, predictable. Weather describes day-to-day changes in atmospheric conditions. Climate describes the typical weather patterns for a given location over a period of many years. Instrumentation is used to collect weather and climate data. • The four major factors affecting climate are latitude, elevation, proximity to bodies of water, and position relative to mountains. Earth's major climatic zones are the polar, temperate, and tropical zones. Areas near the equator receive more of the sun's energy per unit area than areas nearer the poles. • Earth's surface is much more efficiently heated by the sun than is the atmosphere. The amount of energy reaching any given point on Earth's surface is controlled by the angle of sunlight striking the surface and varies with the seasons. • Winds are created by uneven heat distribution at Earth's surface and modified by the rotation of Earth. The Coriolis effect causes deflections of the atmosphere due to the rotation of Earth. Global wind patterns result from the uneven heating of Earth by the sun and are influenced by the Coriolis effect. • Convection in the atmosphere is a major cause of weather. Convection is the major mechanism of energy transfer in the oceans, atmosphere, and Earth's interior. • The conditions necessary for cloud formation are air at or below dew	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~label a diagram of global wind patterns.~~identify and describe the direction of local winds (land, sea breezes and jet stream). • read and interpret data from a thermometer, a barometer, and a psychrometer. • predict weather based on cloud type, temperature, and barometric pressure. • read and interpret a weather map containing fronts, isobars, and isotherms. • read and interpret weather station models. • identify types and origins of air masses, fronts and the accompanying weather conditions. • read and interpret climate graphs. • label a diagram of global climate zones and the surface movement of ocean currents. • label a diagram that demonstrates the interaction of Earth's atmosphere and energy transfer (conduction, convection, and radiation). • analyze the impact of satellite technology on weather prediction and the tracking of severe storms, including hurricanes, and evaluate the cost and benefits of this technology in terms of lives and property saved. Predict the impact on storm preparedness if there were no weather satellites.

Standard ES.12

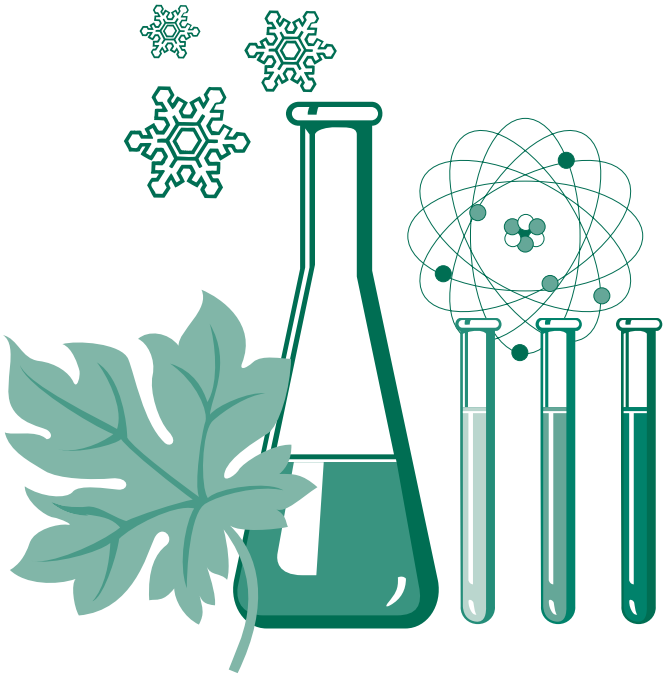
ES.12	The student will investigate and understand that energy transfer between the sun and Earth and its atmosphere drives weather and climate on Earth. Key concepts include a) observation and collection of weather data; b) prediction of weather patterns; c) severe weather occurrences, such as tornadoes, hurricanes, and major storms; and d) weather phenomena and the factors that affect climate including radiation, conduction, and convection.

Essential Understandings	Essential Knowledge and Skills
point and presence of condensation nuclei. Cloud droplets can join together to form precipitation. • A tornado is a narrow, violent funnel-shaped column of spiral winds that extends downward from the cloud base toward Earth. A hurricane is a tropical cyclone (counterclockwise movement of air) characterized by sustained winds of 120 kilometers per hour (75 miles per hour) or greater.	

Standard ES.13

ES.13	The student will investigate and understand scientific concepts related to the origin and evolution of the universe. Key concepts include a) cosmology including the Big Bang theory; and b) the origin and evolution of stars, star systems, and galaxies.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The universe is vast in size and very old. • The ~~b~~Big ~~b~~Bang theory is our best current model for the origin of the universe. The ~~b~~Big ~~b~~Bang theory states that the universe began in a very hot, dense state that expanded and eventually condensed into galaxies. • The solar nebular theory is our best current idea for the origin of the solar system. The solar nebular theory explains that the planets formed through the condensing of the solar nebula. • Stars have a finite lifetime and evolve over time. The mass of a star controls its evolution, ~~length of its lifetime~~ lifespan, and ultimate fate. Stars form by condensation and gravitational compression of interstellar gas and dust. • The Hertzsprung-Russell diagram illustrates the relationship between the absolute magnitude and the surface temperature of stars. As stars evolve, their position on the Hertzsprung-Russell diagram moves. • Galaxies are collections of billions of stars. The basic types of galaxies are spiral, elliptical, and irregular. • The solar system is located in the Milky Way galaxy. • A light-year is the distance light travels in one year and is the most commonly used measurement for distance in astronomy. • Much of our information about our galaxy and the universe comes from ground-based observations across the electromagnetic spectrum. Much information about other planets comes from ground-based observations from Earth, but also from landers and orbiting spacecraft.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • contrast the life span and energy output of a blue giant star to that of the sun and relate this to the potential existence of life on planets in its orbit. • explain the potential origin and role of ultra massive black holes in the center of galaxies. • using the Hertzsprung-Russel diagram, classify stars as to their place on the main sequence or in beginning or end points in their life cycles. • evaluate the probability of travel to nearby solar systems using current spacecraft speeds. • analyze the various fusion production of a blue giant star over its lifetime, and relate this to the presence and abundance of elements that make up our solar system and its contents, including living organisms.



Science Standards of Learning Curriculum Framework

Biology

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard BIO.1

BIO.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations of living organisms are recorded in the lab and in the field;
b) hypotheses are formulated based on direct observations and information from scientific literature;
c) variables are defined and investigations are designed to test hypotheses;
d) graphing and arithmetic calculations are used as tools in data analysis;
e) conclusions are formed based on recorded quantitative and qualitative data;
f) sources of error inherent in experimental design are identified and discussed;
g) validity of data is determined;
h) chemicals and equipment are used in a safe manner;
i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions;
j) research utilizes scientific literature;
k) differentiation is made between a scientific hypothesis, theory, and law;
l) alternative scientific explanations and models are recognized and analyzed; and
m) current applications of biological concepts are used.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts a) the natural world is understandable; b) science is based on evidence - both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • Active participation in scientific investigations is necessary to develop an understanding of biology as an experimental science. • The continual use and development of cognitive and manipulative skills associated with the formulation of ~~the~~ scientific explanations is	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • conduct investigations in the classroom and field, as appropriate, and critically examine investigations reported in scientific literature and databases. • collect preliminary observations, both qualitative and quantitative. • make clear distinctions among observations, inferences, and predictions. • formulate hypotheses based on cause-and-effect relationships. • justify hypotheses based on both preliminary observations and scientific literature. • identify the independent variable (IV) and the values of the IV that will be used in the experiment. • select dependent variables that allow collection of quantitative data. • identify variables that must be held constant.

Standard BIO.1

BIO.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations of living organisms are recorded in the lab and in the field; b) hypotheses are formulated based on direct observations and information from scientific literature; c) variables are defined and investigations are designed to test hypotheses; d) graphing and arithmetic calculations are used as tools in data analysis; e) conclusions are formed based on recorded quantitative and qualitative data; f) sources of error inherent in experimental design are identified and discussed; g) validity of data is determined; h) chemicals and equipment are used in a safe manner; i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions; j) research utilizes scientific literature; k) differentiation is made between a scientific hypothesis, theory, and law; l) alternative scientific explanations and models are recognized and analyzed; and m) current applications of biological concepts are used.

Essential Understandings	Essential Knowledge and Skills
important. • The design of sound scientific experiments relies on systematic preliminary observations and data collected in the laboratory and in the field, as well as on a knowledge base gained from an examination of related scientific literature. Prior establishment of an adequate knowledge base is essential before hypotheses can be developed and tested. • ~~It is typical for scientists to disagree with one another about the interpretation of evidence or a theory being considered. This is partly a result of the unique background (social, educational, etc.) that individual scientists bring to their research.~~ • Because of ~~this inherent subjectivity, scientific inquiry~~ the rigor that scientific inquiry requires, science is a process that involves evaluating the results and conclusions proposed by other scientists. • Scientific tools including microscopes, computers, graphing calculators, and probeware allow for the gathering and analysis of data. • The analysis of evidence and data is essential in order to make sense of the content of science.	• establish controls as appropriate. • write clear, replicable procedures. • ~~Use appropriate technology for data collection, including probeware interfaced to a graphing calculator and/or computer, microscope, video microscope, or digital camera with image processing software.~~ identify and use appropriate technology for data collection and analysis, including probeware (i.e., sensors for temperature, pH and dissolved oxygen). • record quantitative data in clearly labeled tables with units. • include labeled diagrams in the data record. • determine the range, mean, and values for data, using a graphing calculator and/or computer spreadsheet software. • plot data graphically, showing independent and dependent variables. • describe ~~linear mathematical functions~~ trends from the data where appropriate, using a graphing calculator and/or computer spreadsheet. • recognize and discuss contradictory or unusual data.

Standard BIO.1

BIO.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

a) observations of living organisms are recorded in the lab and in the field;
b) hypotheses are formulated based on direct observations and information from scientific literature;
c) variables are defined and investigations are designed to test hypotheses;
d) graphing and arithmetic calculations are used as tools in data analysis;
e) conclusions are formed based on recorded quantitative and qualitative data;
f) sources of error inherent in experimental design are identified and discussed;
g) validity of data is determined;
h) chemicals and equipment are used in a safe manner;
i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions;
j) research utilizes scientific literature;
k) differentiation is made between a scientific hypothesis, theory, and law;
l) alternative scientific explanations and models are recognized and analyzed; and
m) current applications of biological concepts are used.

Essential Understandings	Essential Knowledge and Skills
• Multiple data manipulation and analysis strategies are available to help explain results of quantitative investigations. • Data and evidence should come from a variety of sources, including student investigation, peer investigation, and databases. • The scientific establishment sometimes rejects new ideas, and new discoveries often spring from unexpected findings. • Scientific knowledge usually grows slowly through contributions from many different investigators from diverse cultures. • Science depends on experimental and observational confirmation and is subject to change as new evidence becomes available. • A hypothesis can be supported, modified, or rejected based on collected data. A hypothesis is a tentative explanation that accounts for a set of facts and that can be tested by further investigation. A theory is an accepted explanation of a large body of information, experimental and inferential, and serves as an overarching framework for numerous concepts. It is subject to change as new evidence becomes available. A law is a statement of fact meant to describe, in concise terms, an action.	• determine the extent to which data support~~s~~/do~~es~~ not support a hypothesis, and propose further hypotheses and directions for continued research. • discuss the validity of results as related to accuracy, confidence, and sources of experimental error based on number of trials and variance in the data. • use evidence, apply logic, and construct an argument for conclusions based on reported data. • ~~explain how competing scientific theories based on the same observations can be equally valid.~~ • recognize that in order to ensure the validity of scientific investigations, ~~other members of the scientific community~~ they must be evaluated by other members of the scientific community. • compare and contrast hypotheses, theories and laws. • identify and describe scientific theories that have been changed or modified over time.

Standard BIO.1

BIO.1	The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which a) observations of living organisms are recorded in the lab and in the field; b) hypotheses are formulated based on direct observations and information from scientific literature; c) variables are defined and investigations are designed to test hypotheses; d) graphing and arithmetic calculations are used as tools in data analysis; e) conclusions are formed based on recorded quantitative and qualitative data; f) sources of error inherent in experimental design are identified and discussed; g) validity of data is determined; h) chemicals and equipment are used in a safe manner; i) appropriate technology including computers, graphing calculators, and probeware, is used for gathering and analyzing data, communicating results, modeling concepts, and simulating experimental conditions; j) research utilizes scientific literature; k) differentiation is made between a scientific hypothesis, theory, and law; l) alternative scientific explanations and models are recognized and analyzed; and m) current applications of biological concepts are used.

Essential Understandings	Essential Knowledge and Skills
It is generally accepted to be true and universal.	

Standard BIO.2

BIO.2 The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include

a) water chemistry and its impact on life processes;
b) the structure and function of macromolecules;
c) the nature of enzymes; and
d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Water is essential for life on Earth. Water absorbs heat when it evaporates, allowing organisms to release excess heat. The solid form of water, ice, floats, preventing lakes and oceans from freezing solid. Water molecules are both cohesive and adhesive due to the nature of hydrogen bonding ~~(polar covalent and hydrogen bonding)~~. • About two-thirds of the mass of a cell is made up of water, and most of the biochemical processes of life occur in water solutions. Water is able to dissolve many substances (due to polarity); therefore, the water inside and outside of cells is able to carry nutrients into and around cells and wastes away from cells. • ~~Water is able to absorb large amounts of heat. As a result, lakes and oceans stabilize air and land temperatures.~~ • ~~The pH scale ranges from 0 to 14. The pH of pure water is 7. Substances added to water can lower or raise the pH. A solution with a pH below 7 is acidic. A solution with a pH above 7 is basic.~~ • Organisms can tolerate only small changes in pH because every cell has a particular pH at which it functions best. For example, changes in pH cause changes in enzyme conformation, resulting in a change in activity. Most cells function best within a narrow range of temperature and pH. At very low temperatures, reaction rates are too slow. High temperatures or extremes of pH can irreversibly change the structure of proteins and alter their function.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • explain the importance of the chemical and physical properties of water that make it vital to life. • recognize that ~~T~~the main components of a living cell are carbon, hydrogen, nitrogen, oxygen, phosphorus, and sulfur. Carbon atoms can easily bond to several other carbon atoms in chains and rings to form large complex molecules. • explain the role and function of the four major categories of macromolecules (lipids, carbohydrates, proteins and nucleic acids). • identify the functions of different types of proteins and recognize the significance that their conformation play in their functions. • describe the structure of enzymes and explain their role in acting as catalysts to control the rate of metabolic reactions. • explain how light is the initial source of energy for most communities. • recognize the equations for photosynthesis and respiration and identify the reactants and products. • describe the role of ATP in the storage and release of chemical energy in the cell. • explain the interrelatedness of photosynthesis and cell respiration.

Standard BIO.2

BIO.2	The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include a) water chemistry and its impact on life processes; b) the structure and function of macromolecules; c) the nature of enzymes; and d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.

Essential Understandings	Essential Knowledge and Skills
• <u>In multicellular organisms, the fluid within the cell and the fluids surrounding the cells have a characteristic and nearly constant pH. This pH is maintained in a number of ways, and one of the most important is through buffer systems.</u> • Inside every cell is a concentrated mixture of thousands of different macromolecules forming a variety of specialized structures that carry out cell functions, such as energy production, transport, waste disposal, synthesis of new molecules, and storage of genetic material. • Cells can make a variety of macromolecules from a relatively small set of monomers. • The primary functions of carbohydrate macromolecules are to provide and store energy. • The primary functions of lipid macromolecules are to insulate, store energy, and make up cell membranes. • Nucleic acids (DNA and RNA) control cell activities by directing protein synthesis. • Proteins are polymers made by linking together amino acid monomers. Protein molecules that are assembled in cells carry out most of the cells' work. The function of each protein molecule depends on its specific conformation. The sequence of amino acids and the shape of the chain are a consequence of attractions between the chain's parts. Some proteins are structural (hair, nails). Others function in transport (hemoglobin), movement (muscle fibers and cytoskeletal elements), defense (antibodies), and regulation of cell functions (hormones and enzymes). ~~A protein's structure depends on its specific conformation.~~ • Most life processes are a series of chemical reactions influenced by	

Standard BIO.2

BIO.2	The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include a) water chemistry and its impact on life processes; b) the structure and function of macromolecules; c) the nature of enzymes; and d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.

Essential Understandings	Essential Knowledge and Skills
environmental and genetic factors. The chemical reactions that occur inside cells are directly controlled by a large set of protein molecules called enzymes, whose functions depend on their specific shapes. Each enzyme has a definite three-dimensional shape that allows it to recognize and bind with its substrate. In living cells, enzymes control the rate of metabolic reaction by acting as catalysts. • The breakdown of nutrient molecules enables all cells to store energy in specific chemicals that are used to carry out the life functions of the cell. • Plant cells and many microorganisms use solar energy to combine molecules of carbon dioxide and water into complex, energy-rich organic compounds and release oxygen into the environment. • ~~Light is the initial source of energy for most communities.~~ The process of photosynthesis provides a vital connection between the sun and the energy needs of living systems. During photosynthesis, cells trap energy from sunlight with chlorophyll, found in chloroplasts, and use the energy, carbon dioxide, and water to produce energy-rich organic molecules (glucose) and oxygen. Photosynthesis involves an energy conversion in which light energy is converted to chemical energy in specialized cells. These cells are found in autotrophs such as plants and some protists. • During cell respiration, eukaryotic cells "burn" organic molecules with oxygen~~, which produces energy, carbon dioxide, and water.~~ in the mitochondria, which releases energy in the form of ATP, carbon dioxide, and water. • Photosynthesis and cell respiration are complementary processes for cycling carbon dioxide and oxygen as well as transferring energy in ecosystems.	

Standard BIO.2

BIO.2	The student will investigate and understand the chemical and biochemical principles essential for life. Key concepts include a) water chemistry and its impact on life processes; b) the structure and function of macromolecules; c) the nature of enzymes; and d) the capture, storage, transformation, and flow of energy through the processes of photosynthesis and respiration.

Essential Understandings	Essential Knowledge and Skills
• Cells release the chemical energy stored in the products of photosynthesis. This energy is transported within the cell in the form of ATP. When cells need energy to do work, certain enzymes release the energy stored in the chemical bonds in ATP.	

Standard BIO.3

BIO.3 The student will investigate and understand relationships between cell structure and function. Key concepts include

a) evidence supporting the cell theory;
b) characteristics of prokaryotic and eukaryotic cells;
c) similarities between the activities of the organelles in a single cell and a whole organism;
d) the cell membrane model; and
e) the impact of surface area to volume ratio on cell division, material transport, and other life processes.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The cell theory is the unifying theme in biology because it emphasizes the similarity of all living things. The traditional cell theory states that 1) ~~all~~ living things are composed of one or more cells and that cells come from other cells by the process of cell reproduction; 2) ~~C~~cells are the basic units of structure and function of all living things; and 3) ~~C~~cells contain specialized structures to perform functions necessary for life. • The development of the cell theory was accelerated by the ability to make observations on a microscopic level. The development and refinement of magnifying lenses and light microscopes made the observation and description of microscopic organisms and living cells possible. • Continued advances in microscopy allowed observation of cell organelles and ultrastructure. Current technology allows the observation of cellular processes underlying both cell structure and function. • As a result of additional study and the integration of studies of cell life functions, a modern cell theory has been developed. The modern cell theory, in addition to the tenants of the traditional cell theory, states 1) energy flow (metabolism and biochemistry) occurs within cells; 2) cells contain hereditary information (DNA) that is passed from cell to cell during cell division; and 3) all cells are basically the same in chemical composition in organisms of similar species . • Cell structure is one of the ways in which organisms differ from each other. The diversity that exists ranges from simple prokaryotic cells to complex multicellular organisms. • The simplest life forms exhibiting cellular structure are the prokaryotes.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • describe the key events leading to the development of the cell theory. • compare and contrast characteristics of prokaryotic and eukaryotic cells. • compare and contrast the activities of an organelle in a single cell and a whole organism. • identify the following essential cell structures and their functions ~~include~~ - the nucleus (contains DNA; site where RNA is made) - ribosome (site of protein synthesis) - mitochondrion (site of cell respiration) - chloroplast (site of photosynthesis) - endoplasmic reticulum (transports materials through the cell) - Golgi (site where cell products are packaged for export) - lysosome (contains digestive enzymes) - cell membrane (controls what enters and leaves the cell) - cell wall (provides support) - vacuole (storage of material) - cytoplasm (contains organelles and site of many chemical reactions) - centriole (organizes spindle fibers in animal cells) - cytoskeleton • describe how the selective permeability of the cell membrane affects the life of a cell. • describe processes associated with movement across the membrane for diffusion, facilitated diffusion, osmosis, and active transport.

Standard BIO.3

BIO.3	The student will investigate and understand relationships between cell structure and function. Key concepts include a) evidence supporting the cell theory; b) characteristics of prokaryotic and eukaryotic cells; c) similarities between the activities of the organelles in a single cell and a whole organism; d) the cell membrane model; and e) the impact of surface area to volume ratio on cell division, material transport, and other life processes.

Essential Understandings	Essential Knowledge and Skills
Earth's first cells were prokaryotes. Prokaryotic cells exist in two major forms: eubacteria and archaebacteria. Prokaryotes are ~~the~~ Earth's most abundant inhabitants. They can survive in a wide range of environments and obtain energy in a variety of ways. • ~~Several differences between eukaryotes and prokaryotes include~~ Eukaryotes differ from prokaryotes based on size, genetic material surrounded by a nuclear membrane, and the addition of membrane bound organelles (i.e., mitochondria and chloroplasts). • Eukaryotes arose from prokaryotes and developed into larger more complex organisms, from single-celled protists to multicellular protists, fungi, plants, and animals. • Some organisms exist as a single cell, while others are composed of many cells, each specialized to perform distinct metabolic functions. The basic processes necessary for living things to survive are the same for a single cell as they are for a more complex organism. A single-celled organism has to conduct all life processes by itself. A multicellular organism has groups of cells that specialize to perform specific functions. • ~~Cell specialization occurs during the development of a multicellular organism. The genetic information necessary for all cellular functions remains in each cell but may not be used.~~ • Cellular activities necessary for life include chemical reactions that facilitate acquiring energy, reproduction, and ~~adaptation/~~maintaining homeostasis. Relationships between structure and function can be examined at each of the hierarchical levels of organization: molecular, cellular, organism, population, community, and ecosystem. • Cellular differences between plant and animal cells include the presence of a cell wall that gives the plant cell a defined shape, the presence of	• describe the relationship between a cell's external solute concentration and its effect on the cell's internal solute concentration. • compare the efficiency of the ability of a cell to transport material based on surface area to volume ratios.

Standard BIO.3

BIO.3	The student will investigate and understand relationships between cell structure and function. Key concepts include a) evidence supporting the cell theory; b) characteristics of prokaryotic and eukaryotic cells; c) similarities between the activities of the organelles in a single cell and a whole organism; d) the cell membrane model; and e) the impact of surface area to volume ratio on cell division, material transport, and other life processes.

Essential Understandings	Essential Knowledge and Skills
chloroplast, and the number of vacuoles. • The fluid mosaic model of a membrane emphasizes the arrangement and function of a bilayer of phospholipids, transport proteins, and cholesterol. • Homeostasis of a cell is maintained by ~~a~~ the plasma membrane comprised of a variety of organic molecules. ~~that~~ The membrane controls the movement of material in and out of the cell, communication between cells, and the recognition of cells to facilitate multiple metabolic functions. • Diffusion occurs in cells when substances (oxygen, carbon dioxide, salts, sugars, amino acids) that are dissolved in water move from an area of higher concentration to an area of lower concentration. • Facilitated diffusion occurs in cells when larger substances are moved from an area of higher concentration to an area of lower concentration with the assistance of a carrier protein without the use of energy. • Osmosis refers to the movement of water molecules through a semi-permeable membrane from an area of greater water concentration or pressure (lower solute concentration) to an area of lesser water concentration or pressure (higher solute concentration). • Active transport refers to the movement of solid ~~and~~ or liquid particles into and out of a cell with an input of energy. • As cells increase in size, surface area to volume ratios decrease, making cells unable to obtain nutrients or remove wastes. To reduce the effects of this, cells divide to stay small or change shape to increase surface area or reduce volume.	

Standard BIO.4

BIO.4 The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include

a) comparison of their metabolic activities;
b) maintenance of homeostasis;
c) how the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans;
d) human health issues, human anatomy, and body systems;
e) how viruses compare with organisms; and
f) evidence supporting the germ theory of infectious disease.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The ~~millions of different~~ organisms that live on Earth today share many structural and metabolic features, including cellular organization, common molecular mechanisms for energy transformation, ~~and~~ utilization and maintenance of homeostasis, common genetic code, and mechanisms for the transmission of traits from one generation to the next. • The diversity that is evident in the natural world can be studied in the local environment in the context of variations on a common theme. • Understanding normal body functioning assists in understanding situations~~, both hereditary and environmental, in which~~ when functioning is impaired. • Like other organisms, human beings are composed of groups of cells (tissues, organs, and organ systems) that are specialized to provide the human organism with the basic requirements for life: obtaining food and deriving energy from it, maintaining homeostasis, coordinating body functions, and reproducing. • Organ systems function and interact to maintain a stable internal environment that can resist disturbance from within or without (homeostasis). • For the body to use food for energy, the food must first be digested into molecules that are absorbed and transported to cells, where the food is used for energy and for repair and growth. To burn food for the release of energy, oxygen must be supplied to cells and carbon dioxide removed. The respiratory system responds to changing demands by increasing or decreasing breathing rate in order to maintain homeostasis.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • compare and contrast the metabolic activities of all domains of life. • identify the proper response an organism would exhibit in response to changes in the environment to maintain homeostasis. • categorize and compare the Eukarya kingdoms based on cell structure, locomotion, reproduction, response to the environment and metabolism. • identify the main factors that affect human health. • describe the major functions of the human body systems and the role of each in maintaining homeostasis. • compare and contrast a virus and a cell in relation to genetic material and reproduction. • describe how Pasteur's and Koch's experimentation and hypotheses led to an understanding of the presence of microorganisms and their relationship to diseases. • ~~differentiate and give examples of the following from local ecosystems:~~ - ~~autotrophs and heterotrophs (producers, consumers, and decomposers)~~ - ~~multicellular and unicellular organisms~~ - ~~motile and non-motile organisms~~ - ~~organisms with and without cell walls~~ - ~~sexually and asexually reproducing organisms~~ - ~~aquatic and terrestrial organisms~~

Standard BIO.4

BIO.4	The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include a) comparison of their metabolic activities; b) maintenance of homeostasis; c) how the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans; d) human health issues, human anatomy, and body systems; e) how viruses compare with organisms; and f) evidence supporting the germ theory of infectious disease.

Essential Understandings	Essential Knowledge and Skills
• The circulatory system, which moves all of these substances to or from cells, responds to changing demands by increasing or decreasing heart rate and blood flow in order to maintain homeostasis. • The urinary system disposes of dissolved waste molecules; the intestinal tract removes solid wastes; and the skin and lungs rid the body of heat energy. • Specialized cells of the immune system and the molecules they produce are designed to protect against organisms and substances that enter from outside the body and against some cancer cells that arise from within. • Communication between cells is required for coordination of body functions. The nerves communicate with electrochemical signals, hormones circulate through the blood, and some cells secrete substances that spread only to nearby cells. • Environmental factors that impact human health include diet, exercise, sleep, stress, toxic substances that enter the body, viruses, and other living organisms that infect the body. • Genetic predisposition towards diseases impacts human health. Awareness of genetic predisposition allows individuals to make lifestyle changes that can enhance quality of life. • Viruses do not share many of the characteristics of living organisms. Viruses are not cells. Basic viral structure consists of a nucleic acid core surrounded by a protein coat. Viruses can reproduce only inside a living cell, the host cell. • The viral reproductive process includes the following steps: - A virus must insert its genetic material into the host cell.	- ~~behavioral responses to the environment.~~

Standard BIO.4

BIO.4	The student will investigate and understand life functions of Archaea, Bacteria and Eukarya. Key concepts include a) comparison of their metabolic activities; b) maintenance of homeostasis; c) how the structures and functions vary among and within the Eukarya kingdoms of protists, fungi, plants, and animals, including humans; d) human health issues, human anatomy, and body systems; e) how viruses compare with organisms; and f) evidence supporting the germ theory of infectious disease.

Essential Understandings	Essential Knowledge and Skills
- The viral genetic material takes control of the host cell and uses it to produce viruses. - The newly formed viruses are released from the host cell. • Throughout history, people have created explanations for disease. The introduction of the germ theory led to the understanding that many diseases are caused by microorganisms. Changes in health practices have resulted from the acceptance of the germ theory of disease. • Modern health practices emphasize sanitation, the safe handling of food and water, aseptic techniques to keep germs out of the body, and the development of vaccinations and other chemicals and processes to destroy microorganisms.	

Standard BIO.5

BIO.5	The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include a) cell growth and division; b) gamete formation; c) cell specialization; d) prediction of inheritance of traits based on the Mendelian laws of heredity; e) historical development of the structural model of DNA; f) genetic variation; g) the structure, function, and replication of nucleic acids; h) events involved in the construction of proteins; i) use, limitations, and misuse of genetic information; and j) exploration of the impact of DNA technologies.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • All living cells come from other living cells. A typical cell goes through a process of growth, development, and reproduction called the cell cycle. • Mitosis produces two genetically identical cells. During mitosis, the nucleus of the cell divides, forming two nuclei with identical genetic information. Mitosis is referred to in the following stages: prophase, metaphase, anaphase, and telophase. • Many organisms are capable of combining genetic information from two parents to produce offspring. Sex cells are produced through meiosis. This allows sexually reproducing organisms to produce genetically differing offspring, and maintain their number of chromosomes. Meiosis occurs in sexual reproduction when a diploid germ cell produces four haploid daughter cells that can mature to become gametes (sperm or egg). • Genetically diverse populations are more likely to survive changing environments. Recombination and mutation provide for genetic diversity. Some new gene combinations have little effect, some can produce organisms that are better suited to their environments, and others can be deleterious. • Mitosis and meiosis refer to division of the nuclear material. Cytokinesis is the division of the cytoplasm and organelles.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • create a diagram to model the stages of mitosis and explain the processes occurring at each stage. • describe the importance of cell specialization in the development of multicellular organisms. • create a diagram to model the stages of meiosis and explain the processes occurring at each stage. • compare and contrast the process of mitosis and meiosis and determine under which conditions each process will occur. • explain how the Mendelian laws of heredity apply to the patterns of inheritance. • ~~predict possible gametes in a dihybrid cross, given parental genotypes~~. • identify the traits expressed from a given genotype. • use a Punnett square to show all possible combinations of gametes and the likelihood that particular combinations will occur in monohybrid and dihybrid crosses. • evaluate karyotype charts and make a determination of the gender

Standard BIO.5

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Essential Understandings	Essential Knowledge and Skills
• The many body cells of an organism can be specialized to perform different functions, even though they are all descended from a single cell and contain essentially the same genetic information. • Mendel's laws of heredity are based on his mathematical analysis of observations of patterns of inheritance of traits. Geneticists apply mathematical principles of probability to Mendel's laws of heredity in order to predict the results of simple genetic crosses. The laws of probability govern simple genetic recombinations. • Genotype describes the genetic make-up of an organism and phenotype describes the organism's appearance based on its genes. Homozygous individuals have two identical alleles for a particular trait, while heterozygous individuals have contrasting alleles. When one allele masks the effect of another, that allele is called dominant and the other recessive. When an intermediate phenotype occurs and no allele dominates, incomplete dominance results. Many other patterns of inheritance exist including multiple alleles, polygenic inheritance, and sex-linked inheritance. • Once DNA was shown to be the genetic material, a race among scientists took place to work out its structure. Studies of the amounts of each DNA base in different organisms led to the concept of complementary base-paring. Interpretations of X-ray photographs of DNA were used to describe the shape and dimensions of the molecule. An analysis of this and other available data led to a structural model for the DNA double helix.	and genetic health of the individual. • provide examples of reasons for genetic diversity and why it can be an advantage for populations. • provide examples of mutations that are lethal, harmful, and beneficial. • describe the basic structure of DNA and its function in inheritance. • describe the key events leading to the development of the structural model of DNA. • given a DNA sequence, write a complementary mRNA strand (A-U, T-A, C-G and G-C). • explain the process of DNA replication. • explain the process of protein synthesis, including DNA transcription and translation. • evaluate examples of genetic engineering and the potential for controversy. • describe the uses, limitations, and potential for misuse of genetic information.

Standard BIO.5

BIO.5	The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include a) cell growth and division; b) gamete formation; c) cell specialization; d) prediction of inheritance of traits based on the Mendelian laws of heredity; e) historical development of the structural model of DNA; f) genetic variation; g) the structure, function, and replication of nucleic acids; h) events involved in the construction of proteins; i) use, limitations, and misuse of genetic information; and j) exploration of the impact of DNA technologies.

Essential Understandings	Essential Knowledge and Skills
• DNA is a polymer consisting of nucleotides. A DNA nucleotide is identified by the base it contains: adenine (A), guanine (G), ~~and~~ cytosine (C) or thymine (T). DNA is a double-stranded molecule. The strands are composed of covalently bonded sugar and phosphate molecules and are connected by complementary nucleotide pairs (A-T and C-G) like rungs on a ladder. The ladder twists to form a double helix. • The double helix model explained how heredity information is transmitted and provided the basis for an explosion of scientific research in molecular genetics. The sorting and recombination of genes in sexual reproduction results in a great variety of gene combinations in the offspring of any two parents. • The genetic code is a sequence of DNA nucleotides in the nucleus of eukaryotic cells. Before a cell divides, the instructions are duplicated so that each of the two new cells gets all the necessary information for carrying on life functions. Cells pass on their genetic code by replicating ~~(copying)~~ their DNA. • DNA stores the information for directing the construction of proteins within a cell. These proteins determine the phenotype of an organism. The genetic information encoded in DNA molecules provides instructions for assembling protein molecules. The code is virtually the same for all life forms. • During DNA replication, enzymes unwind and unzip the double helix and each strand serves as a template for building a new DNA molecule.	

Standard BIO.5

BIO.5	The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include a) cell growth and division; b) gamete formation; c) cell specialization; d) prediction of inheritance of traits based on the Mendelian laws of heredity; e) historical development of the structural model of DNA; f) genetic variation; g) the structure, function, and replication of nucleic acids; h) events involved in the construction of proteins; i) use, limitations, and misuse of genetic information; and j) exploration of the impact of DNA technologies.

Essential Understandings	Essential Knowledge and Skills
Free nucleotides bond to the template (A-T and C-G) forming a complementary strand. The final product of replication is two identical DNA molecules. • Inserting, deleting, or substituting DNA bases can alter genes. An altered gene may be passed on to every cell that develops from it, causing an altered phenotype. An altered phenotype may be neutral, beneficial or detrimental. Sometimes entire chromosomes can be added or deleted, resulting in a genetic disorder ~~such as Trisomy 21 (Down syndrome)~~. These abnormalities may be diagnosed using a Karyotype. • In order for cells to make proteins, the DNA code must be transcribed (copied) to messenger RNA (mRNA). The mRNA carries the code from the nucleus to the ribosomes in the cytoplasm. RNA is a single-stranded polymer of four nucleotide monomers. A RNA nucleotide is identified by the base it contains: adenine (A), guanine (G), and cytosine (C) or uracil (U). • At the ribosome, amino acids are linked together to form specific proteins. The amino acid sequence is ~~directed~~ determined by the mRNA molecule. • DNA technologies allow scientists to identify, study, and modify genes. Forensic identification is an example of the application of DNA technology. • Genetic engineering techniques are used in a variety of industries, in agriculture, in basic research, and in medicine. There is great ~~potential~~	

Standard BIO.5

BIO.5	The student will investigate and understand common mechanisms of inheritance and protein synthesis. Key concepts include a) cell growth and division; b) gamete formation; c) cell specialization; d) prediction of inheritance of traits based on the Mendelian laws of heredity; e) historical development of the structural model of DNA; f) genetic variation; g) the structure, function, and replication of nucleic acids; h) events involved in the construction of proteins; i) use, limitations, and misuse of genetic information; and j) exploration of the impact of DNA technologies.

Essential Understandings	Essential Knowledge and Skills
~~for the development of~~ benefit in terms of useful products derived through genetic engineering (e.g., human growth hormone, insulin, and pest- and disease-resistant fruits and vegetables). • Eugenics, a pseudo-science of selective procreation, was a movement throughout the twentieth century, worldwide as well as in Virginia, that demonstrated a misuse of the principles of heredity. • The Human Genome Project is a collaborative effort to map the entire gene sequence of organisms. This information ~~will be~~ may be useful in detection, prevention, and treatment of many genetic diseases. The potential for identifying and altering genomes raises practical and ethical questions. • Cloning is the production of genetically identical cells and/or organisms.	

Standard BIO.6

BIO.6 The student will investigate and understand bases for modern classification systems. Key concepts include

a) structural similarities among organisms;
b) fossil record interpretation;
c) comparison of developmental stages in different organisms;
d) examination of biochemical similarities and differences among organisms; and
e) systems of classification that are adaptable to new scientific discoveries.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Biological classifications are based on how organisms are related. Organisms are classified into a hierarchy of groups and subgroups based on similarities that reflect their relationships over a period of time. • Binomial nomenclature is a standard way of identifying a species with a scientific two-word name. The first word is the genus name and the second the species name. Species is the basic unit of classification. A species is defined as a group of organisms that has the ability to interbreed and produce fertile offspring in nature. • A dichotomous key is a classification tool used to identify and organize organisms using defining characteristics. • Information about relationships among living organisms and those that inhabited Earth in the past is gained by comparing biochemistry and developmental stages of organisms and by examining and interpreting the fossil record. This information is continually being gathered and used to modify and clarify existing classification systems. • Evolutionary relationships can be represented using a branching diagram called a cladogram or phylogenetic tree which are organized by shared, derived characteristics. • Similarities among organisms on the structural and metabolic levels are reflected in the large degree of similarity in proteins and nucleic acids of different organisms. Diversity is the product of variations in these molecules. • ~~Investigations of local flora and fauna provide opportunities to enhance understanding and stimulate interest in local environmental issues by developing and applying classification systems in the field.~~	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • construct and utilize dichotomous keys to classify groups of objects and organisms. • describe relationships based on homologous structures. • compare structural characteristics of an extinct organism, as evidenced by its fossil record, with present, familiar organisms. • recognize similarities in embryonic stages in diverse organisms in the animal kingdom, from zygote through embryo and infer relationships. • ~~describe relationships between organisms, given amino acid or nucleotide sequences.~~ • compare biochemical evidence (DNA sequences, amino acid sequences) and describe relationships. • interpret a ~~clad gram~~ cladogram or phylogenic tree showing evolutionary relationships among organisms. • investigate flora and fauna in field investigations and apply classification systems.

Standard BIO.7

BIO.7 The student will investigate and understand how populations change through time. Key concepts include

a) evidence found in fossil records;
b) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations;
c) how natural selection leads to adaptations;
d) emergence of new species; and
e) scientific evidence and explanations for biological evolution.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • A fossil is any evidence of an organism that lived long ago. Scientists have used the fossil record to construct a history of life on Earth. Although there is not a complete record of ancient life for the past 3.5 billion years, a great deal of modern knowledge about the history of life comes from the fossil record. • ~~Scientists have developed hypotheses about conditions on early Earth that could have led to the formation of the first organic molecules, early self-replicating molecules, the source of free oxygen in Earth's atmosphere, and the appearance of prokaryotic and later eukaryotic cells.~~ • Populations are groups of interbreeding individuals that live in the same place at the same time and compete with each other for food, water, shelter, and mates. Populations produce more offspring than the environment can support. Organisms with certain genetic variations will be favored to survive and pass their variations on to the next generation. The unequal ability of individuals to survive and reproduce leads to the gradual change in a population, generation after generation over many generations. Depending on the selective pressure, these changes can be rapid over few generations (ie., antibiotic resistance) • Genetic mutations and variety produced by sexual reproduction allow for diversity within a given population. Many factors can cause a change in a gene over time. Mutations are important in how populations change over time because they result in ~~genetic~~ changes to the gene pool. • Through his observations, including those made in the Galapagos Islands, Charles Darwin formulated a theory of how species change over time, called natural selection. Natural selection is a process by which	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • determine the relative age of a fossil given information about its position in the rock and absolute dating by radioactive decay. • differentiate between relative and absolute dating based on fossils in biological evolution. • recognize that adaptations may occur in populations of organisms over a period of time. • describe the impact of reproductive strategies and rates on a population's survival. • describe how genetic variation can lead to gradual changes in populations and the emergence of new species over time. • predict the impact of environmental pressures on populations. • explain how natural selection leads to changes in gene frequency in a population over time. • compare and contrast punctuated equilibrium with gradual change over time.

Standard BIO.7

BIO.7	The student will investigate and understand how populations change through time. Key concepts include a) evidence found in fossil records; b) how genetic variation, reproductive strategies, and environmental pressures impact the survival of populations; c) how natural selection leads to adaptations; d) emergence of new species; and e) scientific evidence and explanations for biological evolution.

Essential Understandings	Essential Knowledge and Skills
organisms with traits well suited to an environment survive and reproduce at a greater rate than organisms less suited to that environment~~.~~, and ~~Natural selection~~ is governed by the principles of genetics. The change in frequency of a gene in a given population leads to a change favoring maintenance of that gene within a population and if so, may result in the emergence of a new species. Natural selection operates on populations over many generations. • Depending on the rate of adaptation, the rate of reproduction, and the environmental factors present, structural adaptations may take millions of years to develop. • Adaptations sometimes arise abruptly in response to strong environmental selective pressures, for example, the development of antibiotic resistance in bacterial populations, morphological changes in the peppered moth population, the development of pesticide resistance in insect populations. • Stephen Jay Gould's idea of *punctuated equilibrium* proposes that organisms may undergo rapid (in geologic time) bursts of speciation followed by long periods of time unchanged. This view is in contrast to the traditional evolutionary view of gradual and continuous change.	

Standard BIO.8

BIO.8 The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include

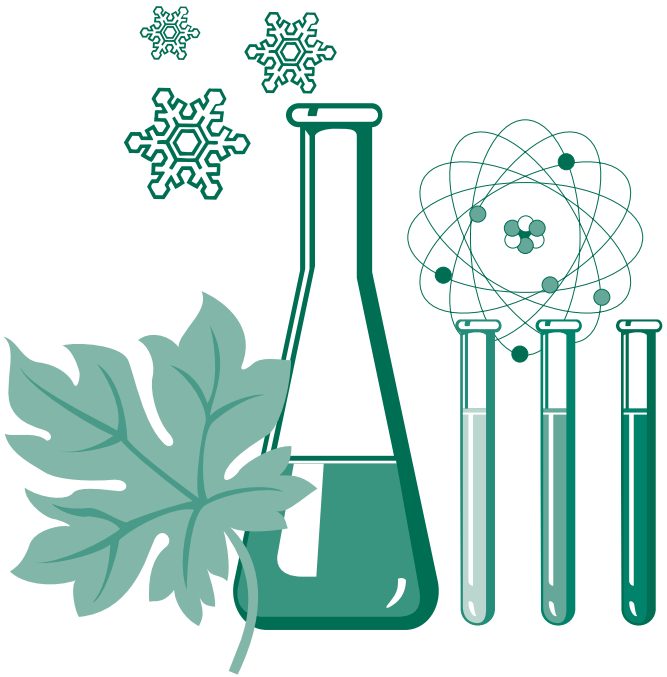
a) interactions within and among populations including carrying capacities, limiting factors, and growth curves;
b) nutrient cycling with energy flow through ecosystems;
c) succession patterns in ecosystems;
d) the effects of natural events and human activities on ecosystems; and
e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • As any population of organisms grows, it is held in check by interactions among a variety of biotic and abiotic factors. • Abiotic factors are the nonliving elements in an ecosystem, such as temperature, moisture, air, salinity, and pH. Biotic factors are all the living organisms that inhabit the environment, including predators, food sources, and competitors. • Population growth curves exhibit many characteristics, such as initial growth stage, exponential growth, steady state, decline, and extinction. Limiting factors are the components of the environment that restrict the growth of populations. Carrying capacity is the number of organisms that can be supported by the resources in an ecosystem. • A community is a collection of interacting populations. • Symbiosis is a close and permanent relationship between organisms of two different species. Examples include mutualism, commensalism, and parasitism. • Ecosystems demonstrate an exchange of energy and nutrients among inhabiting organisms. ~~The gradual change in an ecosystem that occurs as communities slowly replace one another is known as *ecological succession.*~~ • An ecosystem consists of all the interacting species and the abiotic environment in a given geographic area. All matter including essential ~~N~~nutrients cycle through an ecosystem. The most common examples of such matter and nutrients include carbon, ~~oxygen,~~ nitrogen, and water. • Energy flows in an ecosystem from producers to various levels of	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • graph and interpret a population growth curve and identify the carrying capacity of the populations. • make predictions about changes that could occur in population numbers as the result of population interactions. • illustrate and/or model the key processes in the water, carbon, and nitrogen cycle and explain the role of living things in each of the cycles. • given an illustration of a food chain and a food web, identify each organism as a producer (autotroph), consumer (primary/second order), or decomposer and describe their role in the ecosystem. • interpret how the flow of energy occurs between trophic levels in all ecosystems ~~and can be depicted as follows~~ in each of the following: - food chain - food web - pyramid of energy - pyramid of biomass - pyramid of numbers. • identify and describe an ecosystem in terms of the following: - effects of biotic and abiotic components - examples of interdependence - evidence of human influences - energy flow and nutrient cycling - diversity analysis • describe the patterns of succession found in aquatic and terrestrial

Standard BIO.8

BIO.8	The student will investigate and understand dynamic equilibria within populations, communities, and ecosystems. Key concepts include a) interactions within and among populations including carrying capacities, limiting factors, and growth curves; b) nutrient cycling with energy flow through ecosystems; c) succession patterns in ecosystems; d) the effects of natural events and human activities on ecosystems; and e) analysis of the flora, fauna, and microorganisms of Virginia ecosystems.

Essential Understandings	Essential Knowledge and Skills
consumers and decomposers. This flow of energy can be diagramed using a food chain or food web. The efficiency of this flow of energy is represented by an energy pyramid. • Ecological succession is a ~~series of changes in a community in which new populations of organisms gradually replace existing ones~~ predictable change in the sequence of species that establish in a particular area over time. • A climax community occurs when succession slows down and a stable community is established. ~~The climax community is made up of organisms that are successful at competing for resources in a given environment.~~ The climax community in most of Virginia is a deciduous oak-hickory (hardwood) forest. • As the human population increases, so does human impact on the environment. Human activities, such as reducing the amount of forest cover, increasing the amount and variety of chemicals released into the ~~atmosphere~~ environment, and intensive farming, have changed the Earth's land, oceans, and atmosphere. Some of these changes have decreased the capacity of the environment to support some life forms. • ~~Investigations of local ecosystems provide opportunities for students to enhance their understanding and stimulate their interest in local environmental issues by applying ecological principles in the field.~~	ecosystems of Virginia. • identify the similarities and differences between primary and secondary succession. • describe the characteristics of a climax community. • ~~Observe and identify flora and fauna in a local community,~~ use local ecosystems to apply ecological principles in the classroom and in the field where appropriate, using field guides and dichotomous keys for identifying and describing ~~organisms~~ flora and fauna that characterize the local ecosystem. • evaluate examples of human activities that have negative and positive impacts on Virginia's ecosystems. • recognize that the Chesapeake Bay watershed includes the majority of Virginia and human activities play an important role in its health.



Science Standards of Learning Curriculum Framework

Chemistry

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning Curriculum Framework* amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The *Science Curriculum Framework* provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (6 – Physics); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard
This section includes background information for the teacher (K-5). It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan lessons focusing on the standard.

Essential Understandings
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard CH.1

CH.1 The student will investigate and understand that experiments in which variables are measured, analyzed, and evaluated produce observations and verifiable data. Key concepts include

a) designated laboratory techniques;
b) safe use of chemicals and equipment;
c) proper response to emergency situations;
d) manipulation of multiple variables, using repeated trials;
e) accurate recording, organization, and analysis of data through repeated trials;
f) mathematical and procedural error analysis;
g) mathematical manipulations including SI units, scientific notation, linear equations, graphing, ratio and proportion, significant digits, and dimensional analysis;
h) use of appropriate technology including computers, graphing calculators, and probeware, for gathering data, communicating results, and using simulations to model concepts;
i) construction and defense of a scientific viewpoint; and
j) the use of current applications to reinforce chemistry concepts.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Techniques for experimentation involve the identification and the proper use of chemicals, the description of equipment, and the recommended statewide framework for high school laboratory safety. • Measurements are useful in gathering data about chemicals and how they behave. • Repeated trials during experimentation ensure verifiable data. • Data tables are used to record and organize measurements. • Mathematical procedures are used to validate data~~.~~, including percent error to evaluate accuracy. • Measurements of quantity include length, volume, mass, temperature, time, and pressure to the correct number of significant digits. Measurements must be expressed in International System of Units (SI) units. • Scientific notation is used to write very small and very large numbers. • Algebraic equations represent relationships between dependent and independent variables.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • demonstrate safe laboratory practices, procedures, and techniques. • demonstrate the following basic lab techniques: filtering, ~~decanting~~, using chromatography, and lighting a gas burner. • understand Material Safety Data Sheet (MSDS) warnings, including handling chemicals, lethal dose (LD), hazards, disposal, and chemical spill cleanup. • identify the following basic lab equipment: beaker, Erlenmeyer flask, graduated cylinder, test tube, test tube rack, test tube holder, ring stand, wire gauze, clay triangle, crucible with lid, ~~evaporation~~ evaporating-dish, watch glass, wash bottle, and dropping pipette. • make the following measurements, using the specified equipment: - volume: graduated cylinder, pipette, volumetric flask, buret - mass: electronic or dial-a-gram - temperature: thermometer and/or temperature probe - pressure: barometer or pressure probe. • identify, locate, and know how to use laboratory safety equipment, including aprons, goggles, gloves, fire extinguishers, fire blanket,

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Essential Understandings	Essential Knowledge and Skills
• Graphs are used to summarize the relationship between the independent and dependent variable. • Graphed data give a picture of a relationship. • Ratios and proportions are used in calculations. • Significant digits of a measurement are the number of known digits together with one estimated digit. • The last digit of any valid measurement must be estimated and is therefore uncertain. • Dimensional analysis is a way of translating a measurement from one unit to another unit. • Graphing calculators can be used to manage the mathematics of chemistry. • Scientific questions drive new technologies that allow discovery of additional data and generate better questions. New tools and instruments provide an increased understanding of matter at the atomic, nano and molecular scale. • Constant reevaluation in the light of new data is essential to keeping scientific knowledge current. In this fashion, all forms of scientific	safety shower, eye wash, broken glass container, and fume hood. • design and perform controlled experiments to test predictions, including the following key components: hypotheses, independent and dependent variables, constants, controls, and repeated trials. • ~~Identify variables.~~ • predict outcome(s) when a variable is changed. • read measurements and record data, ~~using~~ reporting the significant digits of the measuring equipment. • demonstrate precision (reproducibility) in measurement. • recognize accuracy in terms of closeness to the true value of a measurement. • determine the mean of a set of measurements. • use data collected to calculate percent error. • discover and eliminate procedural errors. • ~~know most frequently used~~ use common SI prefixes and their values (milli-, centi-, ~~deci-~~, kilo-) in measurements and calculations. • demonstrate the use of scientific notation, using the correct number of

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Essential Understandings	Essential Knowledge and Skills
knowledge remain flexible and may be revised as new data and new ways of looking at existing data become available.	significant digits with powers of ten notation for the decimal place. • ~~Correctly utilize the following when graphing~~ graph data utilizing the following: - independent variable (horizontal axis) - dependent variable (vertical axis) - scale and units of a graph - regression line (best fit curve). • calculate mole ratios, percent composition, conversions, and ~~relative~~ average atomic mass. • ~~Use the rules for performing operations~~ perform calculations ~~with~~ according to significant digits rules. • ~~utilize~~ convert measurements using dimensional analysis. • use graphing calculators to solve chemistry problems. • read a measurement from a graduated scale, stating measured digits plus the estimated digit. • use appropriate technology for data collection and analysis, including probeware interfaced to a graphing calculator and/or computer and computer simulations.

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Essential Understandings	Essential Knowledge and Skills
	• ~~use probeware to gather data.~~ • summarize knowledge gained through gathering and appropriate processing of data in a report that documents background, objective(s), data collection, data analysis and conclusions. • explain the emergence of modern theories based on historical development. For example, students should be able to explain the origin of the atomic theory beginning with the Greek atomists and continuing through the most modern ~~Q~~quantum models.

Standard CH.2

CH.2	The student will investigate and understand that the placement of elements on the periodic table is a function of their atomic structure. The periodic table is a tool used for the investigations of a) average atomic mass, mass number, and atomic number; b) isotopes, half lives, and radioactive decay; c) mass and charge characteristics of subatomic particles; d) families or groups; e) periods; f) trends including atomic radii, electronegativity, shielding effect, and ionization energy; g) electron configurations, valence electrons, and oxidation numbers; h) chemical and physical properties; and i) historical and quantum models.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The periodic table is arranged in order of increasing atomic number~~s~~. • The atomic number of an element is the same as the number of protons. In a neutral atom, the number of electrons is the same as the number of protons. All atoms of an element have the same number of protons. • The average atomic mass for each element is the weighted average of that element's naturally occurring isotopes. • The mass number of an element is the sum of the number of protons and neutrons. It is different for each element's isotopes. • An isotope is an atom that has the same number of protons as another atom of the same element but has a different number of neutrons. Some isotopes are radioactive; many are not. • Half-life is the length of time required for half of a given sample of a radioactive isotope to decay. • Electrons have little mass and a negative (–) charge. They are located in electron clouds or probability clouds outside the nucleus. • Protons have a positive (+) charge. Neutrons have no charge. Protons and neutrons are located in the nucleus of the atom and comprise most	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~Using a periodic chart,~~ determine the atomic number, atomic mass, the number of protons, and the number of electrons~~, and the number of neutrons~~ of any ~~neutral~~ atom of a particular element using a periodic table. • determine the number of neutrons in an isotope given its mass number. • ~~determine~~ perform calculations involving the half-life of a radioactive substance. • ~~describe~~ differentiate between alpha, beta, and gamma radiation with respect to penetrating power, shielding, and composition. • differentiate between the major atom components (proton, neutron and electron) in terms of location, size, and charge. • distinguish between a group and a period. • identify key groups, periods, and regions of elements on the periodic table. • identify and explain trends in the periodic table as they relate to

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c) mass and charge characteristics of subatomic particles;
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e) periods;
f) trends including atomic radii, electronegativity, shielding effect, and ionization energy;
g) electron configurations, valence electrons, and oxidation numbers;
h) chemical and physical properties; and
i) historical and quantum models.

Essential Understandings	Essential Knowledge and Skills
of its mass. Quarks are also located in the nucleus of the atom. • The names of groups and periods on the periodic chart are alkali metals, alkaline earth metals, transition metals, halogens, and noble gases~~, and metalloids~~. • Metalloids have properties of metals and nonmetals. They are located between metals and nonmetals on the periodic table. Some are used in semiconductors. • Periods and groups are named by numbering columns and rows. Horizontal rows called periods have predictable properties based on an increasing number of electrons in the outer ~~orbitals~~ energy levels. Vertical columns called groups or families have similar properties because of their similar valence electron configurations. • The Periodic Law states that when elements are arranged in order of increasing atomic numbers, their physical and chemical properties show a periodic pattern. • Periodicity is regularly repeating patterns or trends in the chemical and physical properties of the elements arranged in the periodic table. • Atomic radius is the measure of the distance between radii of two identical atoms of an element. Atomic radius decreases from left to right and increases from top to bottom within given groups. • Electronegativity is the measure of the attraction of an atom for	ionization energy, electronegativity and relative sizes. • compare an element's reactivity to the reactivity of other elements in the table. • relate the position of an element on the periodic table to its electron configuration. • ~~use an element's electron configuration to~~ determine the number of valence electrons and possible oxidation numbers from an element's electron configuration. • write the electron configuration for the first 20 elements of the periodic table. • distinguish between physical and chemical properties of metals and nonmetals. • differentiate between pure substances and mixtures and between homogeneous and heterogeneous mixtures. • ~~major insights regarding the atomic model of the atom and~~ identify key contributions of principal scientists ~~include~~ including: - ~~particles~~ *atomos*, initial idea of atom – Democritus - first atomic theory of matter, solid sphere model – John Dalton - discovery of the electron using the cathode ray tube experiment, plum pudding model – J. J. Thom~~p~~son - discovery of the nucleus using the gold foil experiment, nuclear

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Essential Understandings	Essential Knowledge and Skills
electrons in a ~~covalent~~ bond. Electronegativity increases from left to right within a period and decreases from top to bottom within a group. • Shielding effect is constant within a given period and increases within given groups from top to bottom. • Ionization energy is the energy required to remove the most loosely held electron from a neutral atom. Ionization energies generally increase from left to right and decrease from top to bottom of a given group. • Electron configuration is the arrangement of electrons around the nucleus of an atom based on their energy level. • Electrons are added one at a time to the lowest energy levels first (Aufbau Principle). Electrons occupy equal-energy orbitals so that a maximum number of unpaired electrons results (Hund's Rule). • Energy levels are designated 1–7. Orbitals are designated s, p, d, and f according to their shapes ~~s, p, d, f orbitals~~ and relate to the regions of the Periodic Table. An orbital can hold a maximum of two electrons (Pauli Exclusion Principle). • Atoms can gain, lose, or share electrons within the outer energy level. • Loss of electrons from neutral atoms results in the formation of an ion with a positive charge (cation). Gain of electrons by a neutral atom results in the formation of an ion with a negative charge (anion).	model – Ernest Rutherford - discovery of charge of electron using the oil drop experiment – Robert Millikan - energy levels, planetary model ~~of atom~~ – Niels Bohr - periodic table arranged by atomic mass – Demitri~~y~~ Mendeleev - periodic table arranged by atomic number – Henry Moseley - quantum nature of energy – Max Planck - uncertainty principle, quantum mechanical model – Werner Heisenberg - wave theory, quantum mechanical model – Louis de Broglie~~.~~ - quantum numbers, quantum mechanical model – Erwin Schrödinger. • differentiate between the historical and quantum models of the atom.

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b) isotopes, half lives, and radioactive decay;
c) mass and charge characteristics of subatomic particles;
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e) periods;
f) trends including atomic radii, electronegativity, shielding effect, and ionization energy;
g) electron configurations, valence electrons, and oxidation numbers;
h) chemical and physical properties; and
i) historical and quantum models.

Essential Understandings	Essential Knowledge and Skills
• Transition metals can have multiple oxidation states. • Matter occurs as elements (pure), compounds (pure), and mixtures, which may be homogeneous (solutions) or heterogeneous. Some elements, such as oxygen, hydrogen, fluorine, chlorine, bromine, iodine, and nitrogen, naturally occur as diatomic molecules. • Matter is classified by its chemical and physical properties. • Physical properties refer to the condition or quality of a substance that can be observed or measured without changing the substance's composition. Important physical properties are density, conductivity, melting point, boiling point, malleability, and ductility. • Chemical properties refer to the ability of a substance to undergo chemical reaction and form a new substance. • Reactivity is the tendency of an element to enter into a chemical reaction. • Discoveries and insights related to the atom's structure have changed the model of the atom over time. Historical models have included solid sphere, plum pudding, nuclear, and planetary models. The modern atomic theory is called the ~~Q~~quantum ~~M~~mechanical ~~M~~model.	

Standard CH.3

CH.3 The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations. Key concepts include

a) nomenclature;
b) balancing chemical equations;
c) writing chemical formulas;
d) bonding types;
e) reaction types; and
f) reaction rates, kinetics, and equilibrium.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Chemical formulas are used to represent compounds. Subscripts represent the relative number of each type of atom in a molecule or formula unit. The International Union of Pure and Applied Chemistry (IUPAC) system is used for naming compounds. • When pairs of elements form two or more compounds, the masses of one element that combine with a fixed mass of the other element form simple, whole-number ratios (Law of Multiple Proportions). • ~~Elements and compounds react in different ways.~~ Compounds have different properties than the elements from which they are composed. • Conservation of matter is represented in balanced chemical equations. A coefficient is a quantity that precedes a reactant or product ~~symbol or~~ formula in a chemical equation and indicates the relative number of particles involved in the reaction. • The empirical formula shows the simplest whole-number ratio in which the atoms of the elements are present in the compound. The molecular formula shows the actual number of atoms of each element in one molecule of the substance. • Lewis dot diagrams are used to represent valence electrons in an element. Structural formulas ~~also~~ show the arrangements of atoms and bonds in a molecule and are represented by Lewis dot structures. • Bonds form between atoms to achieve stability. Covalent bonds involve the sharing of electrons between atoms. Ionic bonds involve the transfer of electrons between ions. Elements with low ionization energy form	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • name binary covalent/molecular compounds. • name binary ionic compounds (using the Roman numeral system where appropriate). • predict, draw, and name molecular shapes (bent, linear, trigonal planar, tetrahedral, and trigonal pyramidal). • transform word equations into chemical equations and balance chemical equations. • write the chemical formulas for certain common substances, such as ammonia, water, carbon monoxide, carbon dioxide, sulfur dioxide, and carbon tetrafluoride. • ~~recognize the formulas and names of certain polyatomic ions, such as carbonate, sulfate, nitrate, hydroxide, phosphate, and ammonium, and~~ use ~~these~~ polyatomic ions for naming and writing ~~the~~ formulas of ionic compounds, including carbonate, sulfate, nitrate, hydroxide, phosphate, and ammonium. • draw Lewis dot diagrams to represent valence electrons in elements and draw Lewis dot ~~diagrams~~ structures to show covalent bonding. • use valence shell electron pair repulsion (VSEPR) model to ~~predict,~~ draw and name molecular shapes (bent, linear, trigonal planar, tetrahedral, and trigonal pyramidal). • recognize polar molecules and non-polar molecules.

Standard CH.3

CH.3	The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations. Key concepts include a) nomenclature; b) balancing chemical equations; c) writing chemical formulas; d) bonding types; e) reaction types; and f) reaction rates, kinetics, and equilibrium.

Essential Understandings	Essential Knowledge and Skills
positive ions (cations) easily. Elements with high ionization energy form negative ions (anions) easily. Polar bonds form between elements with very different electronegativities. Non-polar bonds form between elements with similar electronegativities. • Polar molecules result when ~~a molecule behaves as if one end were positive and the other end negative~~ electrons are distributed unequally. • ~~Spontaneous reactions may be fast or slow. Randomness (entropy), heat content (enthalpy), and temperature affect spontaneity.~~ • Major types of chemical reactions are - synthesis ($A+B \rightarrow AB$) - decomposition ($BC \rightarrow B+C$) - single replacement ($A+BC \rightarrow B+AC$) - double replacement ($AC+BD \rightarrow AD+BC$) - neutralization ($HX+MOH \rightarrow H_2O + MX$) - combustion ($C_xH_y + O_2 \rightarrow CO_2 + H_2O$). • Kinetics is the study of reaction rates. Several factors affect reaction rates, including temperature, concentration, surface area, and the presence of a catalyst. • Reaction rates/kinetics are affected by activation energy, catalysis, and the degree of randomness (entropy). Catalysts decrease the amount of activation energy needed. • Chemical reactions ~~based on the net heat energy~~ are exothermic reactions (heat producing) and endothermic reactions (heat absorbing). • Reactions occurring in both forward and reverse directions are	• classify types of chemical reactions as synthesis, decomposition, single replacement, double replacement, neutralization, and/or combustion. • recognize that there is a natural tendency for systems to move in a direction of randomness (entropy). • recognize equations for redox reactions and neutralization reactions. • distinguish between an endothermic and exothermic process. • interpret reaction rate diagrams. • identify and explain the effect of factors that affect the rate and time of a chemical reaction (catalyst, temperature, concentration, size of particles). • distinguish between irreversible reactions and those at equilibrium. • predict the shift in equilibrium when a system is subjected to a stress (Le Chatelier's Principle) and identify the factors that can cause a shift in equilibrium (temperature, pressure, and concentration.) • ~~Identify common examples of reaction types.~~

Standard CH.3

CH.3	The student will investigate and understand how conservation of energy and matter is expressed in chemical formulas and balanced equations. Key concepts include a) nomenclature; b) balancing chemical equations; c) writing chemical formulas; d) bonding types; e) reaction types; and f) reaction rates, kinetics, and equilibrium.

Essential Understandings	Essential Knowledge and Skills
reversible. Reversible reactions can reach a state of *equilibrium*, where the reaction rates of both the forward and reverse reactions are constant. ~~can occur in two directions simultaneously.~~ Le Chatelier's Principle indicates the qualitative prediction of direction of change with temperature, pressure, and concentration.	

Standard CH.4

CH.4 The student will investigate and understand that chemical quantities are based on molar relationships. Key concepts include

a) Avogadro's principle and molar volume;
b) stoichiometric relationships;
c) solution concentrations; and
d) acid/base theory; strong electrolytes, weak electrolytes, and nonelectrolytes; dissociation and ionization; pH and pOH; and the titration process.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Atoms and molecules are too small to count by usual means. A *mole* is a way of counting any type of particle (atoms, molecules, and formula units). • Avogadro's number = 6.02×10^{23} particles per mole. • Molar mass of a substance is its average atomic mass in grams from the Periodic Table. • Molar volume = ~~22.4 dm^3/mole and/or~~ 22.4 L/mole for any gas at standard temperature and pressure (STP). • Stoichiometry involves quantitative relationships. Stoichiometric relationships are based on mole quantities in a balanced equation. • Total grams of reactant(s) = total grams of product(s). • Molarity = ~~moles/dm^3 or~~ moles of solute/L of solution. • [ ] refers to molar concentration. • When solutions are diluted, the moles of solute present initially remain. • The saturation of a solution is dependent on the amount of solute present in the solution. • Two important classes of compounds are acids and bases. Acids and bases are defined by several theories. According to ~~T~~the Arrhenius theory ~~of~~, acids are characterized by their sour taste, low pH, and the fact that they turn litmus paper red. According to ~~T~~the Arrhenius theory ~~of~~, bases are characterized by their bitter taste, slippery feel, high pH, and the fact that they turn litmus paper blue. According to ~~T~~the	~~Knowledge Skills~~ In order to meet this standard, it is expected that students will • perform conversions between mass, volume, particles, and moles of a substance. • ~~Make~~ perform stoichiometric calculations involving the following relationships: - mole-mole; - mass-mass; - mole-mass; - mass-volume; - mole-volume; ~~and~~ - volume-volume; - particle-particle; - mole-particle; - mass-particle; and - volume-particle. • identify the limiting reactant (reagent) in a reaction. • calculate percent yield of a reaction. • perform calculations involving the molarity of a solution, including dilutions. • interpret solubility curves. • differentiate between the defining characteristics of the Arrhenius theory of acids and bases and the Bronsted-Lowry theory of acids and bases.

Standard CH.4

CH.4	The student will investigate and understand that chemical quantities are based on molar relationships. Key concepts include a) Avogadro's principle and molar volume; b) stoichiometric relationships; c) solution concentrations; and d) acid/base theory; strong electrolytes, weak electrolytes, and nonelectrolytes; dissociation and ionization; pH and pOH; and the titration process.

Essential Understandings	Essential Knowledge and Skills
Bronsted-Lowry theory ~~of~~, acids are proton donors, whereas bases are proton acceptors. Acids and bases dissociate in varying degrees. • Strong electrolytes dissociate completely. Weak electrolytes dissociate partially. Non-electrolytes do not dissociate. • pH is a number scale ranging from 0 to 14 that represents the acidity of a solution. The pH number denotes hydrogen (hydronium) ion concentration. The pOH number denotes hydroxide ion concentration. The higher the hydronium [H_3O^+] concentration, the lower the pH. • pH + pOH = 14 • Strong acid-strong base titration is the process that measures [H~~+~~$^+$] and [OH-$^-$]. • Indicators show color changes at certain pH levels.	• identify common examples of acids and bases, including vinegar and ammonia. • compare and contrast the differences between strong, weak, and non-electrolytes. • relate the hydronium ion concentration to the pH scale. • perform titrations in a laboratory setting using indicators.

Standard CH.5

CH.5 The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. Key concepts include

a) pressure, temperature, and volume;
b) partial pressure and gas laws;
c) vapor pressure;
d) phase changes;
e) molar heats of fusion and vaporization;
f) specific heat capacity; and
g) colligative properties.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Atoms and molecules are in constant motion, and the amount of motion depends on the substance's state of matter. • The ~~K~~kinetic ~~M~~molecular ~~T~~theory is a model for predicting and explaining gas behavior. • Gases have mass and occupy space. Gas particles are in constant, rapid, random motion and exert pressure as they collide with the walls of their containers. Gas molecules with the lightest mass travel fastest. Relatively large distances separate gas particles from each other. • Equal volumes of gases at the same temperature and pressure contain an equal number of particles. Pressure ~~U~~units include atm, ~~K~~kPa, and mm ~~of~~ Hg. • An ~~I~~ideal ~~G~~gas does not exist, but this concept is used to model gas behavior. A ~~R~~real ~~G~~gas exists, has intermolecular forces and particle volume, and can change states. The Ideal Gas Law states that PV = nRT. • The pressure and volume of a sample of a gas at constant temperature are inversely proportional to each other (Boyle's Law: $P_1V_1 = P_2V_2$). • At constant pressure, the volume of a fixed amount of gas is directly proportional to its absolute temperature (Charles' Law: $V_1/T_1 = V_2/T_2$). • The Combined Gas Law ($P_1V_1/T_1 = P_2V_2/T_2$) relates pressure, volume, and temperature of a gas.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • explain the behavior of gases and the relationship between pressure and volume (Boyle's Law), and volume and temperature (Charles' Law). • solve problems and interpret graphs involving the gas laws. • identify how hydrogen bonding in water plays an important role in many physical, chemical, and biological phenomena. • interpret vapor pressure graphs. • graph and interpret a heating curve (temperature vs. time). • interpret a phase diagram of water. • calculate energy changes, using molar heat of fusion and molar heat of vaporization. • calculate energy changes, using specific heat capacity. • ~~Perform calorimetry calculations.~~ • examine the polarity of various solutes and solvents in solution formation.

Standard CH.5

CH.5	The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. Key concepts include a) pressure, temperature, and volume; b) partial pressure and gas laws; c) vapor pressure; d) phase changes; e) molar heats of fusion and vaporization; f) specific heat capacity; and g) colligative properties.

Essential Understandings	Essential Knowledge and Skills
• The sum of the partial pressures of all the components in a gas mixture is equal to the total pressure of a gas mixture (Dalton's law of partial pressures). • Forces of attraction (intermolecular forces) between molecules determine ~~the physical changes of state~~ their state of matter at a given temperature. Forces of attraction include hydrogen bonding, dipole-dipole attraction, and London dispersion (van der Waals) forces. • Vapor pressure is ~~a property of a substance determined by intermolecular forces~~ the pressure of the vapor found directly above a liquid in a closed container. When the vapor pressure equals the atmospheric pressure, a liquid boils. Volatile liquids have high vapor pressures, weak intermolecular forces, and low boiling points. Nonvolatile liquids have low vapor pressures, strong intermolecular forces and high boiling points. • Solid, liquid, and gas phases of a substance have different energy content. Pressure, temperature, and volume changes can cause a change in physical state. Specific amounts of energy are absorbed or released during phase changes. • A fourth state of matter is the plasma phase. A plasma is formed when a gas is heated to a temperature at which its electrons dissociate from the nuclei. • A heating curve graphically describes the relationship between temperature and energy (heat). It can be used to identify a substance's state of matter at a given temperature as well as the temperature(s) at	

Standard CH.5

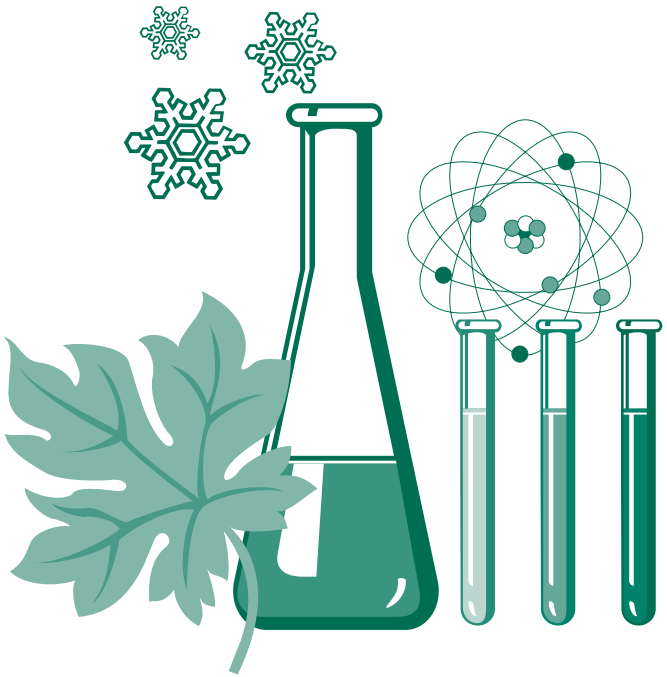
CH.5	The student will investigate and understand that the phases of matter are explained by kinetic theory and forces of attraction between particles. Key concepts include a) pressure, temperature, and volume; b) partial pressure and gas laws; c) vapor pressure; d) phase changes; e) molar heats of fusion and vaporization; f) specific heat capacity; and g) colligative properties.

Essential Understandings	Essential Knowledge and Skills
which it changes state. It also shows the strength of the intermolecular forces present in a substance. • Molar heat of fusion is a property that describes the amount of energy needed to convert one mole of a substance between its solid and liquid states. Molar heat of vaporization is a property that describes the amount of energy needed to convert one mole of a substance between its liquid and gas states. Specific heat capacity is a property of a substance that tells the amount of energy needed to raise one gram of a substance by one degree Celsius. The values of these properties are related to the strength of their intermolecular forces. • Solutions can be a variety of solute/solvent combinations: gas/gas, gas/liquid, liquid/liquid, solid/liquid, gas/solid, liquid/solid, or solid/solid. • Polar substances dissolve ionic or polar substances; nonpolar substances dissolve nonpolar substances. The number of solute particles changes the freezing point and boiling point of a pure substance. • A liquid's boiling point and freezing point are affected by changes in atmospheric pressure. A liquid's boiling point and freezing point are affected by the presence of certain solutes.	

Standard CH.6

CH.6	The student will investigate and understand how basic chemical properties relate to organic chemistry and biochemistry. Key concepts include a) unique properties of carbon that allow multi-carbon compounds; and b) uses in pharmaceuticals and genetics, petrochemicals, plastics and food.

Essential Understandings	Essential Knowledge and Skills
It is expected that the content of this SOL is incorporated into the appropriate SOL as that content is being taught (i.e., bonding types, shapes, etc.) and not isolated as a discrete unit. The concepts developed in this standard include the following: • The bonding characteristics of carbon contribute to its stability and allow it to be the foundation of organic molecules. These characteristics result in the formation of a large variety of structures. • Carbon-based compounds include simple hydrocarbons, small carbon-containing molecules with functional groups, complex polymers, and biological molecules. • Petrochemicals contain hydrocarbons, including propane, butane, and octane. • There is a close relationship between the properties and structure of organic molecules. • Common pharmaceuticals that are organic compounds include aspirin, vitamins, and insulin. • Small molecules link to make large molecules, called polymers, that have combinations with repetitive subunits. Natural polymers include proteins and nucleic acids. Human-made (synthetic) polymers include polythene, nylon and Kevlar.	In order to meet this standard, it is expected that students will • describe how saturation affects shape and reactivity of carbon compounds. • draw Lewis dot structures, identify geometries, and describe polarities of the following molecules: CH_4, C_2H_6, C_2H_4, C_2H_2, CH_3CH_2OH, CH_2O, C_6H_6, CH3COOH. • recognize that organic compounds play a role in natural and synthetic pharmaceuticals. • recognize that nucleic acids and proteins are important natural polymers. • recognize that plastics formed from petrochemicals are organic compounds that consist of long chains of carbons. • conduct a synthesis lab that exemplifies the versatility and importance of organic compounds (aspirin, an ester, a polymer).



Science Standards of Learning Curriculum Framework

Physics

First Review
September 23, 2010

Commonwealth of Virginia
Board of Education
Richmond, Virginia
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by the

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Virginia *Science Standards of Learning* Curriculum Framework 2010
Introduction

The *Science Standards of Learning* Curriculum Framework amplifies the *Science Standards of Learning for Virginia Public Schools* and defines the content knowledge, skills, and understandings that are measured by the Standards of Learning tests. The Science Curriculum Framework provides additional guidance to school divisions and their teachers as they develop an instructional program appropriate for their students. It assists teachers as they plan their lessons by identifying essential understandings and defining the essential content knowledge, skills, and processes students need to master. This supplemental framework delineates in greater specificity the minimum content that all teachers should teach and all students should learn.

School divisions should use the *Science Curriculum Framework* as a resource for developing sound curricular and instructional programs. This framework should not limit the scope of instructional programs. Additional knowledge and skills that can enrich instruction and enhance students' understanding of the content identified in the Standards of Learning should be included as part of quality learning experiences.

The Curriculum Framework serves as a guide for Standards of Learning assessment development. Assessment items may not and should not be a verbatim reflection of the information presented in the Curriculum Framework. Students are expected to continue to apply knowledge and skills from Standards of Learning presented in previous grades as they build scientific expertise.

The Board of Education recognizes that school divisions will adopt a K–12 instructional sequence that best serves their students. The design of the Standards of Learning assessment program, however, requires that all Virginia school divisions prepare students to demonstrate achievement of the standards for elementary and middle school by the time they complete the grade levels tested. The high school end-of-course Standards of Learning tests, for which students may earn verified units of credit, are administered in a locally determined sequence.

Each topic in the *Science Standards of Learning* Curriculum Framework is developed around the Standards of Learning. The format of the Curriculum Framework facilitates teacher planning by identifying the key concepts, knowledge and skills that should be the focus of instruction for each standard. The Curriculum Framework is divided into two columns: Understanding the Standard (K-5); Essential Understandings (middle and high school); and Essential Knowledge, Skills, and Processes. The purpose of each column is explained below.

Understanding the Standard (K-5)
This section includes background information for the teacher. It contains content that may extend the teachers' knowledge of the standard beyond the current grade level. This section may also contain suggestions and resources that will help teachers plan instruction focusing on the standard.

Essential Understandings (middle and high school)
This section delineates the key concepts, ideas and scientific relationships that all students should grasp to demonstrate an understanding of the Standards of Learning.

Essential Knowledge, Skills and Processes (K-12)
Each standard is expanded in the Essential Knowledge, Skills, and Processes column. What each student should know and be able to do in each standard is outlined. This is not meant to be an exhaustive list nor a list that limits what is taught in the classroom. It is meant to be the key knowledge and skills that define the standard.

Standard PH.1

PH.1 The student will plan and conduct investigations using experimental design and product design processes. Key concepts include

a) the components of a system are defined;
b) instruments are selected and used to extend observations and measurements;
c) information is recorded and presented in an organized format;
d) the limitations of the experimental apparatus and design are recognized;
e) the limitations of measured quantities are recognized through the appropriate use of significant figures or error ranges;
f) models and simulations are used to visualize and explain phenomena, to make predictions from hypotheses, and to interpret data; and
g) appropriate technology, including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Appropriate instruments are used to measure ~~displacement,~~ position, time, mass, force, volume, temperature, ~~heat exchange, energy transformations,~~ motion, fields, ~~and~~ electric ~~charge~~ current, and potential. • No measurement is complete without a statement about its ~~exactness~~ uncertainty. • Experimental records, including experimental diagrams, data, and procedures, are kept concurrently with experimentation. • Tables, spreadsheets, and graphs are used to interpret, organize, and clarify experimental observations, possible explanations, and models for phenomena being observed. • ~~The average for a set of data is a valid way to estimate the true value of the set.~~ • ~~The spread in a set of data is an indication of the error in the measurement: a large spread indicates a large error, and a small spread indicates a small error.~~ • ~~The difference between the accepted value and the measured value is the uncertainty or error.~~ • ~~Measurements are always recorded with appropriate SI units.~~ • ~~Calculations are made using appropriate SI units.~~ • Accuracy is the difference between the accepted value and the measured	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • measure and record ~~displacement,~~ position, time, mass, force, volume, temperature, ~~heat exchange, energy transformations,~~ motion, fields, and electric ~~charge~~ current and potential, using appropriate technology. • determine ~~percent error from~~ accuracy of measurement by comparing the experimental averages and the theoretical value~~s~~. • determine precision of measurement using range or standard deviation. • follow safe practices in all laboratory procedures. • ~~calculate average values, and compare to theoretical values.~~ • use simulations to model physical phenomena.

Standard PH.1

PH.1	The student will plan and conduct investigations using experimental design and product design processes. Key concepts include a) the components of a system are defined; b) instruments are selected and used to extend observations and measurements; c) information is recorded and presented in an organized format; d) the limitations of the experimental apparatus and design are recognized; e) the limitations of measured quantities are recognized through the appropriate use of significant figures or error ranges; f) models and simulations are used to visualize and explain phenomena, to make predictions from hypotheses, and to interpret data; and g) appropriate technology, including computers, graphing calculators, and probeware, is used for gathering and analyzing data and communicating results.

Essential Understandings	Essential Knowledge and Skills
value. • Precision is the spread of repeated measurements. • Results of calculations or analyses of data are reported in appropriate numbers of significant digits. • Data are organized into tables and graphed when involving dependent and independent variables.	

Standard PH.2

PH.2 The student will investigate and understand how to analyze and interpret data. Key concepts include

a) a description of a physical problem is translated into a mathematical statement in order to find a solution;
b) relationships between physical quantities are determined using the shape of a curve passing through experimentally obtained data;
c) the slope of a linear relationship is calculated and includes appropriate units;
d) interpolated, extrapolated, and analyzed trends are used to make predictions; and
e) situations with vector quantities are analyzed utilizing trigonometric or graphical methods.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Mathematics is a tool used to ~~explain~~ model and describe phenomena. • ~~Dimensional analysis is the verification of the appropriateness of the units. (This can be used as a consistency check in calculations as well as in experiments.)~~ • Graphing ~~is~~ and dimensional analysis are used to reveal relationships and other important features of data. • Predictions are made from trends based on the data. • The shape of the curve ~~passing through~~ fit to experimentally obtained data is used to determine the relationship of the plotted quantities. • All experimental data do not follow a linear relationship. • The area under the curve of experimentally obtained data is used to determine related physical quantities. • Not all quantities add ~~algebraically~~ arithmetically. Some must be combined using trigonometry. These quantities are known as vectors. • ~~A p~~Physical phenomena or events can often be described in mathematical terms (as an equation or inequality).	~~Knowledge Skills~~ In order to meet this standard, it is expected that students will • recognize linear and nonlinear relationships from graphed data. • ~~draw the~~ where appropriate, draw a straight line through a set of experimental data points and determine the slope~~, using appropriate SI units~~ and/or area under the curve. • use dimensional analysis to ~~solve problems~~ verify appropriate units. • ~~combine vectors and resolve vectors into components, using graphical methods that place scaled vectors head-to-tail.~~ • ~~sketch a vector diagram, and trigonometrically solve for the components.~~ • ~~sketch the components of a vector, and trigonometrically solve for the resultant.~~ • combine vectors into resultants utilizing trigonometric or graphical methods. • resolve vectors into components utilizing trigonometric or graphical methods.

Standard PH.3

PH.3	The student will investigate and demonstrate an understanding of the nature of science, scientific reasoning, and logic. Key concepts include a) analysis of scientific sources to develop and refine research hypotheses; b) analysis of how science explains and predicts relationships; c) evaluation of evidence for scientific theories; d) examination of how new discoveries result in modification of existing theories or establishment of new paradigms; and e) construction and defense of a scientific viewpoint.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The nature of science refers to the foundational concepts that govern the way scientists formulate explanations about the natural world. The nature of science includes the following concepts a) the natural world is understandable; b) science is based on evidence - both observational and experimental; c) science is a blend of logic and innovation; d) scientific ideas are durable yet subject to change as new data are collected; e) science is a complex social endeavor; and f) scientists try to remain objective and engage in peer review to help avoid bias. • Experimentation may support a hypothesis, falsify it, or lead to new discoveries. • The hypothesis may be modified based upon data and analysis. • A careful study of prior reported research is a basis for the formation of a research hypothesis. • A theory is a comprehensive and effective explanation, which is well supported by experimentation and observation, of a set of phenomena. • Science is a human endeavor relying on human qualities, such as reasoning, insight, energy, skill, and creativity as well as intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • identify and explain the interaction between human nature and the scientific process. • identify examples of a paradigm shift (e.g., quantum mechanics). • ~~relativity and quantum mechanics are recent examples of paradigm shifts in theoretical physics.~~ • ~~the change from an earth-centered to a sun-centered model of the solar system is an example of a paradigm shift.~~

Standard PH.4

PH.4	The student will investigate and understand how applications of physics affect the world. Key concepts include a) examples from the real world; and b) exploration of the roles and contributions of science and technology.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • ~~Physics d~~Discoveries in physics, both theoretical and experimental, have resulted in advancements in communication, medicine, engineering, transportation, commerce, exploration, and technology. • Journals, books, the Internet, and other sources are used in order to identify key contributors and their contributions to physics as well as their impact on the real world.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • be aware of real-world applications of physics, and the importance of physics in the advancement of various fields, such as medicine, engineering, technology, etc.

Standard PH.5

PH.5	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include a) linear motion; b) uniform circular motion; c) projectile motion; d) Newton's laws of motion; e) gravitation; f) planetary motion; and g) work, power, and energy.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Newton's three laws of motion are the basis for understanding the mechanical universe. • Linear motion graphs include - displacement (d) vs. time (t) - velocity (v) vs. time (t) - acceleration (a) vs. time (t) • Position, displacement, velocity, and acceleration are vector quantities. • ~~The concept of m~~Motion is described in terms of position, displacement, time, velocity, and acceleration~~, and their dependence on time~~. • ~~Graphical analysis is used as a representation of motion.~~ • Velocity is the change in ~~distance~~ displacement divided by the change in time. A straight-line, position-time graph indicates constant velocity. The slope of a ~~distance~~displacement-time graph is the velocity. • Forces are interactions that can cause objects to accelerate. When one object exerts a force on a second object, the second exerts a force on the first that is equal in magnitude but opposite in direction. • An object with no net force acting on it is stationary or moves with constant velocity. • Acceleration is the change in velocity divided by the change in time. A	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • qualitatively explain motion in terms of Newton's Laws. • solve problems involving force (F), mass (m), and acceleration (a). • construct and analyze displacement (d) vs. time (t), velocity (v) vs. time (t), and acceleration (a) vs. time (t) graphs. • solve problems involving displacement, velocity, acceleration, and time in one and two dimensions (only constant acceleration). • resolve vector diagrams involving ~~distance~~ displacement and velocity into their components along perpendicular axes. • draw vector diagrams of a projectile's motion. Find range, trajectory, height of the projectile, and time of flight (uniform gravitational field, no air resistance). • distinguish between centripetal and centrifugal force. • solve problems related to free-falling objects, including 2-D motion. • solve problems using Newton's Law of Universal Gravitation. • ~~solve problems using the coefficient of friction.~~ • solve problems involving multiple forces, using free-body diagrams. • solve problems involving mechanical work, power, and energy.

Standard PH.5

PH.5	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include a) linear motion; b) uniform circular motion; c) projectile motion; d) Newton's laws of motion; e) gravitation; f) planetary motion; and g) work, power, and energy.

Essential Understandings	Essential Knowledge and Skills
straight-line, velocity-time graph indicates constant acceleration. A horizontal-line, velocity-time graph indicates zero acceleration. The slope of a velocity-time graph is the acceleration. • The acceleration of a body is directly proportional to the net force on it and inversely proportional to its mass. • ~~Horizontal and vertical components of the motion of a projectile are independent of one another.~~ • In a uniform vertical gravitational field with negligible air resistance, ~~a projectile moves~~ horizontal and vertical components of the motion of a projectile are independent of one another with constant horizontal velocity and constant vertical acceleration. • An object moving ~~uniformly~~ along a ~~circle~~ circular path ~~moves~~ with a constant speed ~~and with~~ experiences an acceleration directed toward the center of the circle. • The force that causes an object to move in a circular path is directed centripetally, toward the center of the circle. The object's inertia is sometimes falsely characterized as a centrifugal or outward-directed force. • ~~Friction is a force that acts in a direction opposite the velocity.~~ • Weight is the gravitational force acting on a body. • For small angles of oscillation, a pendulum exhibits simple harmonic motion. • Newton's Law of Universal Gravitation can be used to determine the	• describe the forces involved in circular motion. • ~~Work and energy are measured in Joules, which is a derived unit equal to a Nm or kgm^2/s^2.~~ • ~~Power is measured in Watts, which is a derived unit equal to a J/s.~~ • ~~($F_w = mg$)~~

Standard PH.5

PH.5	The student will investigate and understand the interrelationships among mass, distance, force, and time through mathematical and experimental processes. Key concepts include a) linear motion; b) uniform circular motion; c) projectile motion; d) Newton's laws of motion; e) gravitation; f) planetary motion; and g) work, power, and energy.

Essential Understandings	Essential Knowledge and Skills
force between objects separated by a known distance, and ~~the distance between objects with a known gravitational attraction.~~ ~~Newton's Law of Universal Gravitation~~ describes the force that determines the motion of celestial objects. The total force on a body can be represented as a vector sum of constituent forces. • ~~Centripetal force is a "true" force acting on a body in circular motion while centrifugal force is a "false" force that describes the feeling experienced in centripetal acceleration.~~ • For a constant force acting on an object, the impulse by that force is the product of the force and the time the object experiences the force. The impulse also equals the change in momentum of the object. • ~~Energy is the capacity to do work. Work and energy are expressed in the same units, but are not identical.~~ When work is done, energy converts from one form to another and energy is conserved. Work is change in kinetic energy. • For a constant force acting on an object, the work done by that force ~~Work~~ is the product of the force ~~exerted on an object~~ and the distance the object moves in the direction of the force. The net work performed on an object equals its change in kinetic energy. • Power is the rate of doing work.	

Standard PH.6

PH.6	The student will investigate and understand that quantities including mass, energy, momentum, and charge are conserved. Key concepts include a) kinetic and potential energy; b) elastic and inelastic collisions; and c) mass/energy equivalence.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Kinetic energy is the energy of motion. Potential energy is the energy due to an object's position or state. • ~~Quantities such as~~ Total energy and momentum are conserved ~~when they are exchanged or transformed, and their total quantity remains the same~~. • For elastic collisions, total momentum and total kinetic energy are conserved. For inelastic collisions, total momentum is conserved and some kinetic energy is transformed to other forms of energy~~, such as heat~~. • Electrical charge moves through electrical circuits and is conserved. • In some systems the conservation of mass and energy must take into account the principle of mass/energy equivalence.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~Electric power (watt) is change in electrical energy divided by corresponding change in time. Current (ampere) is the amount of charge that moves through a circuit element divided by the elapsed time. Electric potential difference (voltage) is change in electric potential energy per unit charge.~~ • ~~In any system of electrical charge, electrical movement, or electrical interaction, both charge and energy are conserved.~~ • provide and explain examples of how energy can be converted from potential energy to kinetic energy and the reverse. • provide and explain examples showing linear momentum is the product of mass and velocity, and is conserved in a closed system.

Standard PH.7

PH.7	The student will investigate and understand that energy can be transferred and transformed to provide usable work. Key concepts include a) transfer and storage of energy among systems including mechanical, thermal, gravitational, electromagnetic, chemical, and nuclear systems; and b) efficiency of systems.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Energy can be transformed from one form to another. ~~(Example: Falling water turns a turbine that generates electricity and produces heat and light in a classroom.)~~ • Efficiency ~~of a machine~~ is the ratio of output work to input work.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • Illustrate that energy can be transformed from one form to another, using examples from everyday life and technology. • Calculate efficiency by identifying the useful energy in a process. • Qualitatively identify the various ~~forms of~~ energy transformations in simple demonstrations.

Standard PH.8

PH.8 The student will investigate and understand wave phenomena. Key concepts include
a) wave characteristics;
b) fundamental wave processes; and
c) light and sound in terms of wave models.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Mechanical waves transport energy as a traveling disturbance in a medium. • In a transverse wave, particles of the medium ~~move~~ oscillate in a direction perpendicular to the direction the wave travels. • In a longitudinal wave, particles of the medium ~~move~~ oscillate in a direction parallel to the direction the wave travels. • ~~For harmonic waves,~~ Wave velocity equals the product of the frequency and the wavelength. • Frequency and period are reciprocals of each other. • Waves are reflected and ~~refracted~~ transmitted when they encounter a change in medium or a boundary. • The overlapping of two or more waves results in constructive or destructive interference. • When source and observer are in relative motion, a shift in frequency occurs (Doppler effect). • Sound is a longitudinal mechanical wave that travels through matter. • Light is a transverse electromagnetic wave ~~(transverse)~~ that can travel through matter as well as a vacuum. • Reflection is the change of direction of the wave in the original medium. • Refraction is the change of direction ~~(bending)~~ of the wave ~~in the new medium~~ at the boundary between two media. • Diffraction is the spreading of a wave around a barrier or an aperture. • The pitch of a note is determined by the frequency of the sound wave.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~Period, wavelength, and frequency are measured in seconds, meters, and Hertz.~~ • ~~identify examples of longitudinal and transverse waves.~~ • identify examples of and differentiate between transverse and longitudinal waves, using ~~simple~~ simulations and/or models ~~(slinky, stadium waves)~~. • illustrate period, wavelength, and amplitude on a graphic representation of a ~~harmonic~~ wave. • solve problems involving frequency, period, wavelength, and velocity. • distinguish between superimposed waves that are in-phase and those that are out-of-phase. • graphically illustrate reflection and refraction of a wave when it encounters a change in medium or a boundary. • graphically illustrate constructive and destructive interference. • identify a standing wave, using a string.

Standard PH.8

PH.8	The student will investigate and understand wave phenomena. Key concepts include a) wave characteristics; b) fundamental wave processes; and c) light and sound in terms of wave models.

Essential Understandings	Essential Knowledge and Skills
• The color of light is determined by the frequency of the light wave. • As the amplitude of a sound wave increases, the loudness of the sound increases. • As the amplitude of a light wave increases, the ~~brightness~~ intensity of the light increases. • Electromagnetic waves can be polarized by reflection or transmission. • ~~Polarizing filters can transmit one direction of polarized light and block the other.~~ Polarizing filters allow light oriented in one direction (or component of) to pass through.	

Standard PH.9

PH.9	The student will investigate and understand that different frequencies and wavelengths in the electromagnetic spectrum are phenomena ranging from radio waves through visible light to gamma radiation. Key concepts include a) the properties, behaviors, and relative size of radio waves, microwaves, infrared, visible light, ultraviolet, X-rays, and gamma rays; b) wave/particle dual nature of light; and c) current applications based on the respective wavelengths.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Frequency, wavelength, and energy vary across the entire electromagnetic spectrum. • The long wavelength, low frequency portion of the electromagnetic spectrum is used for communication (e.g., radio, TV, cellular phone). • Medium wavelengths (infrared) are used for heating ~~and night-vision enhancing devices~~ and remote control devices. • Visible light comprises a ~~very~~ relatively narrow portion of the electromagnetic spectrum. • Ultraviolet (UV) wavelengths (shorter than the visible spectrum) are ionizing radiation and can cause damage to humans. UV is responsible for sunburn, and can be used for sterilization and fluorescence. • X-rays and gamma rays are the highest frequency ~~and~~ (shortest wavelength) and are used primarily for medical purposes. These wavelengths are also ionizing radiation and can cause damage to humans.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • describe the change in observed frequency of waves due to the motion of a source or a receiver (the Doppler effect). • identify common uses for radio waves, microwaves, X-rays and gamma rays.

Standard PH.10

PH.10	The student will investigate and understand how to use the field concept to describe the effects of gravitational, electric, and magnetic forces. Key concepts include a) inverse square laws (Newton's law of universal gravitation and Coulomb's law); and b) technological applications.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • The electrostatic force (Coulomb's law) can be either repulsive or attractive, depending on the sign of the charges. • The gravitational force (Newton's ~~l~~Law of Gravitation) is always an attractive force. • The force found from Newton's ~~l~~Law of Gravitation and in Coulomb's law is dependent on the inverse square of the distance between two objects. • The interaction of two particles at a distance can be described as a two-step process that occur simultaneously: the creation of a field by one of the particles and the interaction of the field with the second particle. • ~~The rotation of the coil of a motor or a generator through a magnetic field is used to transfer energy.~~ • The force a magnetic field exerts on a moving electrical charge has a direction perpendicular to both the velocity and field directions. Its magnitude is dependent on the velocity of the charge, the magnitude of the charge, and the strength of the magnetic field.	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • ~~Coulomb's law states that the magnitude F of the electrostatic force exerted by one point charge on another point charge is directly proportional to the magnitudes of q1 and q2 of the charges and inversely proportional to the square of the distance r between them: $F = k (q_1 q_2)/r^2$~~. • ~~Newton's Law of Universal Gravitation states that every particle in the universe attracts every other particle in the universe. $F = G (m_1 m_2)/r^2$. (F is the force, G is the universal gravitation constant, m is the mass of the two particles, and r is the distance between them.)~~ • describe the attractive or repulsive forces between objects relative to their forces and distance between them (Coulomb's Law.) • describe the attraction of particles (Newton's Law of Universal Gravitation.) • describe the effect of a uniform magnetic field on a moving electrical charge.

Standard PH.11

PH.11	The student will investigate and understand how to diagram, construct, and analyze basic electrical circuits and explain the function of various circuit components. Key concepts include a) Ohm's law; b) series, parallel, and combined circuits; c) electrical power; and d) alternating and direct currents.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • Current is ~~the flow of electrical charge~~ the rate at which charge moves through a circuit element. • Electric potential difference (~~V~~voltage) in a circuit provides the energy that drives the current. • Elements in a circuit are positioned relative to other elements either in series or parallel. • According to Ohm's law, the resistance of an element equals the voltage across the element divided by the current through the element. • ~~Voltage~~ Potential difference (voltage) is the change in electrical potential energy per unit charge across that element. • The dissipated power of a circuit element equals the product of the voltage across that element and the current through that element. • In a DC (direct current) circuit, the current flows in one direction, whereas in an AC (alternating current) circuit, the current switches direction several times per second (60Hz in the U.S.).	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • recognize a series and a parallel circuit. • apply Ohm's law to a series and a parallel circuit. • assemble simple circuits composed of batteries and resistors in series and in parallel. • solve simple circuits using Ohm's law. • calculate the dissipated power of a circuit element. • recognize that DC power is supplied by batteries and that AC power is supplied by electrical wall sockets.

Standard PH.12

PH.12	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics. Key concepts may include a) wave/particle duality; b) wave properties of matter; c) matter/energy equivalence; d) quantum mechanics and uncertainty; e) relativity; f) nuclear physics; g) solid state physics; h) nanotechnology; i) superconductivity; and j) radioactivity.

Essential Understandings	Essential Knowledge and Skills
The concepts developed in this standard include the following: • For processes that are important on the atomic scale, objects exhibit both wave characteristics (e.g., interference) as well as particle characteristics (e.g., discrete amounts and a fixed definite number of electrons per atom). • Nuclear physics is the study of the interaction of the protons and neutrons in the atom's nucleus. • The nuclear force binds protons and neutrons in the nucleus. *Fission* is the breakup of heavier nuclei to lighter nuclei. *Fusion* is the combination of lighter nuclei to heavier nuclei. • ~~The dramatic~~ Dramatic examples of ~~the~~ mass-energy transformation are the fusion of hydrogen in the sun, which provides light and heat for the earth, and the fission process in nuclear reactors that provide electricity. • Natural radioactivity is the spontaneous disintegration of unstable nuclei. Alpha, beta, and gamma rays are different emissions associated with radioactive decay. • The special theory of relativity predicts that energy and matter can be converted into each other. • Objects cannot travel faster than the speed of light. • ~~Many substances in the natural world have a crystal structure, including~~	~~Knowledge~~ ~~Skills~~ In order to meet this standard, it is expected that students will • explain that ~~T~~the motion of objects traveling near or approaching the speed of light does not follow Newtonian mechanics but must be treated within the theory of relativity. • describe the relationship between the Big Bang theory timeline and particle physics. • describe the structure of the atomic nucleus, including quarks. • provide examples of technologies used to explore the nanoscale.

Standard PH.12

PH.12	The student will investigate and understand that extremely large and extremely small quantities are not necessarily described by the same laws as those studied in Newtonian physics. Key concepts may include a) wave/particle duality; b) wave properties of matter; c) matter/energy equivalence; d) quantum mechanics and uncertainty; e) relativity; f) nuclear physics; g) solid state physics; h) nanotechnology; i) superconductivity; and j) radioactivity.

Essential Understandings	Essential Knowledge and Skills
~~most metals and minerals.~~ • ~~Atoms and molecules bind together in regular arrays to form crystals. The structure of these crystals is important in determining the properties of these materials (appearance, hardness, etc.).~~ The atoms and molecules of many substances in the natural world, including most metals and minerals, bind together in regular arrays to form crystals. The structure of these crystals is important in determining the properties of these materials (appearance, hardness, etc.). • Certain materials at very low temperatures exhibit the property of zero resistance called *superconductivity*. • Electrons ~~rotating around the nucleus of an atom~~ in orbitals can be treated as standing waves in order to model the atomic spectrum. • Quantum mechanics requires an inverse relationship between the measurable location and the measurable momentum of a particle. The more accurately one determines the position of a particle, the less accurately the momentum can be known, and vice versa. This is known as the Heisenberg uncertainty principle. • Matter behaves differently at nanometer scale (size and distance) than at macroscopic scale.	

Board of Education Agenda Item

Item: J. **Date:** September 23, 2010

Topic: First Review of the Annual Measurable Objectives in Reading and Mathematics from 2010-2011 through 2013-2014 for Virginia's Consolidated State Application Accountability Plan under the *No Child Left Behind Act of 2001*

Presenter: Mrs. Shelley Loving-Ryder, Assistant Superintendent for Student Assessment and School Improvement

Telephone Number: (804) 225-2101 **E-Mail Address:** Shelley.Loving-Ryder@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting ____ Action requested at future meeting: _____ (date)

Previous Review/Action:

____ No previous board review/action

_X_ Previous review/action

Date: November 17, 2009
Action: First review of proposed amendments submitted to USED,

Date: January 14, 2010
Action: Final review of proposed amendments submitted to USED.

Date: May 27, 2010
Action: First review of revised proposed amendments.

Date: June 24, 2010
Action: Final review of revised proposed amendments.

Background Information:

Virginia received final approval on July 29, 2010, from the United States Department of Education (USED) for the revisions to its accountability workbook submitted by the Board of Education on June 24, 2010. Approval of the revised workbook allows Virginia to maintain its Annual Measurable Objectives (AMOs) for reading and mathematics at 81 percent for reading and 79 percent for mathematics for the 2010-2011 school year based on Adequate Yearly Progress (AYP) results from 2009-2010. On August 23, 2010, USED informed the Virginia Department of Education that while USED maintains its approval for holding the targets for 2010-2011, a "To Be Determined" (TBD) status,

presently stated in the workbook, is not acceptable for the remaining years through 2013-2014. USED has requested that Virginia set intermediate targets and a final target in 2013-2014 of 100 percent for both subjects. Virginia can, however, submit a waiver request to USED in any year to change the established intermediate targets. In addition, based on guidance provided by USED in 2006, states may modify their AMOs to ensure a smooth transition when changes in the test program occurs. Virginia will implement new mathematics tests in 2011-2012 and new reading tests in 2012-2013.

As background, Virginia's AMOs for 2001-2002 to 2009-2010 are shown below.

Year	Reading			Mathematics		
	Approved 2003	Approved 2005	Revised 2010	Approved 2003	Approved 2005	Revised 2010
2001-2002	60.7	60.7	60.7	58.4	58.4	58.4
2002-2003	61	61	61	59	59	59
2003-2004	61	61	61	59	59	59
2004-2005	70	65	65	70	63	63
2005-2006	70	69	69	70	67	67
2006-2007	70	73	73	70	71	71
2007-2008	80	77	77	80	75	75
2008-2009	80	81	81	80	79	79
2009-2010	80	85	81	80	83	79

Summary of Major Elements:
Section 1111 (H)(iii) of Public Law 107-110 of the *No Child Left Behind Act of 2001* states that intermediate targets for annual yearly progress can be maintained for up to three years without an increase in the targets. Reauthorization of the law is anticipated by 2012-2013. In addition, as noted above, Virginia will administer new mathematics tests in 2011-2012 and new reading tests in 2012-2013. As the new tests are implemented, Virginia will continue to pursue the development of a growth measure that can be used as a part of its AYP calculations. The following options for annual proficiency targets are being proposed to replace the TBD status presently listed in Virginia's approved accountability workbook based on: 1) a review of Virginia's current data; 2) guidance provided in the NCLB law for establishing targets; 3) new mathematics and reading tests available in the next several years; and 4) anticipated reauthorization of the law.

Proposed Annual Proficiency Targets (Annual Measurable Objectives) in
Reading and Mathematics between 2010-2011 and 2013-2014

Option 1

Year	Reading			Mathematics		
	Approved 2003	Approved 2005	Revised 2010	Approved 2003	Approved 2005	Revised 2010
2010-2011	90	89	82	90	87	80
2011-2012	90	93	82	90	91	80
2012-2013	90	97	82	90	95	80
2013-2014	100	100	100	100	100	100

Option 2

Year	Reading			Mathematics		
	Approved 2003	Approved 2005	Revised 2010	Approved 2003	Approved 2005	Revised 2010
2010-2011	90	89	82	90	87	81
2011-2012	90	93	82	90	91	81
2012-2013	90	97	82	90	95	81
2013-2014	100	100	100	100	100	100

Option 3

Year	Reading			Mathematics		
	Approved 2003	Approved 2005	Revised 2010	Approved 2003	Approved 2005	Revised 2010
2010-2011	90	89	82	90	87	80
2011-2012	90	93	83	90	91	81
2012-2013	90	97	84	90	95	82
2013-2014	100	100	100	100	100	100

Superintendent's Recommendation:
The Superintendent of Public Instruction recommends that the Board of Education receive for first review the annual proficiency targets (Annual Measurable Objectives) in reading and mathematics from 2010-2011 through 2013-2014 for Virginia's Consolidated State Application Accountability Plan under the *No Child Left Behind Act of 2001*.

Impact on Resources:
The provisions of the Elementary and Secondary Education Act (ESEA) require the Department of Education to collect and analyze data related to determining Adequate Yearly Progress (AYP) for all schools and school divisions in the state. These requirements will continue to have an impact on the agency's resources.

Timetable for Further Review/Action:
This item will be presented to the Board of Education for final review at the October 28, 2010, meeting.

Board of Education Agenda Item

Item: K. **Date:** September 23, 2010

Topic: First Review of Multidivision Online Providers Approval Process: List of Accreditation Agencies

Presenter: Lan Neugent, Assistant Superintendent for Technology, Career & Adult Education

Telephone Number: 804-225-2757 **E-Mail Address:** lan.neugent@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
- _X_ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

_X_ Action requested at this meeting ____ Action requested at future meeting: _____ (date)

Previous Review/Action:

_X_ No previous board review/action

____ Previous review/action
date _____
action _____

Background Information:

As specified in § 22.1-212.24.A & B, the Superintendent of Public Instruction will develop, and the Board of Education will approve, the criteria for approving multidivision online providers. In developing the criteria for approval, the Superintendent of Public Instruction shall (i) require multidivision online providers to be accredited by a national, regional, or state accreditation program approved by the Board.

Summary of Major Elements:

After careful research, the attached list of agencies have been chosen as those which are most highly qualified to provide accreditation to entities that provide online courses and programs for K-12 students in Virginia's public schools.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education accept for first review the attached list of accreditation programs recommended for approval.

Impact on Resources:

N/A

Timetable for Further Review/Action:

Upon acceptance of first review by the Board of Education, a 30-day public comment period will be announced. The recommended list will be presented to the Board of Education for final review on October 28, 2010.

Accreditation Programs Pending Approval by the Virginia Board Of Education

AdvancEd (formerly Commission on International and Trans-Regional Accreditation [CITA], North Central Association Commission on Accreditation and School Improvement [NCA CASI], and Southern Association of Colleges and Schools Council on Accreditation and School Improvement [SACS CASI])

Middle States Association of Colleges and Schools Commission on Elementary Schools and Commission on Secondary Schools

New England Association of Schools and Colleges (NEASC)

Northwest Accreditation Commission (NWAC) (formerly Northwest Association of Accredited Schools)

Western Association of Schools and Colleges (WASC)

Virginia Council for Private Education (VCPE)

School divisions operating as multidivision online providers may be deemed as meeting accreditation requirements if a majority of its schools are fully accredited by the Virginia Board of Education.

Board of Education Agenda Item

Item: L. **Date:** September 23, 2010

Topic: First Review of Nominations to Fill Vacancies on Board of Education Advisory Committees: Advisory Committee on Adult Education and Literacy, State Special Education Advisory Committee, Virginia Advisory Committee for Career and Technical Education, Virginia Advisory Committee for the Education of the Gifted, and the Advisory Board on Teacher Education and Licensure

Presenter: Dr. Margaret N. Roberts, Executive Assistant to the Board of Education

Telephone: 804/ 225-2924 **E-mail:** Margaret.Roberts@doe.virginia.gov

___ Topic presented for information only (no board action required)

____ Board review required by
- ____ State or federal law or regulation
- ____ Board of Education regulation
- _X_ Other: Board of Education Bylaws

___ Action requested at this meeting

_X_ Action requested at future meeting

Previous Review/Action:

_X_ No previous board review/action

____ Previous review/action:
date:
action:

Background Information: Article Nine, Section 2 of the Board of Education's bylaws states the following:

> Advisory Committees. Advisory committees may be created by the Board for special purposes to include, but not be limited to, federal and state-mandated committees. An advisory committee shall be composed of persons who represent the views and interests of the general public and who are known to be qualified to perform their duties. Personnel of the Department of Education may be appointed to the committee, as members or as consultants. All appointments to an advisory committee shall be made by the Board upon the recommendations of the Superintendent of Public Instruction. . . .

The Board of Education's bylaws also specify the term of service in Article Sixteen, Section 4, as follows:

> **Section 4. Term of Service.** Appointments to an advisory committee shall be for a term of three years. Members of an advisory committee may be appointed to a second consecutive three-year term, but shall not be eligible to serve for more than six consecutive years . . .

The Board of Education has six advisory committees, five of which have vacancies for the three-year term of October 2010 to June 2013. Two advisory committees require specific categories for membership. The categories are set by the *Code of Virginia* or by state or federal regulation. In addition, the Board's bylaws permit persons to be reappointed to a second term.

Superintendent's Memo number 169-10 dated July 23, 2010, announced the call for nominations to fill the current advisory committee vacancies. The call for nominations was sent to public school principals, statewide education organizations, interest groups, advocates, and individuals who had expressed interest. This information was also posted on the Board of Education's Web page. The deadline for submission was August 27, 2010.

Following the close of the nomination period, the nominations were reviewed. Persons recommended for appointment or reappointment were selected based upon qualifications and on the required categories for membership (if applicable). It is important to note that every attempt was made to balance the membership by geographic region as well as gender and ethnicity.

Summary of Major Elements: The list of nominees recommended for appointment or reappointment to the 2010-2013 term are as follows:

<u>Advisory Board on Teacher Education and Licensure</u>

- Ms. Janice Underwood, Secondary Special Education Teacher, Hampton City
- Dr. James Roberts, Division Superintendent, Chesapeake City
- Dr. Cathy Fisher, Higher Education (Independent), to fill an unexpired term 7/1/2009-6/30/2012
- Ms. Ruth Wallace, School Board Member, Botetourt, to fill an unexpired term 7/1/2009-6/30/2012
- Ms. Angela Turley, Elementary School Teacher, reappointment to a second term
- Ms. Tracey Dingus, Middle School Teacher, Bristol City, reappointment to a second term

State Special Education Advisory Committee

- Dr. Scott R. Kizner, Division Superintendent, Harrisonburg City, Local Education Official

- Ms. Judy Averill, Transition Coordinator, Chesterfield County Schools, Representative of Transition/CTE; reappointment to a second term

- Ms. Suzanne Bowers, Parent: Region 4, reappointment to a second term

- Ms. Mona Holmes, Parent: Region 5, reappointment to a second term

- Ms. Christina Draper, Person with a Disability, reappointment to a second term

Advisory Committee on Adult Education and Literacy

- Dr. Thomas Brewster, Assistant Superintendent, Pulaski County Public Schools and chair, Virginia Career Education Foundation

Career and Technical Education Advisory Committee

- Ms. Anne Carson, Region 1, President-Elect of the Virginia PTA, Glen Allen

- Mr. Robert Mayfield, Region 5, Plant Manager – Tenaska, Scottsville, Virginia

- Ms. Karen DeRoche Black, Region 2, Technology Academy Coordinator for Chesapeake City Public Schools

Virginia Advisory Committee for the Education of the Gifted

- Dr. Matthew J. Edinger, Adjunct Assistant Professor of Gifted Education, University of Richmond, Richmond

- Ms. Amy S. Lamb, K-12 Mathematics Specialist, Northumberland County Public Schools

- Ms. Beverly Catlin, Coordinator of Instruction, Charlottesville County Public Schools, reappointment to a second term

- Ms. Tomica Crosby, Teacher, Suffolk County Public Schools, reappointment to a second term

- Ms. Mary Jane Mutispaugh, Director of Instruction, Alleghany County Public Schools, reappointment to a second term

- Mrs. Diane Naff, Supervisor of Gifted Education, Montgomery County Public Schools, reappointment to a second term

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education waive first review and adopt the list of nominees recommended for appointment to Board of Education advisory committees for the 2010-2013 term.

Impact on Resources: The operating expenses and other costs associated with the meetings and functions of the Board of Education's advisory committees are provided through the Department of Education's operating funds. Where applicable, federal funds are provided to support the expenses and the work of an advisory committee.

Timetable for Further Review/Action: Department of Education staff will notify the nominees appointed to the Board of Education advisory committees so that the committee meetings for the 2010-2011 school year may be set as soon as possible.

Board of Education Agenda Item

Item: M. **Date:** September 23, 2010

Topic: First Review of the Board of Education's Comprehensive Plan: 2011-2016

Presenter: Dr. Margaret N. Roberts, Executive Assistant to the Board of Education

Telephone Number: (804) 225-2924 **E-Mail Address:** Margaret.Roberts@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

____ Board review required by
_X_ State or federal law or regulation
____ Board of Education regulation
____ Other: _____

__ _ Action requested at this meeting _X__ Action requested at future meeting: TBD

Previous Review/Action:

__X_ No previous board review/action

____ Previous review/action:
Date:
Action:

Background Information: The *Code of Virginia* requires the following:

§ 22.1-253.13:6. Standard 6. Planning and public involvement.

A. The Board of Education shall adopt a statewide comprehensive, unified, long-range plan based on data collection, analysis, and evaluation. Such plan shall be developed with statewide participation. The Board shall review the plan biennially and adopt any necessary revisions. . . .

This plan shall include the objectives of public education in Virginia, including strategies for improving student achievement then maintaining high levels of student achievement; an assessment of the extent to which these objectives are being achieved; a forecast of enrollment changes; and an assessment of the needs of public education in the Commonwealth. . . . The Board shall also develop, consistent with, or as a part of, its comprehensive plan, a detailed comprehensive, long-range plan to integrate educational technology into the Standards of Learning and the curricula of the public schools in Virginia, including career and technical education programs. The Board shall review and approve the comprehensive plan for educational technology and may require the revision of such plan as it deems necessary… .

The Board of Education's *Comprehensive Plan: 2007-2012* was adopted in 2007 and is currently in effect. The *Code* requires that the plan be reviewed and revised as needed every two years. The Board reviewed the current plan in 2009, with the understanding that the Board would do a more detailed review in 2010. The document describes the Board's current priorities. In addition to detailing the Board of Education's goals for public education in Virginia, the comprehensive plan contains timelines and activities related to implementing the various components of the goals. Since the six-year plan was adopted in 2007, the activities and strategies associated with the goals have been completed or are now substantially underway.

Summary of Major Elements: An initial, rough draft of the *Comprehensive Plan: 2011-2016* is attached. This draft contains information that addresses the various components of the plan that are required by the *Code*, including the Board's goals for public education, a forecast of enrollment changes, and an assessment of the needs of public education in the Commonwealth.

An assessment of the extent to which goals are being achieved will be contained in the Board of Education's *Annual Report on the Condition and Needs of Public Schools in Virginia*, which will be presented to the Board for first review at its meeting on October 28, 2010. Department staff will begin the data analysis that will be necessary to link the contents of the Board of Education's *Annual Report on the Condition and Needs of Public Schools* to the measures contained in the comprehensive plan. The data analysis in the annual report will be used to assess progress in meeting goals stated in the comprehensive plan.

After the vision and mission statements, goals, strategies, and measures are revised to the Board's satisfaction, these components will be inserted in appropriate places in the draft, which will be broadly disseminated for public comment. The final draft will then be prepared for the Board's consideration and adoption in early 2011.

Superintendent's Recommendation: The Superintendent of Public Instruction recommends that the Board of Education receive the draft for first review and authorize staff to take the following actions:

1. Incorporate into the text the revisions agreed to at the September 23rd meeting;
2. Make editorial adjustments throughout the review period, as may be necessary;
3. Disseminate the plan for a 45-day public comment period;
4. Incorporate additional revisions agreed to by the Board of Education; and
5. Summarize the public comment and incorporate comments and suggestions into the text, as agreed to by the Board;
6. Present the document to the Board for final review and adoption in early 2011.

Impact on Resources: Any costs associated with the development and dissemination of the document will be provided by Department of Education funds according to state procurement policies and procedures.

Timetable for Further Review/Action: Based upon the conclusions, directives, and priorities of the Board of Education during the September meeting, a draft of the Board of Education's *Comprehensive Plan: 2011-2016* will be disseminated broadly to school division leaders and interested organizations and persons across the state. Public comment will be solicited for a 45-day period, after which the comments will be summarized for Board of Education consideration prior to the final adoption of the plan.

It is anticipated that the Board of Education will conduct the final review and adoption in early 2011.

BOARD OF EDUCATION
COMPREHENSIVE PLAN: 2011-2016

DISCUSSION DRAFT:
September 23, 2010

Board of Education
Commonwealth of Virginia

Adopted
(*DATE*)

Members of the Board of Education
As of July 1, 2010

Mrs. Eleanor B. Saslaw, President
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Springfield, VA 22151

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BOARD OF EDUCATION
COMPREHENSIVE PLAN: 2011-2016

Executive Summary

The Board of Education's *Comprehensive Plan: 2011-2016* updates the goals set forth in the Board's previous plan, which covered the years 2007-2012. Building upon the previous plan, the two-year update reflected in this document provides the framework for resources and policy development to continue Virginia's forward momentum in student achievement.

Current economic conditions remind us more than ever that the key to economic recovery is education. As always, the Board of Education will continue to think creatively and make sure that its goals and strategies are relevant, evidence-based, practical, and cost-effective.

Highlights of the Board of Education's *Comprehensive Plan: 2011-2016*:

- Virginia intends to be the best. The Board of Education's vision and mission statements and goals for public education provide the framework for a world-class statewide system of public schools. The statements are forward-looking and acknowledge the programs and services provided by Virginia's public schools to meet the increasingly diverse needs of students who will live, compete, and work in an expanding and complex global, high-tech economy.

- The Board of Education's goals for public education for 2011-2016 are as follows:

  Goal 1: Expanded Opportunities to Learn: The Board of Education will continue to improve the standards for public schools in Virginia in order to expand learning opportunities needed for Virginia's public schools to lead the nation in rigor and quality and for all students to compete and excel in postsecondary education and/or in the global workplace.

  Goal 2: Accountability for Student Learning: The Board of Education will support accountability for all public schools by providing leadership and establishing policies that help schools and school divisions increase the academic success of all students, especially those who are at-risk or in underperforming school systems.

  Goal 3: Nurturing Young Learners: The Board of Education will work cooperatively with partners to help ensure that all young children are ready to enter kindergarten with the skills they need for success.

  Goal 4: Strong Literacy and Mathematics Skills: The Board of Education will establish policies that support the attainment of literacy and mathematics skills for all students, pre-K through grade 12.

Goal 5: Effective, Equitably Distributed Work Force: The Board of Education will establish policies and standards that enhance the equitable distribution of Virginia's educational work force and that improve the preparation, recruitment, and retention of Virginia's educational personnel, including meaningful, ongoing professional development.

Goal 6: Sound Policies for Student Success: The Board of Education will provide leadership in implementing the provisions of state and federal laws and regulations in ways that enhance and expand opportunities for all of Virginia's schoolchildren to excel academically.

Goal 7: Safe and Secure Schools: The Board of Education will provide leadership to help schools and school divisions create and maintain school environments that enhance the safety and success of all children and the professionals who serve them.

- The Board of Education is adamant that all of Virginia's children—regardless of their personal circumstances—must have the school environment, the resources, and the teachers to help them be successful at school. However, there remain persistent differences in the achievement level of students. Many students continue to struggle academically and need costly, intensive instructional support to succeed in school.

- Record enrollment in public elementary and secondary schools will continue over the next five years, according to research conducted by The University of Virginia's Weldon Cooper Center for Public Service (2010). Total enrollment will increase from the current 1.21 million to 1.27 million students in the 2014-15 school year.

- Enrollment growth is centered in certain geographic regions of the state, while other areas are expected to shrink in enrollment. The variance in enrollment growth will have significant impact—a rippling effect on funding, school construction, school closings, consolidation of programs, the teaching work force, and economic viability of localities.

Statutory Requirement for Updating the Comprehensive Plan

§ 22.1-253.13:6. Standard 6. Planning and public involvement.
A. The Board of Education shall adopt a statewide comprehensive, unified, long-range plan based on data collection, analysis, and evaluation. Such plan shall be developed with statewide participation. The Board shall review the plan biennially and adopt any necessary revisions. The Board shall post the plan on the Department of Education's website if practicable, and, in any case, shall make a hard copy of such plan available for public inspection and copying.

This plan shall include the objectives of public education in Virginia, including strategies for improving student achievement then maintaining high levels of student achievement; an assessment of the extent to which these objectives are being achieved; a forecast of enrollment changes; and an assessment of the needs of public education in the Commonwealth. In the annual report required by § 22.1-18, the Board shall include an analysis of the extent to which these Standards of Quality have been achieved and the objectives of the statewide comprehensive plan have been met. The Board shall also develop, consistent with, or as a part of, its comprehensive plan, a detailed comprehensive, long-range plan to integrate educational technology into the Standards of Learning and the curricula of the public schools in Virginia, including career and technical education programs. The Board shall review and approve the comprehensive plan for educational technology and may require the revision of such plan as it deems necessary…

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BOARD OF EDUCATION
COMPREHENSIVE PLAN: 2011-2016

> *This is a world in which a very high level of preparation in reading, writing, speaking, mathematics, science, literature, history, and the arts will be an indispensable foundation for everything that comes after for most members of the work force.*
>
> National Center on Education and the Economy's Commission on the Skills of the American Workforce (2007)

Virginia's students are the hope of a bright future not only for themselves and their families, but for the state, the nation, and the rapidly expanding global economy. Can there be any doubt that Virginia's students will work and compete in a global economy---one that was almost unimaginable just a few years ago? Virginia's economic strength is directly tied to the quality of our work force and our education system.

This theme is echoed in the report of the National Center on Education and the Economy's Commission on the Skills of the American Workforce (2007), which describes the education challenges ahead:

> It is a world in which comfort with ideas and abstractions is the passport to a good job, in which creativity and innovation are the key to the good life, in which high levels of education — a very different kind of education than most of us have had — are going to be the only security there is. . . . . The best employers the world over will be looking for the most competent, most creative and most innovative people on the face of the earth and will be willing to pay them top dollar for their services. This will be true not just for the top professionals and managers, but up and down the length and breadth of the work force.

The obvious questions for the Board of Education as it sets its goals for the coming years are: *Will Virginia's young people be ready? Will they be equipped with the knowledge and skills they need to be successful in the global economy? What is the role of the Board of Education in leading the charge for academic excellence?*

With these questions about the future sharply in mind, the Board of Education has set its vision, mission, and goals for the next several years. By working with many partners, the Board of Education intends to move Virginia's education system dramatically forward by fostering the development of a 21st century skills pipeline that will prepare today's students to be tomorrow's working adults in our increasingly complex and diverse global society.

Board of Education Vision and Mission Statements

Virginia intends to be the best. The Board of Education's vision and mission statements and goals for public education provide the framework for a world-class statewide system of public schools for Virginia. The statements are forward-looking and acknowledge the programs and services provided by Virginia's public schools to meet the increasingly diverse needs of students who will live, compete, and work in an expanding and complex global, high tech economy.

Vision Statement

The vision of the Board of Education and Superintendent of Public Instruction, in cooperation with their partners, is to create an excellent statewide system of public education that derives strength from our diversity and that ensures equality of opportunity for each student in a safe and healthy learning environment that prepares all students to be capable, responsible, and self-reliant citizens in the global society.

Mission Statement

The mission of the Board of Education and Superintendent of Public Instruction, in cooperation with their partners, is to set education policies that support the life-long academic and career achievement of all students by establishing high standards and expectations for learning, utilizing evidence and research, measuring and effectively analyzing systemwide performance, as well as ensuring transparency and accountability to parents and the public.

Goals for Public Education in Virginia: 2011-2016

The Board of Education's goals are a roadmap for providing excellent educational opportunities for Virginia's public schools. The goals outline the important priorities for the actions and strategies the Board will use to set policies and directions for the public schools.

The Board of Education's goals support holding schools accountable for measurable results, expanding learning opportunities for all students, and sustaining a public school system in which all students learn at high academic levels. The goals reaffirm the Board of Education's obligation to see each child as a unique learner and to ensure that Virginia's schools and teachers are equipped to tailor instruction to each child's needs. Finally, the goals, taken as a whole, embrace the student-centered approach that is instrumental in helping all of Virginia's children, regardless of their personal circumstance, make great strides in achievement.

Goal 1: Expanded Opportunities to Learn: The Board of Education will continue to improve the standards for public schools in Virginia in order to expand learning opportunities needed for Virginia's public schools to lead the nation in rigor and quality and for all students to compete and excel in postsecondary education and/or in the global workplace.

Goal 2: Accountability for Student Learning: The Board of Education will support accountability for all public schools by providing leadership and establishing policies that help schools and school divisions increase the academic success of all students, especially those who are at-risk or in underperforming school systems.

Goal 3: Nurturing Young Learners: The Board of Education will work cooperatively with partners to help ensure that all young children are ready to enter kindergarten with the skills they need for success.

Goal 4: Strong Literacy and Mathematics Skills: The Board of Education will establish policies that support the attainment of literacy and mathematics skills for all students, pre-K through grade 12.

Goal 5: Effective, Equitably Distributed Work Force: The Board of Education will establish policies and standards that enhance the equitable distribution of Virginia's educational work force and that improve the preparation, recruitment, and retention of Virginia's educational personnel, including meaningful, ongoing professional development.

Goal 6: Sound Policies for Student Success: The Board of Education will provide leadership in implementing the provisions of state and federal laws and regulations in ways that enhance and expand opportunities for all of Virginia's schoolchildren to excel academically.

Goal 7: Safe and Secure Schools: The Board of Education will provide leadership to help schools and school divisions create and maintain school environments that enhance the safety and success of all children and the professionals who serve them.

Achievement Measures for Goals

The Virginia Board of Education is committed to assessing its progress in leading Virginia to create an excellent statewide system of public education. The metrics used to assess the Board's progress will provide information that describes how well the Board meets its goals and the current status of education in Virginia.

The Board's actions are intended to support all students' ability to achieve to their highest potential. The Board, however, is limited in the direct impact it can have on student achievement. As well, many of the actions taken by the Board will take years for any impact to be seen in achievement scores. Therefore, measures related to student outcomes will be considered over time and in conjunction with metrics that provide immediate information about the Board's progress in achieving its goals.

There are several key indicators of student outcomes that provide critical information about the successes and challenges our schools face. These indicators are:

- High school graduation and dropout rates
- Percent of graduates earning advanced studies diplomas
- Percent of graduates who meet or exceed college or career ready performance expectations
- Percent of graduates who enroll and are successful in postsecondary education
- Percent of middle school students participating in high school mathematics courses
- Percent of third-grade students reading on grade level
- Percent of students scoring advanced proficient on statewide assessments

- Number and percent of schools and divisions meeting or exceeding state and federal accountability measures
- Number and percent of schools and divisions that demonstrate relatively high growth in student achievement, as measures become available
- Number and percent of schools earning recognition under the Virginia Index of Performance
- Number and percent of schools that are chronically low performing by state and federal standards

Many of the above indicators inform the Board on the Commonwealth's progress towards meeting Board goals. For some goals more information should be provided as described with each goal.

Goal 1: The Board of Education will continue to improve the standards for public schools in Virginia in order to expand learning opportunities needed for Virginia's public schools to lead the nation in rigor and quality and for all students to compete and excel in postsecondary education and/or in the global workplace.

Metrics

1. The Board of Education regularly reviews and revises the Standards of Quality (SOQ), Standards of Accreditation (SOA), and Standards of Learning (SOL). Throughout this process, the Board collects data and information that support its ability to thoughtfully and deliberately make revisions that are research-based, cost-effective, and clearly aligned with student expectations.

2. When available, data from fourth and eighth grade NAEP scores can be used to inform the Board's work to review and revise Standards of Learning.

3. The Board will continue to review all Standards of Leaning (SOL) to ensure they are college and career ready.

4. The Board will continue to review the accreditation standards in light of the assessment programs currently in place and consider new ways of testing and assessment of student achievement.

Goal 2: Accountability for Student Learning: The Board of Education will support accountability for all public schools by providing leadership and establishing policies that help schools and school divisions increase the academic success of all students, especially those who are at-risk or in underperforming school systems.

Metrics

1. Review key indicators ensuring that the data are disaggregated by student groups, including ESEA subgroups, and gender.

2. Document major Board of Education activities that assist chronically low-performing schools in becoming institutions that meet or exceed minimum accountability requirements.

Goal 3: Nurturing Young Learners: The Board of Education will work cooperatively with partners to help ensure that all young children are ready to enter kindergarten with the skills they need for success.

Metrics

1. Document major Board of Education activities that support schools' ability to facilitate pre-kindergarten children's success.

2. Calculate changes over time in the percent of students in kindergarten who are considered ready for kindergarten upon entry, based on screening or proficiency assessments provided in kindergarten.

3. Calculate changes over time in the percentage of at-risk children served by the Virginia Preschool Initiative or other preschool programs with known quality standards.

Goal 4: Strong Literacy and Mathematics Skills: The Board of Education will establish policies that support the attainment of literacy and mathematics skills for all students, pre-K through grade 12.

Metrics

1. Document new Board of Education policies that support literacy in all students.

2. Assess Virginia's outcomes on NAEP assessments.

3. Assess outcomes on other national assessments, such as SAT, ACT, Advanced placement Exams.

4. Assess statewide SOL assessment results.

Goal 5: Effective, Equitably Distributed Work Force: The Board of Education will establish policies and standards that enhance the equitable distribution of Virginia's education work force and that improve the preparation, recruitment, and retention of Virginia's educational personnel, including meaningful, ongoing professional development.

Metrics

1. Calculate changes over time in the percent of teachers who are highly qualified, as defined by the ESEA provisions. Incorporate measures of teacher effectiveness as they become available.

2. Document that school divisions are meeting the SOQ professional development requirements.

3. Calculate annual retention rates for educational personnel in Virginia.

4. Evaluate results of field study for the new Model Teacher and Administrator Evaluation Systems.

Goal 6: Sound Policies for Student Success: The Board of Education will provide leadership in implementing the provisions of state and federal laws and regulations in ways that enhance and expand opportunities for all of Virginia's schoolchildren to excel academically.

Metrics

1. Review Board of Education policies and regulations with an eye toward helping schools do more with less, increasing effectiveness and efficiency, and ensuring that regulations are cost-effective and research-based to the extent possible.

2. Document Board of Education policies and practices that demonstrate leadership in and compliance with implementing provisions of state and federal laws and regulations.

3. Evaluate initial implementation procedures for the criteria for charter school proposals, which are reviewed by the Board of Education.

4. Evaluate initial implementation procedures for the criteria for college partnership laboratory school proposals, which are reviewed by the Board of Education.

5. Evaluate initial implementation procedures for the Virtual School criteria and application process, which are reviewed by the Board of Education.

Goal 7: Safe and Secure Schools: The Board of Education will provide leadership to help schools and school divisions create and maintain school environments that enhance the safety and success of all children and the professionals who serve them.

Metrics

1. Document the Board's actions that demonstrate leadership in creating safe and secure environments.

2. Calculate changes over time in quantitative measures of school safety and security. Measures will be developed using Virginia's Web-based reporting system and evidence from other sources, as available.

Strategies to Implement Goals: 2011-2016

The Board of Education's goals for Virginia's public education system are constantly evolving. The goals are revised every two years; therefore, they must be viewed as a continuous process of assessment and evaluation, all of which lead to adjustments as needed. Perhaps most importantly, the Board of Education's goals, as well as the strategies and activities to implement them, are tied closely to the requirements of state and federal statutes and regulations and on the availability and appropriation of funding for public education.

Goal 1: Expanded Opportunities to Learn: The Board of Education will continue to improve the standards for public schools in Virginia in order to expand learning opportunities needed for Virginia's public schools to lead the nation in rigor and quality and for all students to compete and excel in postsecondary education and/or in the global workplace.

Background

The Board wishes to be clear in its intent to lead the country in the rigor and quality of standards. This clarity of intent is especially important in light of the national discussion on Common Core State Standards. Virginia will continue to monitor work at the national level related to the Common Core State Standards and the Common Assessments. The state will take the opportunity to benefit from Common Core products and processes, which are being developed in the public domain.

In the meantime, Virginia's Curriculum Framework, other instructional material, and professional development events continue to support teaching and learning in the Commonwealth. New enhanced mathematics assessments will be administered for the first time in Virginia in 2011-2012, two years before the Common Standards assessment consortia anticipate administration of the common assessments, followed by new Virginia English SOL assessments in 2012-2013.

The Board of Education's constitutional responsibility is "to determine and prescribe" the Standards of Quality (SOQ) for Virginia's school divisions. The Standards of Accreditation (SOA) and the Standards of Learning (SOL) are both integral parts of the requirements contained in the SOQ, as established in the *Code of Virginia.* Thus, the SOQ, the SOA, and the SOL form the three-pronged foundation of quality standards for public schools in Virginia.

Revising and updating the SOQ to ensure that the standards are adequate and appropriate for today's schools and students is ongoing. The SOQ was updated in 2009, effective July 1, 2009. In the coming year, the Board of Education's SOQ Committee will lead a review and possible revision of the SOQ, as deemed necessary. The *Code* requires a review in even-numbered years.

Revisions to the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA) were adopted by the Board of Education on February 19, 2009, and became effective July 31, 2009. As a result of legislative action taken during the 2010 General Assembly, a number of provisions in these regulations will be delayed until the 2011-2012 school year.

Standards of Learning (SOL) are revised by content area according to an existing schedule. The SOL describe the Commonwealth's expectations for student learning and achievement in grades K-12 in English, mathematics, science, history/social science, technology, the fine arts, foreign language, health and physical education, and driver education. As students move through the grades---whether they remain in a Virginia public school or move to another state—they must not be at an academic disadvantage.

In the planning period ahead, the Board will undertake review of a significant part of its education regulations to ensure that all regulations currently in place are relevant, necessary for the promotion of student and teacher success, and as effective as possible.

STRATEGIES TO ACHIEVE GOAL 1:

Action	2010	2011	2012	2013	2014	2015	2016
Review and revise the Standards of Quality; required review in even-numbered years.	X		X		X		X
Review and revise (as needed) the Standards of Accreditation.	X				X		
Review and revise the Standards of Learning in:							
Computer Technology			X				
Fine Arts				X			
Foreign Languages					X		
Health, Physical Education, & Driver Ed						X	
History and Social Sciences						X	
Mathematics							X
English	X						(2017)
Science	X						(2017)
Review the English Language Proficiency standards	X	X	X	X	X	X	X
Implement Academic and Career Plan requirements	X	X	X				
Implement Technical Diploma requirements	X	X	X				
Implement Economics and Personal Finance Standards of Learning	X	X	X				

Goal 2: Accountability for Student Learning: The Board of Education will support accountability for all public schools by providing leadership and establishing policies that help schools and school divisions increase the academic success of all students, especially those who are at-risk or in underperforming school systems.

Background

The Board of Education's priority for providing challenging academic standards is that they be student-centered, results-oriented, and supportive of local flexibility. This priority also addresses the need to support the skill development and accountability of local school leaders—superintendents, principals, and teachers. Moreover, the Board of Education intends to help build capacity of school divisions to address their issues successfully with limited intervention from the state and with maximum flexibility for local decision making.

A priority of the Board of Education is to support a variety of learning opportunities that hold promise for increasing student academic success, such as charter school programs, Governor's Schools, STEM academies, online learning programs, and college partnership laboratory programs.

There is a great deal of data available to measure the performance of the state's public schools and its students. The Board has a number of ways to support school accountability, including taking the lead in developing solutions for schools and school divisions that are not meeting

accountability requirements. The Board will continue to study and consider new ways to assess student performance. The Board also wants to ensure rigor and ensure that all students increase their academic achievement by continuing to examine and revise cut-scores for the assessment program.

There is much to be learned from divisions that are seeing real improvements within and among student subgroups. In addition to recognizing these divisions for their success, the Board has the opportunity to provide leadership to help schools and school divisions eliminate the achievement gap through greater use of disaggregated data, including test results and graduation rates by subgroups. The Board can emphasize the importance of using data throughout the public school system to manage school performance.

The Board should also do more to highlight/share best practices from divisions that are seeing real improvement in achievement gaps.

STRATEGIES TO ACHIEVE GOAL 2:

Action	2010	2011	2012	2013	2014	2015	2016
Support the establishment of data manager/ test coordinator positions to serve as a resource to principals and classroom teachers in analyzing and interpreting data for instructional purposes.	X	X	X	X	X	X	X
Support professional development and technical assistance for instructional staff, especially in low-performing schools.	X	X	X	X	X	X	X
Support a focus on civics, international education, technological literacy, and financial literacy to ensure the preparation of all students to be productive citizens.	X	X	X	X	X	X	X
Adopt policies that promote student preparation for college and work readiness in the 21st century.	X	X	X	X	X	X	X
Establish modified achievement standards for students with disabilities who can make significant progress but may not reach grade-level achievement standards within the same time frame as other students.	X	X	X	X	X	X	X
Seek opportunities for assessing LEP students' English language proficiency and content knowledge in an equitable manner.	X	X	X	X	X	X	X
Support school divisions in conducting annual assessment in English language proficiency for all limited English proficient (LEP) students.	X	X	X	X	X	X	X
Establish policies that promote accountability for graduation and dropout rates for all student subgroups in schools and school divisions.	X	X	X	X	X	X	X
Provide incentives to schools and school divisions that succeed in closing the achievement gap and in improving student achievement.	X	X	X	X	X	X	X

Encourage school divisions to find innovative ways to bring foreign language study for all students, starting at the earliest elementary school level possible.	X	X	X	X	X	X	X
Support effective use of federal funds to provide supplemental instruction and services to disadvantaged students.	X	X	X	X	X	X	X
Support policies that promote opportunity and access to postsecondary study for all students.	X	X	X	X	X	X	X
Promote the use of the Academic and Career Plan to help students identify the areas of strength and interest and pursue a high school course of study that will prepare them to pursue additional training or education.	X	X	X	X	X	X	X
Support and encourage school divisions in efforts to establish and maintain Governor's Schools, STEM academies, and participate in Foreign Language Academies	X	X	X	X	X	X	X
Receive periodic reports of findings of academic review teams, review and adopt policies to address recommendations in team reports, and continue to refine the academic review and division level review procedures.	X	X	X	X	X	X	X
Support programs and initiatives that make it clear that high schools take all steps possible to help students earn a high school diploma.	X	X	X	X	X	X	X
Support opportunities for students to have access to college-level courses in high school, including Advanced Placement courses, International Baccalaureate courses, Cambridge courses, and dual enrollment courses.	X	X	X	X	X	X	X
Support strategies for improving the academic success of both high- and low-performing groups of students.	X	X	X	X	X	X	X
Promote the identification of industry certification opportunities for CTE teachers who lack such credentials and for students who seek them.	X	X	X	X	X	X	X
Promote technical assistance on research-based instructional interventions that help improve the academic achievement in schools that are low-performing and those that are identified as in need of improvement under the ESEA Act.	X	X	X	X	X	X	X

Establish and monitor the memorandum of understanding with and monitor the reconstitution of schools denied accreditation.	X	X	X	X	X	X	X
Establish and monitor the memorandum of understanding of school divisions in division level academic review.	X	X	X	X	X	X	X
Establish recognitions and incentives for schools, school divisions, and school personnel that demonstrate significant improvement in student achievement, closing the achievement gap, and addressing overall educational excellence.	X	X	X	X	X	X	X
Recognize Highly Distinguished Title I schools and school divisions.	X	X	X	X	X	X	X
Provide innovative options to support school improvement, such as charter schools and lead turnaround partners.	X	X	X	X	X	X	X

Goal 3: Nurturing Young Learners: The Board of Education will work cooperatively with partners to help ensure that all young children are ready to enter kindergarten with the skills they need for success.

Background

This goal reflects the commitment of the Board to ensure that all children are adequately prepared for school when they enroll. Research shows that from the time of birth to the first day of kindergarten, childhood development proceeds at a pace exceeding that of any subsequent stage of life. Efforts to understand this process have revealed the many remarkable accomplishments of the pre-school years, as well as the serious problems that confront some young children and their families. Striking disparities in what children know and can do are evident well before they enter kindergarten.

A study by Virginia's Joint Legislative Audit Review Commission found that "test results indicate that Virginia Preschool Initiative students gain in literacy skills during the pre-K year and outperform other kindergarteners. Longer term student-level data are needed to assess VPI's impact on test scores in later grades. A survey of kindergarten teachers and principals indicates that most at-risk pre-K graduates are well prepared for kindergarten and later elementary grades."

Pre-K programs provide a school turnaround strategy. The Board of Education will seek new and effective ways to work cooperatively with other agencies and organizations concerned with the development of children of pre-school age. Closing the achievement gap requires close alignment with the entire spectrum of community and social services, as well as with programs for Virginia's youngest children (age 0-5).

If funding for such programs deceases, the Board will encourage collaborations to maintain and enhance current programs. The Department of Education collaborates with the Department of Social Services in the implementation of programs, initiatives, and funding opportunities that

care for and educate young children. The goal of the collaboration efforts is to promote quality preschool education programs and policies proven to reduce achievement gaps; improve literacy; reduce grade retention; improve graduation rates through teacher training; enhance pre-K to third-grade teacher certification; and develop school readiness standards.

STRATEGIES TO ACHIEVE GOAL 3

Action	2010	2011	2012	2013	2014	2015	2016
Continue to collaborate with other entities in maintaining and enhancing learning standards for preschool education, preparation programs for preschool teachers, and professional development opportunities for preschool teachers.	X	X	X	X	X	X	X
Support the Virginia Preschool Initiative, the Title I Preschool Program, the Early Childhood Special Education Program, Start Strong, and the Even Start Family Literacy Program.	X	X	X	X	X	X	X
Seek ways to cooperate with and encourage the Head Start programs.	X	X	X	X	X	X	X
Support a coordinated approach to delivering preschool programs with a variety of service delivery options.	X	X	X	X	X	X	X
Promote increased participation in and expansion of high quality preschool components, such as the Foundation Blocks for Early Learning and the QRIS rating system.	X	X	X	X	X	X	X
Collaborate with VCCS and SCHEV to promote consistent standards and a smooth transition to licensure for early childhood educators.	X	X	X	X	X	X	X
Continue to collaborate with the Department of Social Services and other partners to promote quality preschool education programs and policies proven to reduce achievement gaps, improve literacy, reduce grade retention and to improve graduation rates through teacher training, pre-K to third-grade teacher certification, developing school readiness standards.	X	X	X	X	X	X	X
Support coordination and alignment between early childhood programs and the K-12 system, including the inclusion of school readiness in school assessment criteria.	X	X	X	X	X	X	X
Support assessment tools to support and recognize Pre-K quality as well as facilitate a smooth transition from Pre-K to Kindergarten.	X	X	X	X	X	X	X

Goal 4: The Board of Education will establish policies that support the attainment of literacy and mathematics skills for all students, pre-K through grade 12.

Background

Literacy has traditionally been described as the ability to read and write. Mathematical literacy refers to ways "to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned and reflective citizen." This goal reflects the Board's understanding that skills in reading and writing as well as in mathematics are absolutely essential for all students to master---and master well---if they are to perform successfully in school and in a career later on. Literacy implies that a person is able to read, write, speak, reason, analyze, and solve problems in a real-world setting. Literate individuals are informed citizens and intelligent consumers. They have the ability to interpret, analyze, and communicate the vast amount of information they are inundated with daily in newspapers, on television, and on the Internet.

The Board of Education will continue and expand efforts to support and improve family/parent and student literacy. As stated by the National Council on Family Literacy: "Literacy is at the root of a person's ability to succeed, and the family is at the heart." Family literacy ensures the cycle of learning and progress passes from generation to generation, and the Board can be a bully pulpit through various programs and policies. The Lexile Measure program is a good example of strategies the Board can encourage. The Board also has the ability to influence policy in areas that affect the teaching and learning of reading and mathematics through supporting efforts to enhance the literacy, mathematics, and science skills of all teachers, especially those in the early grades.

STRATEGIES TO ACHIEVE GOAL 4

Action	2010	2011	2012	2013	2014	2015	2016
Implement the requirement for the reading assessment for initial licensure for elementary teachers, specified special education teachers, and reading specialists.	X	X	X	X	X	X	X
Provide leadership for preschool to adult literacy initiatives, including programs that address the needs of speakers of languages other than English and students with disabilities.	X	X	X	X	X	X	X
Support teacher preparation programs and pre-service programs for teachers to improve their skills in teaching reading.	X	X	X	X	X	X	X
Support programs to promote improved adolescent reading in all content areas.	X	X	X	X	X	X	X
Continue to establish and enhance policies in the SOQ and SOA to promote literacy.	X	X	X	X	X	X	X
Support initiatives that provide additional information to parents and teachers to help them identify areas of reading strength among students and target assistance to students in areas of greatest weakness.	X	X	X	X	X	X	X
Review and amend, as needed, the State Literacy Plan, as may be promoted by the U.S. Department of Education.	X	X	X	X	X	X	X

Goal 5: Effective, Equitably Distributed Work Force: The Board of Education will establish policies and standards that enhance the equitable distribution of Virginia's public education work force and that improve the preparation, recruitment, and retention of Virginia's educational personnel, including meaningful, ongoing professional development.

Background

In developing this goal, the Board of Education can play an important role in coordinating and exploring effective strategies for ensuring quality and results, chiefly through efforts in personnel training and professional development. The Virginia Department of Education licenses teachers and administrators according to regulations adopted by the Board of Education. The department also administers regulations governing educator preparation programs to ensure that teachers enter the classroom with content knowledge and instructional skills aligned to the Standards of Learning and other objectives for learning and achievement.

The department also administers programs to help school divisions recruit and retain highly qualified teachers and recognize instructional excellence. The direct influence that the Board can have on the recruitment, retention, and development of teachers, principals, and superintendents is limited because personnel decisions are made at the local level.

In previous plans, activities that the Board has undertaken/approved under this goal have primarily focused on teachers and have not extended to school administrators, even though effective school leadership is an essential component of successful schools.

Opportunities are available to the Board for supporting professional development for educators, particularly at the leadership level within the schools. For example, the Board can develop partnerships with professional organizations that provide ongoing training and development opportunities for their members. The Board can evaluate license renewal policy and identify and disseminate national "best practices" for recruiting and retaining teachers. The Board may also want to consider partnering with teacher education schools to teach their students how to use data at the teacher and administrator levels.

STRATEGIES TO ACHIEVE GOAL 5:

Action	2010	2011	2012	2013	2014	2015	2016
Support initiatives to increase the number of high quality teachers, especially for hard-to-staff schools, such as the mentoring programs in hard-to-staff schools, the Virginia Middle School Teacher Corps, and other incentive programs for qualified teachers.	X	X	X	X	X	X	X

Promote increasing the pool of teachers entering the profession by supporting strategies such as the career switcher program, the Teaching Scholarship Loan Program, and Teacher Cadet programs, to teach in general and critical shortage areas.	X	X	X	X	X	X	X
Supporting incentives for National Board Certification that are aligned with efforts to help hard-to-staff schools including placing National Board Certified Teachers in such schools, and encouraging teachers from these schools to pursue National Board Certification.	X	X	X	X	X	X	X
Support ways to attract and retain career and technical education teachers whose training and expertise meet the demands of students and employers in the Commonwealth.	X	X	X	X	X	X	X
Support executive education opportunities to assist established school administrators in providing skilled leadership in chronically low-performing schools.	X	X	X	X	X	X	X
Support professional development and technical assistance for educational personnel, working with professional education associations and teacher educators.	X	X	X	X	X	X	X
Support, in conjunction with school divisions, professional development strategies that the local schools will use to help ensure the development of highly qualified professional educational personnel and paraprofessionals.	X	X	X	X	X	X	X
Study and develop model teacher and administrative evaluation systems, field test the models, and develop related guidance documents	X	X	X				
Establish STEM credentialing program for Career and Technical education teachers and for other teachers as needed.	X	X	X	X	X	X	X

Goal 6: Sound Policies for Student Success: The Board of Education will provide leadership in implementing the provisions of state and federal laws and regulations in ways that enhance and expand opportunities for all of Virginia's schoolchildren to excel academically.

Background

The Board will focus on ways to help school divisions do more with less by reviewing state standards and expectations and with an eye towards effectiveness and efficiency. The Board also strives to give flexibility to local schools so that alternative and effective approaches to problems may be utilized.

Much of what the Board does during the course of its work is either directly or indirectly related to its constitutional, statutory, or regulatory requirements. The Board plays a key role in assuring the smooth functioning and administration of state and federal requirements and is keenly concerned about efficient and effective implementation and communication of such rules.

Consistent with Governor McDonnell's Executive Order No. 14 (2010), the Board intends that its regulations shall be designed to achieve their intended objectives in the most efficient, cost-effective manner and in a way that enhances student achievement.

STRATEGIES TO ACHIEVE GOAL 6:

Action	2010	2011	2012	2013	2014	2015	2016
Continue to monitor progress of schools, divisions, and the state in meeting Adequate Yearly Progress (AYP) requirements.	X	X	X	X	X	X	X
Receive annual report cards on progress of students in meeting state standards, graduation rates, elementary school attendance rates, names of schools needing improvement, professional qualifications of teachers, percentages of students not tested, and other information as required by ESEA.	X	X	X	X	X	X	X
Support Virginia's participation in NAEP program in reading and mathematics for 4th and 8th grades.	X	X	X	X	X	X	X
Support programs of technical assistance for schools identified as in the first and second year of school improvement.	X	X	X	X	X	X	X
Support procedures and disseminate via Web site notice to parents and the public of any pending corrective actions.	X	X	X	X	X	X	X
Support efforts to enlarge the pool of Supplemental Educational Services providers to provide remediation for low-performing students in Title I schools.	X	X	X	X	X	X	X
Continue to assist school divisions in implementing charter schools and other public school choice options.	X	X	X	X	X	X	X
Develop and submit the state plan for the Carl D. Perkins Act.				X	X	X	X
Receive reports on the Workforce Investment Act, as necessary.	X	X	X	X	X	X	X
Review and revise annually Virginia's Consolidated State Application Accountability Workbook under ESEA	X	X	X	X	X	X	X
Monitor the reauthorization of ESEA and take appropriate action as needed.	X	X	X	X	X	X	X
Support the Turnaround Partners program	X	X	X	X	X	X	X
Respond to the increased demand for data related to the State Fiscal Stabilization Funds and other programs under the American Recovery and Reinvestment Act (ARRA).	X	X	X	X	X	X	X
Increase transparency in reporting and posting (on the Internet) all information for the public, including expenditures, school division improvement grant applications, jobs created with federal stimulus funds, etc.	X	X	X	X	X	X	X
Review and approve criteria and processes for Virtual School offerings and provide ongoing technical assistance.	X	X	X	X	X	X	X
Develop and implement procedures for receiving, reviewing and ruling on applications to create college laboratory schools and provide ongoing technical assistance.	X	X	X	X	X	X	X

Provide technical assistance and guidance in the development of charter school program proposals to be received by school divisions.	X	X	X	X	X	X	X
Support efforts to maintain the state-level Educational Information Management System (EIMS) to enable the department to meet increasing state and federal reporting requirements and to enable stakeholders at all levels of education to make informed educational decisions based on accurate and timely information.	X	X	X	X	X	X	X
Conduct a periodic review and revision of all Board of Education regulations that have not undergone such review within the past four years.		X	X				
Review guideline documents and policy statements to update as necessary to comport with state or federal legislative changes.	X	X	X	X	X	X	X

Goal 7: Safe and Secure Schools: The Board of Education will provide leadership to help schools and school divisions create and maintain school environments that enhance the safety and success of all children and the professionals who serve them.

Background

Everyone wants safe schools in which students, teachers and support staff can concentrate on learning and not have to worry about disruption due to misbehavior, crime, or violence. Especially in the earliest years, the nonacademic skills (motivation, self-control) are critical. These are the skills that make a person more likely to graduate and a good employee, as well.

The Board of Education supports programs and policies for schoolwide and divisionwide safety and prevention plans that consistently address the needs of all students and encourage a safe and healthy learning environment. The Board is committed to policies that provide a positive learning environment for all children and teachers. Through partnerships, resources, data collection, and evaluation, the Board of Education can do much to address the needs of children as well as those who are providing services that protect our children.

STRATEGIES TO ACHIEVE GOAL 7:

Action	2010	2011	2012	2013	2014	2015	2016
Promote annual, and ongoing, staff training that address the health/safety needs of students and staff.	X	X	X	X	X	X	X
Build a foundation to work towards the goal of establishing a coordinated school health program.	X	X	X	X	X	X	X
Encourage school divisions to find innovative ways to keep students with behavioral challenges in school; Support opportunities for students with behavioral challenges to have access to high quality alternative programs in lieu of suspension or expulsion.	X	X	X	X	X	X	X
Support professional development and technical assistance in classroom management for instructional staff.	X	X	X	X	X	X	X

Support programs and initiatives that emphasize prevention and creation of a positive school climate.	X	X	X	X	X	X	X
Provide incentives and rewards to schools that maintain low rates of, or reduce, disciplinary incidents, suspensions and expulsions, and threats to school safety.	X	X	X	X	X	X	X
Support technical assistance for conducting threat assessments.	X	X	X	X	X	X	X
Promote the establishment of student assistance programs to provide comprehensive services to address the needs of students.	X	X	X	X	X	X	X
Collect and analyze discipline data and support the use of the Prevention through Information data system and programs.	X	X	X	X	X	X	X
Encourage annual training to school divisions on discipline-related data collection to ensure accurate and consistent data collection, analysis, and statewide reporting.	X	X	X	X	X	X	X

Assessing Progress: The Board's Annual Report

The Board of Education annually gauges its performance measures and reports an assessment of the extent to which its goals for the public schools are being achieved. This assessment is contained in the Board of Education's *Annual Report on the Condition and Needs of Public Schools in Virginia* that is submitted annually in November to the Governor, the members of the General Assembly, and to the citizens of Virginia. The latest report may be viewed at http://www.doe.virginia.gov/boe/reports/index.shtml.

High achieving schools have much in common: challenging expectations for all students; clear, measurable goals; a consistent curriculum; and a staff that pores over data to see where teachers and students can improve. Such schools have teachers who are not only willing to push students but also come armed with up-to-date textbooks and other helpful resources.

With these imperatives in mind, two years ago the Board of Education set long-term goals in its comprehensive plan of action for the years 2007 through 2012. Progress has been made to meet each of the eight objectives that were set forth in that plan.

The gratifying student achievement and progress seen so far should not obscure the challenges that remain. More details about the various objective measures used to gauge student progress may be found in the Board of Education's Annual *Report on the Condition and Needs of the Public Schools in Virginia*, which is submitted annually in late November to the Governor, the General Assembly, and members of the public. For the latest report, see http://www.doe.virginia.gov/VDOE/VA_Board/home.shtml

Enrollment Projections for Virginia's Schools

Between 2000 and 2009, Virginia's population grew by more than 800,000 —a growth rate of 11.4 percent over nine years. The growth rate has huge implications for Virginia's public school system. Dr. Michael Spar, research associate for the Demographics and Workforce Section of the Weldon Cooper Center at the University of Virginia, explained it this way in the 2010 study, *Enrollment Projections for Virginia Public Schools, 2009-10 to 2014-15*:

> Enrollment in Virginia's public schools has increased steadily for the past ten years, and projections for the next five years indicate this trend will continue. Nearly ten thousand additional students will enroll each year, amounting to an increase of over 50,000 by the end of the projection period. Total enrollment will increase from 1.21 million to 1.27 million students in the 2014-15 school year.

Digging deeper, the Weldon Cooper Center's research finds that the growth is centered in certain areas, while other areas are expected to shrink in enrollment. (The full text, along with detailed tables, may be viewed at: http://www.coopercenter.org/demographics/school-forecasts#fallmembership.) Excerpts from the 2010 report show the following variance in the growth and reduction of enrollments across the state:

- Enrollment Projections
  The Weldon Cooper Center's forecast indicates that most enrollment growth will be confined to the elementary grades. Exactly two-thirds of total statewide growth will occur in elementary grades. Increases in the number of middle school students will account for nearly a third of total student growth. Only two percent of school population growth will be due to an increase in the number of high school students.

- Local Trends
  Statewide school enrollment growth over the next five years is attributable largely to growth in a relatively small number of metropolitan and suburban school divisions. Most school divisions are not growing. Particularly rapid growth in several northern Virginia divisions account for much of the statewide growth.

  The report states that three northern Virginia divisions—Loudoun, Prince William, and Fairfax—will experience large student increases next year. Other school divisions in northern Virginia, around Richmond, and in Tidewater will experience moderate growth. Most of the school divisions expected to grow are located in an arc running from Hampton Roads in the south, through the Richmond metropolitan area, west to Albemarle, and then northeast to northern Virginia.

The Weldon Cooper Center's report concludes by stating:

> In this time of declining state fiscal resources, the impact of school enrollment changes will depend on factors unique to each school division. Divisions with declining enrollment will receive fewer state funds to support education; yet local tax dollars will stretch further. Divisions with growing student enrollment may receive increases in state support, but possibly not enough to offset the

additional costs of educating more children. Additionally, local budgetary adjustments to compensate for declining revenues; the willingness of localities to raise property tax rates to mitigate the impact of budget cuts; and other fiscal resources available to each jurisdiction (including the extent to which federal assistance may become available) will determine how school enrollment changes impact each locality

Important Demographic Trends for Virginia's Schools

The challenges for our public schools become more acute in light of Virginia's changing demographics, which show clearly that diverse population groups (i.e., limited English proficient and economically disadvantaged) are increasingly making up a larger proportion of the overall population. These students often require additional labor-intensive and cost-intensive services in order to be successful in school. Important demographic trends include the following that have powerful implications for our public school system.

Growth in the enrollment of Limited English Proficient (LEP) students

- In Virginia, the Limited English Proficient population has doubled in just the past five years, and this trend is expected to continue. In 1998, Virginia's public schools enrolled 37,000 LEP students. In 2009, that number had increased to almost 87,000.

- The latest data (2009) show that more than 90 percent of Virginia's school divisions now have Limited English Proficient (LEP) students enrolled. While more than two-thirds of Virginia's LEP students are enrolled in divisions in the northern Virginia region, pockets of sizable concentrations of LEP students dot many areas of the state.

- Virginia's population is becoming increasingly diverse. International immigrants comprise one quarter of the Commonwealth's recent population growth. Until 1970, one in every 100 Virginians was born outside the United States. In 2006, one in every 10 Virginians was foreign-born. (Weldon Cooper Center, 2009)

Diversity of economic and educational opportunity factors

- For the 2009-2010 school year, more than 37 percent of the students in Virginia's public schools were eligible for free and reduced-price lunch. The percent varies widely across the school divisions, from a high of more than 75 percent to a low of 8 percent.

- Based on the latest census data (2000), more than 700,000 adults in Virginia are without high school credentials. Virginia has the 21st highest percentage of adults without high school diplomas (18.5 percent) among the 50 states. (Weldon Cooper Center, 2009)

- On the other side of the economic spectrum, Virginia has the highest percentage of the work force in science and engineering occupations of the 50 states. The relatively high percentage reflects Virginia's large knowledge-intensive sector. (Weldon Cooper Center, 2009)

- Clearly, this is a case of the educational haves and have-nots with profound implications for the economic well-being of our citizens and the state as a whole. The public schools have a huge role in providing the education necessary for equal opportunities for economic success.

Additional Planning Documents

The *Code of Virginia* requires the Board of Education to include in its comprehensive plan an assessment of the needs of public education and a plan to integrate educational technology into the Standards of Learning and the curricula, including career and technical education programs. Pursuant to that requirement, the Board of Education has adopted three documents in addition to its comprehensive plan: (1) the Board of Education's Annual Report on the Condition and Needs of the Public Schools in Virginia; (2) the Six-Year Plan for Technology; and (3) the state plan for career and technical education. When viewed with the comprehensive plan contained herein, the documents provide a comprehensive view of the Board's priorities, the condition and needs upon which the priorities are based, and the future direction and needs of our system of public education.

The Board of Education's Annual Report on the Condition and Needs of the Public Schools in Virginia may be viewed at http://www.pen.k12.va.us/VDOE/VA_Board/home.shtml and the Six-Year Plan for Technology may be viewed at http://www.pen.k12.va.us/VDOE/Technology/OET/resources.shtml#etp. Information about Virginia's career and technical programs may be viewed at http://www.pen.k12.va.us/VDOE/Instruction/CTE/.

Key Policy Documents for Implementing Goals

Of particular note, the Board of Education's priorities for Virginia's public schools are embedded throughout the provisions of the Standards of Quality, the Standards of Accreditation, and the Standards of Learning. These and other key policy and regulatory documents of the Board of Education may be viewed on the Department of Education's Web site: www.doe.virginia.gov.

The Challenges Ahead

The Board of Education anticipates a number of critical issues arising during the next year or two that will need to be dealt with head-on. The full impact---and the response required to deal with the fallout---is not totally known at this point. The emerging issues include:

- Funding the Standards of Quality (SOQ) and other valued initiatives and programs in the current fiscal and economic climate.

- Anticipating the impact of the fiscal climate that is destined to become even more difficult as the flow of federal stimulus funds ends.

- Dealing effectively with schools that do not meet full accreditation because of difficulty in meeting the aggressive objective for graduation rates set by the Board of Education.

- Continuing the technical assistance and interventions by the Virginia Department of Education to assist divisions previously identified as low-performing, especially in this time of agency budget and staffing restrictions.

- Keeping up with increasingly burdensome and time-consuming federal reporting and accountability requirements, especially those related to the Elementary and Secondary Education Act (previously known as No Child Left Behind), the Individuals with Disabilities Education Act, and the State Fiscal Stabilization Fund.

The Board of Education sees challenging years ahead as the state faces economic headwinds that have developed over the last several years. State funding for public education across Virginia was deeply impacted by the recent recession. No surprise, it was a difficult time for almost all of Virginia localities. Local schools were under a tremendous amount of pressure to reduce costs, trim programs, streamline the work force, and redefine how work gets done. Finding ways to do more with less was—and will continue to be—the theme.

Current economic conditions remind us more than ever that the key to economic recovery is education. As always, the Board of Education will continue to think creatively and make sure that its goals and strategies are relevant, evidence-based, practical, and cost-effective.

Board of Education Agenda Item

Item: N. **Date:** September 23, 2010

Topic: Report on the Memorandum of Understanding for Petersburg City Public Schools to Include Compliance with the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA) 8 VAC 20-131-315

Presenter: Mrs. Shelley Loving-Ryder, Assistant Superintendent, Division of Student Assessment and School Improvement
Dr. Alvera Parrish, Superintendent, Petersburg City Public Schools

Telephone Number: (804) 225-2865 **E-Mail Address:** Kathleen.Smith@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

_X_ Board review required by
____ State or federal law or regulation
_X_ Board of Education regulation
____ Other: _____

____ Action requested at this meeting ___ Action requested at future meeting: _____

Previous Review/Action:

____ No previous board review/action

_X_ Previous review/action
date May 27, 2010

Background Information:

The Standards of Quality require local school boards to maintain fully accredited schools and to take corrective actions for schools that are not fully accredited.

> § 22.1-253.13:3**.** Standard 3. Accreditation, other standards and evaluation.
>
> …Each local school board shall maintain schools that are fully accredited pursuant to the standards of accreditation as prescribed by the Board of Education. Each local school board shall review the accreditation status of all schools in the local school division annually in public session. Within the time specified by the Board of Education, each school board shall submit corrective action plans for any schools within its school division that have been designated as not meeting the standards as approved by the Board….

In October 2004, the Virginia Board of Education (VBOE) established criteria for identifying low-performing school divisions to undergo a division level academic review. Petersburg City Public Schools met the criteria for division level academic review.

§ 22.1-253.13:3. Standard 3. Accreditation, other standards and evaluation.

> …When the Board of Education has obtained evidence through the school academic review process that the failure of schools within a division to achieve full accreditation status is related to division level failure to implement the Standards of Quality, the Board may require a division level academic review. After the conduct of such review and within the time specified by the Board of Education, each school board shall submit for approval by the Board a corrective action plan, consistent with criteria established by the Board and setting forth specific actions and a schedule designed to ensure that schools within its school division achieve full accreditation status. Such corrective action plans shall be part of the relevant school division's comprehensive plan pursuant to § 22.1-253.13:6….

In 2004, recognizing the need for technical assistance, the Petersburg City School Board requested a division level academic review and assistance from the Virginia Department of Education (VDOE). Petersburg City Public Schools and the VBOE signed an initial Memorandum of Understanding (MOU) detailing the review process on April 21, 2004.

Based on 2005-2006 assessment results and the resulting accreditation and federal adequate yearly progress (AYP) ratings of the division and its schools, Petersburg City Public Schools entered into a second MOU on November 20, 2006. The proposed MOU with the VBOE required Petersburg City Public Schools to continue in division level academic review status and participate in an academic review process prescribed by the VBOE.

In the November 2006 MOU, the Petersburg City School Board and central office staff adopted five key priorities for improving student achievement across the school division, ensuring alignment of resources with these priorities for improving student achievement, and holding the board and staff accountable for results. The key priorities included:

- Student Achievement
- Leadership Capacity
- Teacher Quality
- Communication with all Stakeholders
- Safe and Secure Environment

As part of the November 2006 MOU, an efficiency review was completed on January 10, 2007, by MGT of America, Inc. Ninety (90) recommendations were indicated, 38 of which were accompanied by fiscal implications. According to the review, full implementation of the recommendations would generate a total savings of $34,620,950 over a five-year period. Petersburg City Public Schools has provided periodic updates regarding the implementation of the efficiency review.

As required by the November 2006 MOU, the VBOE and the VDOE assigned a chief academic officer (CAO) to work with the superintendent and administrative staff to coordinate and monitor the implementation of processes, procedures, and strategies associated with the corrective action plan

resulting from the MOU. The CAO coordinated with VDOE offices to provide technical assistance in support of the MOU and corrective action plan. The CAO has administrative authority over processes, procedures, and strategies that are implemented in support of the MOU and funded by targeted federal and state funds with subsequent review and approval by the Petersburg City School Board.

The November 2006 MOU specified target goals for three years ending after the 2008-2009 school year. Additionally, Section 8 VAC 20-131-300 of the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA), adopted by the VBOE in July 2009, requires school divisions with *Accreditation Denied* schools to enter into a MOU with the VBOE and implement a corrective action plan to improve student achievement in the identified schools. In November 2009 a revised MOU was approved by the Board of Education. Since Petersburg City Public Schools had schools in *Accreditation Denied* status for the 2009-2010 academic year based on 2008-2009 results, the current MOU (Attachment B) for division level academic review also serves as the MOU to satisfy Section 8 VAC 20-131-310. As a part of the proposed MOU, a corrective action plan must be developed. The current MOU will be in place until all schools are fully accredited. Under the current MOU, the Petersburg City School Board and central office staff adopted two key priorities: *leadership capacity* and *teacher quality*.

The VBOE and the VDOE have continued to assign a CAO to work with the superintendent and administrative staff to develop, coordinate and monitor the implementation of processes, procedures, and strategies associated with the corrective action plan resulting from the proposed MOU. The CAO coordinates with VDOE offices to provide technical assistance in support of the MOU and corrective action plan. The CAO has administrative authority over processes, procedures, and strategies that are implemented in support of the MOU and funded by targeted federal and state funds with subsequent review and approval by the Petersburg City School Board.

Key school division responsibilities included in the MOU are as follows:

<u>Student Achievement</u>

1. The central office leadership team under the direction of the CAO or designee will develop a consolidated federal application each year of the proposed MOU that complies with the findings of the efficiency review, focuses on improved student achievement, and connects strategies to the division's corrective action plan. The Petersburg City School Board will review and approve the consolidated federal application.

2. The central office leadership team under the direction of the CAO and Petersburg City School Board will develop and implement a corrective action plan that complies with the findings of the efficiency review, focuses on improved student achievement, and connects strategies to the full implementation of the algebra readiness and early reading initiatives.

3. The central office staff will provide monthly written reports on the implementation of the algebra readiness and early reading initiatives to include activities planned, activities completed, timelines, participation targets and requests for reimbursement to the CAO and the Petersburg City School Board.

4. The central office will work with school staff to implement effective corrective action plans for all schools that are in *Accreditation Denied* status and No Child Left Behind (NCLB)

restructuring. The corrective action plans must meet the requirements of NCLB and the Standards of Accreditation (SOA) and be aligned with the division's key strategies for improved student achievement. Corrective action plans must be approved by the Petersburg City School Board, VBOE and VDOE. Additionally, progress reports on implementing the plans will be shared quarterly with these entities.

5. The central office will work with VDOE staff and the CAO to identify one or more external turnaround partners for the implementation of a specific restructuring plan that meets the requirements of NCLB for all schools in restructuring under NCLB and is approved by the VDOE.

Leadership Capacity

Petersburg City Public Schools will implement an accountability system that links leadership of both the school and the division to student achievement data and provides professional development to improve student achievement. Petersburg City Public Schools will demonstrate commitment to hiring school and division staff with a proven record of increasing student achievement.

Teacher Quality

The central office leadership team under the direction of the CAO or designee will develop and monitor individual action plans to reduce the incidence of teachers with provisional licenses. Petersburg City Public Schools will commit to hiring personnel who are the most qualified for the position vacancy and have a proven track record of increasing student achievement.

As a part of the MOU, the Petersburg City School Board continues to provide summative reports on progress made in meeting or exceeding MOU agreements and expectations to the VBOE and VDOE, as requested.

The November 2006 MOU specified that a contingency plan be developed if the schools did not meet school accreditation targets:

> *The Petersburg School Board, Virginia Board of Education, and the Department of Education will develop a contingency plan for major restructuring to be in place for the 2007-2008 school year if significant improvements in student achievement and school accreditation do not occur for the 2006-2007 school year. The decision to begin the planning for restructuring will be based on reports provided by Petersburg Public Schools to both the Virginia Board of Education and department staff as well as recommendations made by the CAO throughout the year.*

Although the development of the contingency restructuring plan was implemented one year later than planned in the November 2006 MOU, a committee of outside experts from universities, community-based organizations working in Petersburg, the CAO, and department staff met during the 2007-2008 year after assessments given in 2006-2007 resulted in the school division not meeting accountability goals of the MOU for two consecutive years. This committee developed an instructional intervention to be led by an outside entity for middle school students and parents (by choice of entry into the intervention) to begin in 2009-2010.

This plan was based in part on the work of Mass Insight Education and the concept of a turnaround zone. The committee agreed that the plan should include an outside partner to develop and implement a comprehensive "school within a school" model for middle grade students. The committee presented this plan at the June 18, 2008, meeting of the Virginia Board of Education, School and Division Accountability Committee. This plan met the following conditions agreed upon by the VBOE and Petersburg City Public Schools:

1. Alternative governance.
2. Choice option for middle school students and parents.
3. Research-based focus on core content.
4. Recruitment, selection, and supervision of highly qualified personnel by an independent entity.
5. Proven track record of educational success.

At that time, federal school improvement funds that were allocated only to local education agencies (LEAs) with schools in improvement were available to cover the start-up costs for program development and implementation planning. On November 20, 2008, the VBOE requested that the Petersburg City School Board plan for the implementation of the contingency restructuring proposal in the 2009-2010 school year and authorized the VDOE to assist Petersburg City Public Schools in such planning by providing available federal resources. On April 30, 2009, Petersburg City Public Schools reported to the VBOE that a turnaround partner could not be secured. The VBOE requested that a vendor be selected no later than August 15, 2009, with implementation for students occurring no later than January 2010. However, after considering the difficulty that Petersburg City Public Schools had experienced in securing a Lead Turnaround Partner (LTP), on October 29, 2009, VDOE began the procurement process to request proposals from qualified sources to serve as LTPs on an as-needed, when-needed basis, to develop and implement academic programs for one or more of the core discipline areas of mathematics, science, social studies and language arts for students in persistently low-achieving public schools. Persistently low-achieving schools for the purpose of this procurement were those schools that were denied accreditation and/or were in restructuring as sanctioned by the *No Child Left Behind Act of 2001*.

On April 1, 2010, the VDOE made multiple contract awards from which applicable divisions, a group of schools or individual schools within a region can select an LTP. On April 7, 2010, VDOE introduced the four selected vendors for the Lead Turnaround Partner contract list to divisions with schools identified as persistently low-achieving. Petersburg City Public Schools selected Cambridge Education as its Lead Turnaround Partner.

Petersburg City Public Schools has two schools currently identified as persistently low-achieving as required by the State Fiscal Stabilization Fund (SFSF) – Phase II requirements: Peabody Middle School (Tier 1) and Petersburg High School (Tier II. B.). For the purposes of federal funding available under 1003(g) of the *No Child Left Behind Act of 2001*, a persistently lowest-achieving school is defined as:

A. A Title I school in improvement, corrective action, or restructuring that is among the lowest-achieving five percent of Title I schools in improvement, corrective action, or restructuring based on the academic achievement of the "all students" group in reading/language arts and mathematics combined and the school has not reduced its failure rate in reading/language arts and/or mathematics by 10 to 15 percent each year for the past two years (Tier I); or
B. A secondary school that is eligible for, but does not receive, Title I funds that is among the lowest-achieving five percent of schools based on the academic achievement of the "all students" group in reading/language arts and mathematics combined and the school has not reduced its

failure rate in reading/language arts and/or mathematics by 10 to 15 percent each year for the past two years (Tier II. A.); or

C. A high school that has had a graduation rate as defined in 34 CFR 200.19(b) that is less than 60 percent for two years (Tier II. B.)

As required by the SFSF – Phase II requirements, the following factors were considered to identify the persistently lowest-achieving schools: 1) the academic achievement of the "all students" group in reading/language arts and mathematics combined; and 2) the schools' lack of progress on those assessments over a number of years in the "all students" group.

In order to receive 1003(g) funding under NCLB to serve Tier III schools (other schools in improvement including A. P. Hill Elementary, J.E.B. Stuart Elementary, and Vernon Johns Junior High School), Petersburg City Public Schools agreed to serve its Tier I school, Peabody Middle School. Also, for this funding, Peabody Middle School selected to implement the transformation model, one of four approved United States Department of Education (USED) models.

The USED did not require Petersburg City Public Schools to serve Petersburg High School, the Tier II. B. school. As indicated by a review of Petersburg's data, grades 6-9 were major areas of concern with regard to student achievement, and as a result of grade configuration changes that occurred in 2008-2009, grade 9 students are no longer served at Petersburg High school. Petersburg High School now serves students in grades 10-12; Vernon Johns Junior High serves students in grades 8 and 9 and Peabody Middle School serves students in grades 6 and 7.

The impact of the challenges to the middle grades on the high school is demonstrated in the NCLB graduation rate change at Petersburg High School falling from 56 percent in 2007-2008 to 53 percent in 2008-2009. For this reason, in its application for 1003(g) funds, Petersburg City Public Schools asked for permission to serve Peabody Middle School and Vernon Johns Junior High School with 1003(g) with a Lead Turnaround Partner. This partnership with Cambridge Education will allow Petersburg City Public Schools to support the operation of multiple smaller learning communities in both Peabody Middle School and Vernon Johns Junior High School.

Summary of Major Elements

The Petersburg City Public Schools completed an application for federal 1003(g) funds and funding was subsequently approved for $3,766,697 for Peabody Middle School, Vernon Johns Junior High School, A. P. Hill Elementary School, and J.E.B. Stuart Elementary School from July 1, 2010, to September 30, 2013. The Lead Turnaround Partner Plan for Peabody Middle School and Vernon Johns Junior High School is included as Attachment A. At this time, 126 students are enrolled in the smaller learning community at Peabody Middle School and there are four open slots. Fifty-three (53) students are enrolled at Vernon Johns Junior High School at eighth grade and there are seven open slots. At ninth grade for English, there are 81 students scheduled for three blocks of a 4x4 block schedule.

<u>Accreditation</u>

For the 2010-2011 school year, based on assessments in 2009-2010, Petersburg City Public Schools has four *Fully Accredited* schools: Petersburg High School, Robert E. Lee Elementary, Vernon Johns Junior High and J.E.B. Stuart Elementary. Two schools remain in *Accreditation Denied* status: Peabody Middle School, and J.E.B. Stuart Elementary School. A. P. Hill Elementary, in *Accreditation Denied* status in 2008-2009, but *Fully Accredited* in 2009-2010, returned to *Accredited with Warning* status in

2010-2011.

Adequate Yearly Progress (AYP)
In 2008-2009, four schools made AYP under NCLB. In 2010, no schools made AYP.

School	2007-2008	2008-2009	2009-2010	Status for English	Status for Mathematics	Federal Graduation Index
A. P. Hill Elementary	Did Not Make AYP	Made AYP	Did Not Make AYP	Year 3	Not in Improvement	
J.E.B. Stuart Elementary	Did Not Make AYP	Did Not Make AYP	Did Not Make AYP	Year 6	Year 2	
Peabody Middle	Did Not Make AYP	Did Not Make AYP	Did Not Make AYP	Year 6	Year 1	
Petersburg High	Did Not Make AYP	Made AYP	Did Not Make AYP	Not in Improvement	Not in Improvement	Four Years 52 Five Years 51
Robert E. Lee Elementary	Did Not Make AYP	Made AYP	Made AYP	Not in Improvement	Not in Improvement	
Vernon Johns Junior High	Did Not Make AYP	Did Not Make AYP	Did Not Make AYP	Year 7	Year 8	
Walnut Hill Elementary	Did Not Make AYP	Made AYP	Did Not Make AYP	Not in Improvement	Not in Improvement	

Unadjusted* AYP Scores for Standards of Learning Assessments

English

School	2007-2008	2008-2009	2009-2010
A. P. Hill Elementary	61.46%	80.65%	60.37%
J.E.B. Stuart Elementary	69.02%	75.94%	63.86%
Peabody Middle	51.77%	64.16%	66.96%
Petersburg High	87.06%	90.09%	90.69%
R. E. Lee Elementary	77.83%	81.00%	76.64%
Vernon Johns Junior High	58.14%	62.05%	72.92%
Walnut Hill Elementary	72.07%	85.18%	78.40%

Mathematics

School	2007-2008	2008-2009	2009-2010
A. P. Hill Elementary	63.67%	80.16%	65.91%
J.E B. Stuart Elementary	73.24%	64.01%	77.20%
Peabody Middle	40.67%	46.71%	58.33%
Petersburg High	68.60%	85.94%	84.45%
R. E. Lee Elementary	77.00%	83.05%	86.22%
Vernon Johns Junior High	50.31%	88.86%	85.66%
Walnut Hill Elementary	64.07%	81.19%	83.66%

Science

School	2007-2008	2008-2009	2009-2010
A. P. Hill Elementary	61.83%	74.02%	53.63%
J.E.B. Stuart Elementary	68.24%	58.64%	73.97%
Peabody Middle	66.46%	N/A	N/A
Petersburg High	63.60%	83.58%	91.35%
R. E. Lee Elementary	75.42%	88.39%	82.70%
Vernon Johns Junior High	71.09%	68.22%	77.68%
Walnut Hill Elementary	70.33%	73.11%	82.91%

History

School	2007-2008	2008-2009	2009-2010
A. P. Hill Elementary	60.60%	81.16%	73.33%
J.E.B. Stuart Elementary	75.86%	88.65%	79.45%
Peabody Middle	45.64%	62.77%	62.68%
Petersburg High	75.54%	91.18%	94.19%
R. E. Lee Elementary	75.86%	89.90%	88.80%
Vernon Johns Junior High	58.05%	69.93%	75.29%
Walnut Hill Elementary	59.22%	84.61%	87.06%

*An unadjusted pass rate is the percent of students demonstrating proficiency on the Standards of Learning assessment without adjustments as allowed by the Standards of Accreditation or by No Child Left Behind.

Superintendent's Recommendation:
The Superintendent of Public Instruction recommends that the Board of Education receive the report for Petersburg City Public Schools.

Impact on Resources:
None

Timetable for Further Review/Action:
Petersburg City Public Schools will provide monthly and quarterly data as required to the Office of School Improvement.

	Reporting and Accountability			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Ongoing (Monthly/Quarterly/Bi-Yearly)	1/A	Provide formative and ongoing reports on program effectiveness to include, but not limited to, student achievement, parental involvement, student attendance, and student discipline.	• Tripod survey analysis(Peabody August 30, Vernon Johns August 31) • Monthly and quarterly student achievement reports using IStation and ARDT • Bi-yearly reports by Cambridge of their progress toward completing requirements of RFP, on January 28, 2011 and June 20, 2011 • Participate in developing and monitoring the School Improvement Plan with the Leadership Teams (September – Ongoing)	• Develop calendar for leadership team meetings(Completed) • Behavior data(Completed) • Attendance/tardiness data (Completed) • Parent involvement data(Completed) • Achievement data • Deliver all district documents for analysis and review as per agreement • Completion of VDOE Quarterly Reports • Monthly and quarterly student achievement reports using iStation and ARDT

	Effectiveness of Teaching and Learning			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Ongoing	2/B	Employ research-based strategies that provide an immediate and dramatic turnaround in student achievement.	• ECO – classroom observation training for admin. And selected staff (Began August 4, 2010; to be completed September 13-17, 2010) • Individual PD support based on student achievement data, survey results • Analysis of existing class observations and evaluations of teaching to identify trends and determine PD needs	• Schedule for classroom observations/first 2weeks of schools, all classrooms • Access to existing observation/evaluation documents
Aug., 2010 and Ongoing	6/F	Promote student motivation for learning.	• Motivated Classroom PD • Teacher Efficacy training PD(Completed August 2-13, 2010) • Behavior management PD(Completed August 2-13, 2010)	• Schedule of training and follow-up accountability for implementation of practices
Sept/Oct	15/O	Provide comprehensive, coherent, manageable and integrated instructional and support programs.	• Curriculum audit • Common Priorities Training (training teachers with effective teaching skills and training principal on how to evaluate classroom instruction) (September 9, 2010-Ongoing) • Monitor the implementation of 9th grade transition program	• Provide access to all existing school and district curricular documents to Cambridge • Provide Teacher Leader Materials to Cambridge and review materials with new teachers • Implement a 9th grade transition program in the SLC as a pilot project in 2010-11; expand to all 9th graders Year 2

	Effectiveness of Teaching and Learning			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Now -May 2011	16/P	Recommend which existing programs are to be continued and which programs are to be eliminated.	• Complete Curriculum audit • Complete time/personnel/ materials usage and impact analysis • Achievement data analysis relative to program impact	• Develop system for measuring existing programs • Central Office staff working with William and Mary on program evaluation will interface with Cambridge
June 2011	18/R	Organize programming to engage students' sense of adventure, camaraderie, and competition.	• Distribute Tripod results (Completed August 30-31, 2010) • Conduct Student interviews	• Share information on extended day activities • Current practice re: activities/sports/counseling
August 2010 ongoing	19/S	Develop and implement evidence-based discipline programs that minimize time out of school and/or class.	• Provide behavior and discipline training for teaching (Began August 2nd – Ongoing) • Conduct analysis of retrospective and current behavior data (Began August 2nd – Ongoing) • Assist in evaluating and revising the existing Effective School-wide Discipline Program (September 9, 2010 – Ongoing)	• Monitor referrals/ attendance/tardiness • Re-affirm Counselor roles/responsibilities • Review and revise External partners' roles (law enforcement/courts, etc.) • Provide Code Conduct Policy to Cambridge • Implement Effective School-wide Discipline Program

	Effectiveness of Teaching and Learning			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
September, 2010 – Ongoing	21/U	Identify and obtain adequate materials from school system resources (such as the Algebra Readiness Diagnostic Assessment (ARDT) or benchmark assessments). I-station	• Engage in data analysis of SOL test results, iStation, ARDT with district to ensure RTI impact	• Algebra Readiness and I Station will be used consistently to monitor student progress • Utilize results from other sources (benchmarks, Voyager, Teen Biz) to monitor student achievement and make data driven decisions
	Staff Recruitment/Assessment/Retention			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Feb.-April 2011	3/C	Work with the school division to recruit and recommend teachers and a leader(s) who have a proven record of success of increasing student achievement.	• Suggest/design recruitment criteria	• Recruitment outside Petersburg • HR shares recruitment practices with Cambridge and develops plan to hire staff in a timely manner
Sept-April 2011	4/D	Recommend necessary restructuring of teacher and leader contracts.	• Review teacher/principal evaluation process and procedures to identify areas for improved accountability for student learning (August, 2010-Ongoing) • Review professional growth plans for evidence of impact on student progress	• Provide documents to Cambridge • Monitor VDOE work on teacher/principal evaluation and provide info to Cambridge • Review and revise teacher evaluation and principal evaluation instruments and process • Align teacher and principal contracts and evaluation forms

	Staff Recruitment/Assessment/Retention			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Sept -June 2011	10/J	Evaluate teacher and leader performance and outcomes and make staffing recommendations accordingly.	• Data analysis of student progress by school, subject, teacher (Began September 2010-Ongoing) • Review summative/formative data from teacher observations (Began September 2010-Ongoing) • Provide principals with a coach (Began September 2010-Ongoing)	• Create/Evaluate growth plans for teachers whose student achievement scores falls below 65% • Collate data from observations to determine teacher retention • Follow closely the timelines for completion of staff evaluations • Provide principals with a coach/mentor (Completed)
	Professional Development			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
September, 2010-Ongoing	5/E	Develop and engage teachers and the leader in professional development aligned to programmatic goals.	• Assess schools via observations, surveys, Tripod, data, etc. (Began September 2010-Ongoing) • Review existing PD plans and practices • Design PD (differentiated)	• Develop SIP, PD Plan, PD schedule for discussion and modification as needs indicate • Implement and monitor use of PD 360 to address teacher professional development
September, 2010-Ongoing	11/K	Develop constructive relationships with existing school personnel.	• Engage in all appropriate aspects of the life of the school in collaboration with existing leadership and support personnel • Attend all Leadership, Governance and Faculty meeting (Began August 2010-Ongoing)	• Agree to responsibilities across all parties and partners to ensure productivity without redundancy (Completed) • Develop a calendar of Leadership, Governance and Faculty meeting dates (August 30-31, 2010-Ongoing)

	Professional Development			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Spring, 2011	14/N	Work with the school division to obtain a commitment from teachers to allow for additional time for instruction and professional development.	• Assess current use of bell-to-bell teaching • Assess impact of current school schedules and district calendars on learning time and PD collaboration	• Agree to explore avenues for ensuring common planning time, increasing instructional time for all students. • Provide teacher duty schedules to Cambridge (Completed) • Internal Leader Partner will work with superintendent and school board to extend the school day beginning 2011-12
Sept. 2010 and Monthly	17/Q	Consistent with the state Standards of Learning recommend alignment of curriculum, instruction, classroom formative assessment and sustained professional development to build rigor, foster student-teacher relationships, and provide relevant instruction that engages and motivates students.	• Conduct curriculum audit • Conduct Common Priorities training (September 9, 2010 – Ongoing)	• Implement PLC's effectively across all schools • Systems developed to track impact of written, taught, assessed standards-based curriculum • Align curriculum and pacing guides to revised mathematics and history SOL Standards of Learning

	Parent/Community Engagement			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
August 2010 - Ongoing	7/G	Secure parental commitment and involvement through school choice.	• Attend parent meetings August 16 - 19 (Completed)	• Communicate with parents in August through Title I office (Completed) • Identify students for SLC's by July 15 (Completed) • Open enrollment, choice, from August 2- August 19 (Completed) • SLC compact signed by student and parent by August 19 (Completed) • Parental meetings on August 16, 18 for Peabody and August 17, 19 for Vernon Johns (Completed)
October 2010 - Ongoing	8/H	Promote parental capacity to support student engagement, motivation, and learning within school, at home and in the community.	• Pending analysis of impact of all existing parent programs and outreach • Present agreed initiatives to parent groups as identified by district	• Provide documentation and of all existing parent programs and outreach to Cambridge (Completed) • Establish parent resource centers at each school

	Parent/Community Engagement			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
October 2010 - Ongoing	9/I	Work with the school division to expand community support to garner human resources needed for reform.	• Pending analysis of impact of all existing community support programs, practices, partnerships • Present agreed initiatives to identified groups as identified by district	• Provide list of existing community support organizations and partnerships to Cambridge (Completed)
September 2010 – June 2011	13/M	Require commitment from parents to allow for additional time for instruction (such as after school support).	• Attend SLC parent conferences each marking period	• SLC compacts signed by parents, students. LTP and principal • SES parent agreements signed • Conference with SLC parents each grading period
Oct. 2010 - Ongoing	20/T	Identify and recommend supporting partners to address social, emotional and behavioral issues (e.g., over-age students).	• Pending analysis of impact of existing partnerships	• Provide list of partners to Cambridge Completed)
Ongoing	22/V	Identify and recommend outside resources needed in the reform effort.	• Collaborate with school/district personnel to identify untapped resources	• Provide list of possible resources to Cambridge (Completed)

	Parent/Community Engagement			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Oct. 2010 - Ongoing	24/X	Work with school division to seek outside funding from the greater community (business, private foundations, federal and state sources) to support the reform effort.	• Collaborate with school/district personnel to identify untapped resources	• See above re: local partnerships, etc.
	Organizational/Operational Effectiveness and Efficiency			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Spring 2011	12/L	Recommend changes to the school calendar according to student and program needs, for example, year-round schools or extending the length of the school day.	• Provide analysis of effectiveness of current structures	• Implement summer school • Develop a plan, to include School Board approval, to extend the school day to provide additional learning time
Spring 2011	23/W	Develop and recommend a budget to the School Board based on available per pupil amounts of local, basic Standards of Quality (SOQ), school improvement, appropriate Title monies, and special education funding in addition to other sources identified and aligned specifically for the turnaround zone.	• Monthly updates of progress on agreed actions to inform FY12 budget decisions	• Develop and recommend a budget to the School Board based on criteria outlined in RFP Item #23/W

	Organizational/Operational Effectiveness and Efficiency			
Timeline	**RFP Item No./Task**		**Cambridge Responsibility**	**School/Division Responsibility**
Ongoing	25/Y	Integrate all academic and support services.	• Provide data and observational analysis of impact of current delivery systems for SPED and ELL	• Provide information regarding Ongoing training especially to ensure high impact inclusion and co-teaching

Attachment B

VIRGINIA BOARD OF EDUCATION
PETERSBURG CITY SCHOOL BOARD

MEMORANDUM OF UNDERSTANDING
Goals and Expected Outcomes

Background

The Standards of Quality require local school boards to maintain fully accredited schools and to take corrective actions for schools that are not fully accredited.

> § 22.1-253.13:3. Standard 3. Accreditation, other standards and evaluation.
>
> ...Each local school board shall maintain schools that are fully accredited pursuant to the standards of accreditation as prescribed by the Board of Education. Each local school board shall review the accreditation status of all schools in the local school division annually in public session. Within the time specified by the Board of Education, each school board shall submit corrective action plans for any schools within its school division that have been designated as not meeting the standards as approved by the Board.

In October 2004, the Virginia Board of Education (VBOE) established criteria for identifying low-performing school divisions to undergo a division-level academic review. Petersburg City Public Schools met the criteria for division-level academic review.

> § 22.1-253.13:3. Standard 3. Accreditation, other standards and evaluation.
>
> ...When the Board of Education has obtained evidence through the school academic review process that the failure of schools within a division to achieve full accreditation status is related to division level failure to implement the Standards of Quality, the Board may require a division level academic review. After the conduct of such review and within the time specified by the Board of Education, each school board shall submit for approval by the Board a corrective action plan, consistent with criteria established by the Board and setting forth specific actions and a schedule designed to ensure that schools within its school division achieve full accreditation status. Such corrective action plans shall be part of the relevant school division's comprehensive plan pursuant to § 22.1-253.13:6.

In 2004, recognizing the need for technical assistance, the Petersburg City School Board requested a division-level review and assistance from the Virginia Department of Education (VDOE). Petersburg City Public Schools and the VBOE signed an initial Memorandum of Understanding (MOU) detailing the review process on April 21, 2004.

Based on 2005-2006 assessment results and the resulting accreditation and federal adequate yearly progress (AYP) ratings of the division and its schools, Petersburg City Public Schools entered into a second MOU on November 20, 2006. This MOU with the VBOE required Petersburg City Public

Schools to continue in division-level academic review status and participate in an academic review process prescribed by the VBOE.

In the November 2006 MOU, the Petersburg City School Board and central office staff adopted five key priorities for improving student achievement across the school division, ensuring alignment of resources with these priorities for improving student achievement, and holding the board and staff accountable for results. The key priorities included:

- Student Achievement
- Leadership Capacity
- Teacher Quality
- Communication with all Stakeholders
- Safe and Secure Environment

As part of the November 2006 MOU, an efficiency review was completed on January 10, 2007, by MGT of America, Inc. Ninety (90) recommendations were indicated, 38 of which were accompanied by fiscal implications. According to the review, full implementation of the recommendations would generate a total savings of $34,620,950 over a five-year period. Petersburg City Public Schools has provided periodic updates regarding the implementation of the efficiency review.

As required by the November 2006 MOU, the VBOE and the VDOE assigned a chief academic officer (CAO) to work with the superintendent and administrative staff to coordinate and monitor the implementation of processes, procedures, and strategies associated with the corrective action plan resulting from the MOU. The CAO coordinated with VDOE offices to provide technical assistance in support of the MOU and corrective action plan. The CAO has administrative authority over processes, procedures, and strategies that are implemented in support of the MOU and funded by targeted federal and state funds with subsequent review and approval by the Petersburg City School Board.

As a result of the collaborative efforts of the superintendent, administrative staff, and the CAO, Petersburg City Public Schools has four of its seven schools fully accredited for the 2009-2010 school year: Robert E. Lee Elementary School, Walnut Hill Elementary School, A. P. Hill Elementary School, and Petersburg High School. Four of six Title I schools remain in school improvement. The history of each school's accreditation and Adequate Yearly Progress (AYP) status is indicated as follows:

A. P. Hill Elementary School

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	54.32	58.79	61.47	80.66
Mathematics Performance	48.75	64.20	63.68	80.16
Science Performance	44.12	58.06	61.83	74.03
History Performance		66.92	60.61	81.17
Did or Did not Make AYP	Did Not Make AYP	Did Not Make AYP Year 1 of Improvement	Did Not Make AYP Year 2 of Improvement	Made AYP Year 2 Holding of Improvement-Holding
Accreditation Status	Warned	Denied	Denied	Fully Accredited

J.E.B. Stuart Elementary

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	63.80	65.66	69.03	75.94
Mathematics Performance	62.58	50.3	73.25	64.02
Science Performance	67.59	62.62	68.24	58.65
History Performance		67.52	75.86	88.65
Did or Did not Make AYP	Did Not Make AYP Year 3 of Improvement	Did Not Make AYP Year 4 of Improvement	Did Not Make AYP Year 5 of Improvement	Did Not Make AYP Year 5 Holding of Improvement
Accreditation Status	Warned	Denied	Denied	Denied

Robert E. Lee Elementary

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	66.67	79.25	77.84	81.01
Mathematics Performance	64.76	84.91	77.01	83.05
Science Performance	69.33	76.71	75.42	88.39
History Performance		81.33	75.86	89.91
Did or Did not Make AYP	Made AYP	Made AYP	Made AYP	Made AYP
Accreditation Status	Warned	Fully Accredited	Fully Accredited	Fully Accredited

Walnut Hill Elementary

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	77.92	76.62	64.08	85.19
Mathematics Performance	77.92	76.51	72.08	81.19
Science Performance	71.24	73.44	70.33	73.11
History Performance		74.51	59.22	84.62
Did or Did not Make AYP	Made AYP	Made AYP	Made AYP	Made AYP
Accreditation Status	Warned	Fully Accredited	Accredited with Warning	Fully Accredited

Peabody Middle

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	46.25	45.15	51.78	64.17
Mathematics Performance	25.17	28.38	40.67	46.72
Science Performance	62.92	62.38	66.46	
History Performance		34.59	45.65	62.78
Did or Did not Make AYP	Did Not Make AYP Year 3 of School Improvement	Did Not Make AYP Year 4 of School Improvement	Did Not Make AYP Year 5 of School Improvement	Did Not Make AYP Year 5 Holding of School Improvement
Accreditation Status	Warned	Denied	Denied	Denied
Assessment data based on grade levels	6-8	6-8	6-8	6-7

Vernon Johns Middle School/Junior High

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	53.64	55.82	58.14	62.06
Mathematics Performance	34.44	39.08	50.31	88.87
Science Performance	62.77	73.99	71.10	68.23
History Performance		46.68	58.05	69.93
Did or Did not Make AYP	Did Not Make AYP Year 5 of School Improvement	Did Not Make AYP Year 6 of School Improvement	Did Not Make AYP Year 7 of School Improvement	Did Not Make AYP Year 7 Holding of School Improvement
Accreditation Status	Warned	Denied	Denied	Denied
Assessment data based on grade levels	6-8	6-8	6-8	8-9

Petersburg High School

Adequate Yearly Progress (AYP) Pass Rates	2006	2007	2008	2009
English Performance	75.64	76.01	87.06	90.10
Mathematics Performance	41.99	49.54	68.61	85.95
Science Performance	53.28	60.50	63.60	83.59
History Performance	53.28	60.50	63.60	83.59
Did or Did not Make AYP	Did Not Make AYP Year 3 of School Improvement	Did Not Make AYP Year 4 of School Improvement	Did Not Make AYP Year 5 of School Improvement	Made AYP Year 5 Holding of School Improvement
Title I Status	Not a Title I School	Not a Title I School	Not a Title I School	Not a Title I School
Accreditation Status	Accreditation Denied	Accreditation Denied	Accreditation Denied	Fully Accredited
Assessment data based on grade levels	9-12	9-12	9-12	10-12

In 2008-2009, Petersburg City Public Schools restructured their middle and high school grades. Peabody Middle School and Vernon Johns Middle School moved from grades 6-8 to grades 6-7 and grades 8-9, respectively. Petersburg High school moved from grades 9-12 to grades 10-12. The rating in the 2009-2010 year provided in the data above is based on the assessment data from the previous year for the new grade configuration. The aggregated data for each grade level for English and mathematics in the division over the past five year period is provided below:

Petersburg City Public Schools - English

Test Level	SOL Test	2004-2005 Passed	2004-2005 Attempted	2004-2005 Pct Passed	2005-2006 Passed	2005-2006 Attempted	2005-20065 Pct Passed	2006-2007 Passed	2006-2007 Attempted	2006-2007 Pct Passed	2007-2008 Passed	2007-2008 Attempted	2007-2008 Pct Passed	2008-2009 Passed	2008-2009 Attempted	2008-2009 Pct Passed
3	English Reading	214	354	60.45	200	312	64.1	217	350	62	229	349	65.62	266	337	78.93
4	English Reading				234	348	67.24	240	304	78.95	240	336	71.43	238	322	73.91
5	English Reading	238	369	64.5	190	313	60.7	232	347	66.86	190	279	68.1	275	321	85.67
6	English Reading				203	382	53.14	168	326	51.53	176	317	55.52	161	265	60.75
7	English Reading				184	350	52.57	187	349	53.58	145	311	46.62	191	298	64.09
8	English Reading	162	415	39.04	161	408	39.46	167	395	42.28	195	349	55.87	175	285	61.4
11	English Reading	191	297	64.31	266	329	80.85	244	309	78.96	250	288	86.81	273	304	89.8

Petersburg City Public Schools - Mathematics

Test Level	SOL Test	2004-2005 Passed	2004-2005 Attempted	2004-2005 Pct Passed	2005-2006 Passed	2005-2006 Attempted	2005-20065 Pct Passed	2006-2007 Passed	2006-2007 Attempted	2006-2007 Pct Passed	2007-2008 Passed	2007-2008 Attempted	2007-2008 Pct Passed	2008-2009 Passed	2008-2009 Attempted	2008-2009 Pct Passed
3	Mathematics	259	353	73.37	230	310	74.19	246	355	69.3	245	349	70.2	253	337	75.07
4	Mathematics				197	347	56.77	194	302	64.24	221	336	65.77	247	322	76.71
5	Mathematics	222	369	60.16	189	309	61.17	240	347	69.16	180	279	64.52	241	318	75.79
6	Mathematics				65	385	16.88	50	306	16.34	106	283	37.46	99	214	46.26
7	Mathematics				33	363	9.09	57	346	16.47	68	299	22.74	104	290	35.86
8	Mathematics	193	423	45.63	192	372	51.61	194	387	50.13	195	338	57.69	235	288	81.6
11	Algebra I	196	330	59.39	246	437	56.29	237	293	80.89	300	352	85.23	448	478	93.72
11	Algebra II	67	189	35.45	74	143	51.75	104	216	48.15	134	210	63.81	74	87	85.06
11	Geometry	74	232	31.9	85	305	27.87	138	388	35.57	78	166	46.99	128	158	81.01

Additionally, Section 8 VAC 20-131-300 of the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA), adopted by the VBOE in July 2009, requires school divisions with *Accreditation Denied* schools to enter into a MOU with the VBOE and implement a corrective action plan to improve student achievement in the identified schools. Since Petersburg City Public Schools have schools in *Accreditation Denied* status for the 2009-2010 academic year based on 2008-2009 results, the MOU for division-level academic review will also serve as the MOU to satisfy Section 8 VAC 20-131-310. As a part of this MOU, a corrective action plan must be developed.

Another area of concern addressed in the November 2006 MOU was the limited number of highly-qualified teachers employed by the division as well as the number of teachers who were provisionally licensed and the number of long-term substitutes employed as teachers in core content areas. Hard-to-staff funding was provided in the first two years of the MOU; however, results presented at the Senate Finance Committee on December 6, 2007, demonstrated little improvement in the number of provisional or unlicensed teachers employed by the division. On September 23, 2008, Petersburg City Public Schools reported that of the 399 teachers employed in 2008-2009, 393 (98 percent) were licensed; five teachers were not teaching in endorsed areas; 61 (15 percent) were new teachers; and six teachers were indicated as long-term substitutes.

The November 2006 MOU specified that a contingency plan be developed if the schools did not meet school accreditation targets:

> *The Petersburg School Board, Virginia Board of Education, and the Department of Education will develop a contingency plan for major restructuring to be in place for the 2007-2008 school year if significant improvements in student achievement and school accreditation do not occur for the 2006-2007 school year. The decision to begin the planning for restructuring will be based on reports provided by Petersburg Public Schools to both the Virginia Board of Education and department staff as well as recommendations made by the CAO throughout the year.*

Although the development of the contingency restructuring plan was implemented one year later than planned in the November 2006 MOU, a committee of outside experts from universities, community-based organizations working in Petersburg, the CAO, and department staff met during the 2007-2008 year after assessments given in 2006-2007 resulted in the school division not meeting accountability goals of the MOU for two consecutive years. This committee developed an instructional intervention to be led by an outside entity for middle school students and parents (by choice of entry into the intervention) to begin in 2009-2010.

This plan was based in part on the work of Mass Insight Education and the concept of a turnaround zone. The committee agreed that the plan should include an outside partner to develop and implement a comprehensive "school within a school" model for middle grade students. The committee presented this plan at the June 18, 2008, meeting of the School and Division Accountability Committee. This plan met the following conditions agreed upon by the VBOE and Petersburg City Public Schools:

1. Alternative governance.
2. Choice option for middle school students and parents.
3. Research-based focus on core content.
4. Recruitment, selection, and supervision of highly qualified personnel by an independent entity.
5. Proven track record of educational success.

Federal school improvement funds that were allocated only to local education agencies (LEAs) with schools in improvement were available to cover the start-up costs for program development and implementation planning. On November 20, 2008, the VBOE requested that the Petersburg City School Board plan for the implementation of the contingency restructuring proposal in the 2009-2010 school year and authorized the VDOE to assist Petersburg City Public Schools in such planning by providing available federal resources. On April 30, 2009, Petersburg City Schools reported to the VBOE that a vendor could not be secured. The VBOE requested that a turnaround partner be selected no later than August 15, 2009, with implementation for students occurring no later than January 2010. At this time, no turnaround partner has been selected.

School Division Goals and Performance Objectives

For the purposes of this MOU, the Petersburg City School Board and central office staff will adopt two key priorities: *leadership capacity* and *teacher quality*. The priorities will improve student achievement across the school division and must be aligned with resources.

This MOU will be in place until all schools are fully accredited.

Assignment of a Chief Academic Officer (CAO) to Petersburg Public Schools

The VBOE and the VDOE will continue to assign a CAO to work with the superintendent and administrative staff to develop, coordinate and monitor the implementation of processes, procedures, and strategies associated with the corrective action plan resulting from this MOU. The CAO will coordinate with VDOE offices to provide technical assistance in support of the MOU and corrective action plan. The CAO will have administrative authority over processes, procedures, and strategies that are implemented in support of the MOU and funded by targeted federal and state funds with subsequent review and approval by the Petersburg City School Board.

Petersburg City Public Schools will provide the CAO with an office in the central administration office; telephone, computer, and printer access, and clerical support, as needed.

Key Administrative Responsibilities

Student Achievement

1. The central office leadership team under the direction of the CAO or designee will develop a consolidated federal application each year of this MOU that complies with the findings of the efficiency review, focuses on improved student achievement, and connects strategies to the division's corrective action plan. The Petersburg City School Board will review and approve the consolidated federal application.

2. The central office leadership team under the direction of the CAO and Petersburg City School Board will develop and implement a corrective action plan that complies with the findings of the efficiency review, focuses on improved student achievement, and connects strategies to the full implementation of the algebra readiness and early reading initiatives.

3. The central office staff will provide monthly written reports on the implementation of the algebra readiness and early reading initiatives to include activities planned, activities completed, timelines, participation targets and requests for reimbursement to the CAO and the Petersburg City School Board.

4. The central office will work with school staff to implement effective corrective action plans for all schools that are in *Accreditation Denied* status and No Child Left Behind (NCLB) restructuring. The corrective action plans must meet the requirements of NCLB and the Standards of Accreditation (SOA) and be aligned with the division's key strategies for improved student achievement. Corrective action plans must be approved by the Petersburg City School Board, VBOE and VDOE. Additionally, progress reports on implementing the plans will be shared quarterly with these entities.

5. The central office will work with VDOE staff and the CAO to identify one or more external turnaround partners for the implementation of a specific restructuring plan that meets the requirements of NCLB for all schools in restructuring under NCLB and is approved by the VDOE.

Leadership Capacity

Petersburg City Public Schools will implement an accountability system that links leadership of both the school and the division to student achievement data and provides professional development to improve student achievement. Petersburg City Public Schools will demonstrate commitment to hiring school and division staff with a proven record of increasing student achievement.

Teacher Quality

The central office leadership team under the direction of the CAO or designee will develop and monitor individual action plans to reduce the incidence of teachers with provisional licenses. Petersburg City Public Schools will commit to hiring personnel who are the most qualified for the position vacancy and have a proven track record of increasing student achievement.

Petersburg City Public Schools will provide written reports as requested by the CAO (as needed and appropriate) on current instructional vacancies, number of teachers with provisional licenses, and progress on individual action plans to reach full licensure to the VBOE and VDOE.

Status Reports to the Virginia Board of Education

The Petersburg City School Board will provide a summative report on progress made in meeting or exceeding MOU agreements and expectations to the VBOE and VDOE, as requested.

Authorizations

I (We) agree to work collaboratively to implement the requirements of the Memorandum of Understanding (MOU) for the purpose of improving student achievement in Petersburg City Public Schools.

Printed Name: Kenneth L. Pritchett **Title: Chair, Petersburg City School Board** **Signature:** Kenneth L. Pritchett **Date:** 12/2/09	**Printed Name:** James M. Victory **Title: Superintendent, Petersburg City Public Schools** **Signature:** James M. Victory **Date:** 12/2/09
Printed Name: Mark E. Emblidge **Title: President, Virginia Board of Education** **Signature:** Mark E. Emblidge **Date:** 12/15/09	**Printed Name:** Patricia I. Wright **Title: Superintendent of Public Instruction** **Signature:** Patricia I. Wright **Date:** 1/8/2010

Board of Education Agenda Item

Item: O. **Date:** September 23, 2010

Topic: Report on the Memorandum of Understanding for Sussex County Public Schools in Accordance with *Regulations Establishing Standards for Accrediting Public Schoolsin Virginia* (SOA) 8 VAC 20-131-315

Presenter: Mrs. Shelley Loving-Ryder, Assistant Superintendent, Division of Student Assessment and School Improvement
Dr. Charles Harris, Superintendent, Sussex County Public Schools

Telephone Number: (804) 225-2865 **E-Mail Address:** Kathleen.Smith@doe.virginia.gov

Origin:

____ Topic presented for information only (no board action required)

__X_ Board review required by
___ State or federal law or regulation
_X_ Board of Education regulation
____ Other: _____

___ Action requested at this meeting ____ Action requested at future meeting: _____

Previous Review/Action:

__X__ No previous board review/action

____ Previous review/action
date _____
action _____

Background Information:

The Standards of Quality require local school boards to maintain fully accredited schools and to take corrective actions for schools that are not fully accredited.

§ 22.1-253.13:3. Standard 3. Accreditation, other standards and evaluation.

> …Each local school board shall maintain schools that are fully accredited pursuant to the standards of accreditation as prescribed by the Board of Education. Each local school board shall review the accreditation status of all schools in the local school division annually in public session. Within the time specified by the Board of Education, each school board shall submit corrective action plans for any schools within its school division that have been designated as not meeting the standards as approved by the Board.

In October 2004, the Virginia Board of Education (VBOE) established criteria for identifying low-performing school divisions to undergo a division level academic review. Sussex County Public Schools met the criteria for division level academic review as indicated in Section 22.1-253.13:.3. Standard 3. Accreditation, other standards and evaluation:

> …When the Board of Education has obtained evidence through the school academic review process that the failure of schools within a division to achieve full accreditation status is related to division level failure to implement the Standards of Quality, the Board may require a division level academic review. After the conduct of such review and within the time specified by the Board of Education, each school board shall submit for approval by the Board a corrective action plan, consistent with criteria established by the Board and setting forth specific actions and a schedule designed to ensure that schools within its school division achieve full accreditation status. Such corrective action plans shall be part of the relevant school division's comprehensive plan pursuant to Section 22.1-253.13:6.

In 2004, recognizing the need for technical assistance, the Sussex County Public Schools requested a division level review and assistance from the Virginia Department of Education (VDOE). Sussex County Public Schools and the VBOE signed an initial memorandum of understanding (MOU) detailing the review process on December 9, 2004.

Sussex County Public Schools has been in division level review status since 2004 and has reported to the VBOE regularly on the status of implementing the corrective action plan and the terms of the initial MOU. The VDOE has provided ongoing technical assistance and monitored the implementation of the division's corrective action plan. Based on assessments in 2008-2009, Ellen W. Chambliss Elementary had a status of *Accreditation Denied* and Sussex Central Middle School (formerly Annie B. Jackson Elementary, school number 0020) was *Accredited with Warning* for the 2009-2010 school year.

Sussex Central Middle School was reconstituted for 2009-2010 to serve all students in the county in grades four through seven. For accountability purposes, the reconstituted middle school received the same school number as Annie B. Jackson Elementary which is now closed. The accreditation rating of *Accredited with Warning* for Sussex Central Middle School for the 2009-2010 school year was based on assessments provided in 2008-2009 for Annie B. Jackson Elementary (school number 0020). The assessment data for 2008-2009 for Sussex Central Middle School (school number 0480), *Conditionally Accredited* in 2008-2009, indicated that the school did meet accreditation benchmarks.

Additionally, Section 8 VAC 20-131-315 of the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA), adopted by the Board in September 2006, requires school divisions with *Accreditation Denied* schools to enter into a MOU with the VBOE and implement a corrective action plan to improve student achievement in the identified schools. Since Ellen W. Chambliss Elementary was in denied status in 2009-2010 based on 2008-2009 assessments, a MOU was required.

Sussex County Public Schools came before the Virginia Board of Education on September 17, 2009. At that time, the Board approved a second Memorandum of Understanding for Sussex County Public Schools (Attachment B). An auditor was assigned to Ellen W. Chambliss Elementary School, as a school in *Accreditation Denied* status. The principal at Sussex Central Middle School requested that a Partnership for Achieving Successful Schools (PASS) coach return to help implement the reconstitution plan to incorporate grades four through seven in 2009-2010, a change from the grades 6-8 configuration in 2008-2009.

Summary of Major Elements:

Sussex County Public Schools has two schools currently identified as persistently low-achieving as defined by the State Fiscal Stabilization Fund (SFSF) – Phase II requirements: Sussex Central Middle School (Tier 1) and Ellen W. Chambliss Elementary (Tier I.). For the purposes of federal funding available under 1003(g) of the *No Child Left Behind Act of 2001*, a persistently lowest-achieving school is defined as:

A. A Title I school in improvement, corrective action, or restructuring that is among the lowest-achieving five percent of Title I schools in improvement, corrective action, or restructuring based on the academic achievement of the "all students" group in reading/language arts and mathematics combined and the school has not reduced its failure rate in reading/language arts and/or mathematics by 10 to 15 percent each year for the past two years (Tier I); or
B. A secondary school that is eligible for, but does not receive, Title I funds that is among the lowest-achieving five percent of schools based on the academic achievement of the "all students" group in reading/language arts and mathematics combined and the school has not reduced its failure rate in reading/language arts and/or mathematics by 10 to 15 percent each year for the past two years (Tier II. A.); or
C. A high school that has had a graduation rate as defined in 34 CFR 200.19(b) that is less than 60 percent for two years (Tier II. B.)

As required by the SFSF – Phase II requirements, the following factors were considered to identify the persistently lowest-achieving schools: 1) the academic achievement of the "all students" group in reading/language arts and mathematics combined; and 2) the schools' lack of progress on those assessments over a number of years in the "all students" group.

Sussex County Public Schools selected Cambridge Education as its Lead Turnaround Partner. Both schools have selected to implement the restart model, one of four approved USED models. The Sussex County Public Schools completed an application for 1003(g) funds and funding was subsequently approved for $2,637,500 for Ellen W. Chambliss Elementary and Sussex Central Middle School from July 1 2010 to September 30, 2013. The Lead Turnaround Partner Plan for these schools is included as Attachment A.

<u>Accreditation</u>
For the 2010-2011 school year, based on assessments in 2009-2010, Sussex County Public Schools has three schools fully accredited: Sussex Central Middle School, Sussex Central High School, and Jefferson Elementary. Ellen W. Chambliss Elementary remains in *Accreditation Denied status*. Since this school has a status of *Accreditation Denied*, the MOU for division level academic review will serve as the MOU to satisfy Section 8 VAC 20-131-315.

<u>Adequate Yearly Progress (AYP)</u>

In 2008-2009, four schools made AYP under NCLB. In 2010, three schools made AYP: Jefferson Elementary School, Sussex Central High, and Sussex Central Middle School. Ellen W. Chambliss entered school improvement for English.

School	2007-2008	2008-2009	2009-2010	Status for English	Status for Mathematics	Federal Graduation Index
Ellen W. Chambliss Elementary	Made AYP	Did Not Make AYP	Did Not Make AYP	Year 1	Not in Improvement	
Jefferson Elementary	Made AYP	Did Not Make AYP	Made AYP	Not in Improvement	Not in Improvement	
Sussex Central High	Did Not Make AYP	Made AYP	Made AYP	Not in Improvement	Not in Improvement	Four Year 62 Five Year 65
Sussex Central Middle	Made AYP	Did Not Make AYP	Made AYP	Year 4	Not in Improvement	

Unadjusted* AYP Scores for Standards of Learning Assessments

English

School	2007-2008	2008-2009	2009-2010
Ellen W. Chambliss Elementary	64.91%	60.00%	63.26%
Jefferson Elementary	84.44%	81.52%	80.64%
Sussex Central High	90.90%	87.65%	88.88%
Sussex Central Middle	76.28%	68.80%	77.55%

Mathematics

School	2007-2008	2008-2009	2009-2010
Ellen W. Chambliss Elementary	81.35%	56.06%	85.71%
Jefferson Elementary	81.31%	82.60%	93.54%
Sussex Central High	81.12%	80.74%	74.50%
Sussex Central Middle	72.44%	69.09%	72.85%

Science

School	2007-2008	2008-2009	2009-2010
Ellen W. Chambliss Elementary	72.88%	61.19%	81.25%
Jefferson Elementary	95.00%	81.96%	90.32%
Sussex Central High	72.95%	76.83%	77.65%
Sussex Central Middle	80.00%	80.76%	80.23%

History

School	2007-2008	2008-2009	2009-2010
Ellen W. Chambliss Elementary	84.21%	80.59%	83.33%
Jefferson Elementary	85.29%	82.14%	90.32%
Sussex Central High	87.75%	84.29%	84.26%
Sussex Central Middle	91.48%	56.14%	69.84%

*An unadjusted pass rate is the percent of students demonstrating proficiency on the Standards of Learning assessment without adjustments as allowed by the Standards of Accreditation or by No Child Left Behind.

Superintendent's Recommendation:
The Superintendent of Public Instruction recommends that the Board of Education receive the report from Sussex County Public Schools.

Impact on Resources:
None

Timetable for Further Review/Action:
Sussex County Public Schools will provide monthly and quarterly data as required to the Office of School Improvement.

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Develop constructive relationships with existing school personnel.	Dr. Harris, SCPS Superintendent Simmie Raiford (CE)*	Introduce the turnaround concept, introduce the CE representative	August 12th	The board will have received the relevant information and had the opportunity to ask questions	The board will understand the project and be fully supportive of it.
Develop constructive relationships with existing school personnel.	Dr. Harris, SCPS Superintendent	Explain turnaround background to the leadership teams	August 20th 1pm	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	Diane Brown, School Principal	Will introduce what this means to the leadership teams	August 20th 1pm	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	CE* Representative	Give a short background to CE and the kind of input that will be provided. and the leadership team's role and responsibility.	August 20th 1pm	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	Diane Brown, School Principal and CE* Representative	Explain turnaround to the teachers	August 23rd 1pm	The teachers will have heard the message.	The teachers will be committed to the turn around concept and fully supportive of it.

***Cambridge Education**

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Develop constructive relationships with existing school personnel.	Diane Brown, School Principal and Ian Nelson (CE)*	Explain turnaround to parents	September 15th Chambliss 6 p.m.	The parents will have heard the message.	The parents who have heard the message will be supportive and become ambassadors for the turn around project with other parents.
Develop constructive relationships with existing school personnel.	Ian Nelson (CE)*	Be introduced to students	September 9th 9am Chambliss	The students will have heard the reasons for his involvement.	He will have established a rapport with students and begun to gain their confidence.
Evaluate teacher and leader performance and outcomes and make staffing recommendations accordingly.	John Francis (CE)*	Run a one day ECO course for Principals and Asst. Principals	August 17th 9am to 3pm for both Chambliss and Sussex	The senior staff will have attended teacher evaluation training.	Senior staff will become more rigorous in evaluating teachers in classrooms.
Organize programming to engage students' sense of adventure, camaraderie, and competition. Promote student motivation for learning.	Rob Ramsdell (CE)*	Tripod surveys of staff students and parents	By the end of September , 2010	Surveys of students, staff and parents will have been carried out.	The school will have a clear understanding of the perception of those stakeholders and be in a stronger position to act upon them.

***Cambridge Education**

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Promote student motivation for learning.	Terri Singleton(CE)*	Run motivated classroom course	Between August 30th and September 1st at Chambliss 8am to 2pm	Teachers will have attended the course.	Teachers will have a better understanding of how to motivate their students and feel confident about introducing some of the strategies from the course, including the effective use of Assessment for Learning techniques.
Develop and engage teachers and the leader in professional development aligned to programmatic goals.	David Jacobson (CE)*	Begin the Common Priorities program by meeting with teachers	September 9th 3:40 Chambliss	The teachers will have been introduced to the program.	Teachers will begin to align their curriculum to ensure power standards are fully covered to accelerate student achievement.

***Cambridge Education**

Lead Turnaround Action Plan for Sussex Central Middle School | 2010

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Develop constructive relationships with existing school personnel.	Dr. Harris, SCPS Superintendent	Introduce the turnaround concept, introduce the CE representative	August 12th	The board will have received the relevant information and had the opportunity to ask questions	The board will understand the project and be fully supportive of it.
Develop constructive relationships with existing school personnel.	John Francis (CE)*	Explain CE's role	August 12th	Same as above	Same as above
Develop constructive relationships with existing school personnel.	Dr. Harris, SCPS Superintendent	Explain turnaround background to the leadership teams AM one school PM the other	August 20th 10 Am Sussex	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	Adriene Stephenson, School Principal	Will introduce what this means to the leadership teams	August 20th 10 Am Sussex	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	Simmie Raiford (CE)	Give a short background to CE and the kind of input that will be provided. and the leadership team's role and responsibility.	August 20th 10 Am Sussex	The leadership team will have heard the message.	The leadership team will be committed to the turn around concept and fully supportive of it.

***Cambridge Education**

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Develop constructive relationships with existing school personnel.	Principal and Ian Nelson (CE)	Explain turnaround to the teachers	August 23rd	The teachers will have heard the message.	The teachers will be committed to the turn around concept and fully supportive of it.
Develop constructive relationships with existing school personnel.	Adriene Stephenson, School Principal and Ian Nelson (CE)	Explain turnaround to parents	September 14th Sussex 6pm	The parents will have heard the message.	The parents who have heard the message will be supportive and become ambassadors for the turn around project with other parents.
Develop constructive relationships with existing school personnel.	Ian Nelson (CE)	Attend state of the union day and be introduced to students	September 10th 10am Sussex	The students will have heard the reasons for his involvement.	He will have established a rapport with students and begun to gain their confidence.
Evaluate teacher and leader performance and outcomes and make staffing recommendations accordingly.	John Francis (CE)	Run a one day ECO course for Principals and APs	August 17th 9am to 3pm Chambliss and Sussex	The senior staff will have attended teacher evaluation training.	Senior staff will become more rigorous in evaluating teachers in classrooms.

***Cambridge Education**

RFP Item	Who	Will do what	Target/ Completion Dates	Completion Evidence	Evidence of Effectiveness
Organize programming to engage students' sense of adventure, camaraderie, and competition. Promote student motivation for learning.	Rob Ramsdell (CE)	Tripod surveys of staff students and parents	By the end of September	Surveys of students, staff and parents will have been carried out.	The school will have a clear understanding of the perception of those stakeholders and be in a stronger position to act upon them.
Promote student motivation for learning.	Terri Singleon (CE)	Run motivated classroom course	August 25th 8am to 2pm	Teachers will have attended the course.	Teachers will have a better understanding of how to motivate their students and feel

***Cambridge Education**

Attachment B

VIRGINIA BOARD OF EDUCATION
SUSSEX COUNTY SCHOOL BOARD

MEMORANDUM OF UNDERSTANDING
Goals and Expected Outcomes
School Years 2009-2011

Background

The Standards of Quality require local school boards to maintain fully accredited schools and to take corrective actions for schools that are not fully accredited.

> § 22.1-253.13:3. Standard 3. Accreditation, other standards and evaluation.
>
> ...Each local school board shall maintain schools that are fully accredited pursuant to the standards of accreditation as prescribed by the Board of Education. Each local school board shall review the accreditation status of all schools in the local school division annually in public session. Within the time specified by the Board of Education, each school board shall submit corrective action plans for any schools within its school division that have been designated as not meeting the standards as approved by the Board.

The *Regulations Establishing Standards for Accrediting Public Schools in Virginia* (SOA), adopted by the Board in July 2009, Section 8 VAC 20-131.315 requires school divisions with *Accreditation Denied* schools to enter into a Memorandum of Understanding (MOU) with the Virginia Board of Education (VBOE) and implement a corrective action plan to improve student achievement in the identified schools.

> 8 VAC 20-131-315. Action requirements for schools that are denied accreditation.
>
> B. Any school rated Accreditation Denied in accordance with 8 VAC 20-131-300 shall be subject to actions prescribed by the Board of Education and affirmed through a memorandum of understanding between the Board of Education and the local school board. The local school board shall submit a corrective action plan to the Board of Education for its consideration in prescribing actions in the memorandum of understanding within 45 days of the notification of the rating. The memorandum of understanding shall be entered into no later than November 1 of the academic year in which the rating is awarded.
>
> The local board shall submit status reports detailing implementation of actions prescribed by the memorandum of understanding to the Board of Education. The status reports shall be signed by the school principal, division superintendent, and the chair of the local school board. The school principal, division superintendent, and the chair of the local school board may be required to appear before the Board of Education to present status reports.

School Division Goals and Performance Objectives

The Sussex County School Board and central office staff will implement key priorities for improving student achievement at Ellen W. Chambliss Elementary School and Sussex Central Middle School ensuring alignment of resources with these priorities for improving student achievement, and holding the board and staff accountable for results. These priorities must align with the expectations in this memorandum of understanding (MOU) and the following areas of focus:

- Shared Leadership Between the Central Office and School to Raise Student Achievement
- Teacher Quality

Since Sussex County Public Schools continues to have schools *Accredited with Warning* and in *Accreditation Denied* status, the MOU for division-level academic review will serve as the MOU to satisfy Section 8 VAC 20-131-315.

The following performance objectives are established.

<u>Shared Leadership Between the Central Office and School</u>

1. The central office staff and principals under the direction of the superintendent will plan, implement and monitor a new basal reading program (Scott Foresman). The central office leadership team and principal will continue to implement and monitor the mathematics program (Saxon Mathematics).

2. The central office staff and principals under the direction of the superintendent will provide monthly written reports on the implementation of reading and mathematics initiatives at Ellen W. Chambliss Elementary School and Sussex Central Middle School to include activities planned, activities completed, timelines, participation targets, and student outcomes to the Sussex County School Board and the Department of Education.

3. The central office staff and principal under the direction of the superintendent will meet monthly with the assigned auditor as well as reading and mathematics consultants to discuss the implementation of the reading and mathematics program at Ellen W. Chambliss Elementary School. The auditor will clear all appointments to visit the school with the superintendent in advance of the visit. Governance meetings will take place as scheduled by the superintendent and will be limited to after school whenever possible.

4. The central office staff and principals under the direction of the superintendent will implement a data monitoring process with accountability for results and link school and division professional development to improving student achievement as supported by assessment results and other data.

5. At the request of the principal, a Partnership for Achieving Successful Schools (PASS) coach will continue working at Sussex Central Middle School.

6. Using the quarterly report approved by the Department of Education, the central office staff and principals under the direction of the superintendent will provide the department data as required and will include recommendations for modifications to the corrective action plan that demonstrate accountability for results.

Teacher Quality

1. The central office staff and principals under the direction of the superintendent will develop and monitor individual action plans to reduce provisional license.

2. Sussex County Public Schools will commit to hiring personnel who are the most qualified for the position vacancy.

3. Sussex County Public Schools will provide written reports as requested by the Virginia Board of Education (as needed and appropriate) on current instructional vacancies, number of teachers on provisional licenses, and progress on individual action plans to reach full licensure.

Status Reports to the Virginia Board of Education

A corrective action plan will be submitted as required to the Virginia Board of Education as required in 8 VAC 20-131-315 of the *Regulations Establishing Standards for Accrediting Public Schools in Virginia* for Ellen W. Chambliss Elementary School.

> 8 VAC 20-131-315. Action requirements for schools that are denied accreditation.
>
> A. Any school rated Accreditation Denied in accordance with 8 VAC 20-131-300 shall be subject to actions prescribed by the Board of Education and shall provide parents of enrolled students and other interested parties with the following:
>
> 1. Written notice of the school's accreditation rating within 30 calendar days of the notification of the rating from the Department of Education;
>
> 2. A copy of the school division's proposed corrective action plan, including a timeline for implementation, to improve the school's accreditation rating; and
>
> 3. An opportunity to comment on the division's proposed corrective action plan.
>
> Such public comment shall be received and considered by the school division prior to finalizing the school's corrective action plan and a Board of Education memorandum of understanding with the local school board.

The Sussex County School Board will provide a summative report on progress made in meeting or exceeding MOU agreements and expectations to the Virginia Board of Education and the Department of Education, as requested.

Authorizations

I (We) agree to work collaboratively to implement the requirements of the memorandum of understanding (MOU) for the purpose of improving student achievement in Sussex County Public Schools.

Printed Name: Gloria Holloman **Title: Chair, Sussex County School Board** **Signature:** Gloria Holloman **Date:** 11-17-09	**Printed Name:** Charles H. Harris, III **Title: Superintendent, Sussex County Public Schools** **Signature:** Charles H. Harris III **Date:** 10-20-09
Printed Name: Mark Emblidge **Title: President, Virginia Board of Education** **Signature:** Mark Emblidge **Date:** October 1, 2009	**Printed Name:** Patricia I. Wright **Title: Superintendent of Public Instruction** **Signature:** Patricia I. Wright **Date:** 12-7-09

Board of Education Agenda Item

Item: P. **Date:** September 23, 2010

Topic: Report on the Preliminary Analysis of Virginia's *2009 Mathematics Standards of Learning* Compared to the Common Core State Standards in Mathematics

Presenter: Mr. Michael Bolling, Mathematics Coordinator

Telephone Number: (804) 786-6418 **E-Mail Address:** Michael.Bolling@doe.virginia.gov

Origin:

X Topic presented for information only (no board action required)

____ Board review required by
- ____ State or federal law or regulation
- ____ Board of Education regulation
- ____ Other: _____

___ Action requested at this meeting ____ Action requested at future meeting: _____ (date)

Previous Review/Action:

____ No previous board review/action

____ Previous review/action
date _____
action _____

Background Information:
In February 2009, the Virginia Board of Education adopted revised *Mathematics Standards of Learning*, followed by adoption of the Mathematics Curriculum Framework on October 22, 2010. As part of the development of the standards, the work of the committee members was informed by reports from Achieve, the College Board, ACT, as well as the National Assessment of Educational Progress (NAEP) Frameworks, the Curriculum Focal Points from the National Council of Teachers of Mathematics (NCTM), Principles and Standards for School Mathematics from NCTM, the Singapore Curricula, and the Report of the President's National Mathematics Advisory Panel. Furthermore, as a member of Achieve's American Diploma Project (ADP) Network, Virginia participated in a rigorous external review process of the 2009 *Mathematics Standards of Learning*, with both ACT and the College Board analyzing Virginia's mathematics standards against their own college- and career-ready benchmarks or standards. Both analyses showed strong alignment between the Virginia Standards of Learning and their respective standards for postsecondary readiness. According to the College Board's analysis, "The Virginia proposed Mathematics Standards of Learning (SOL) present student learning expectations that are intellectually demanding and generally well aligned with the ADP Benchmarks. If Virginia's students master the state standards, they will likely be well prepared for both workplace and college success."

In June 2010, the National Governors Association (NGA) and the Council of Chief State School

Officers (CCSSO) released the Mathematics Common Core State Standards. Since Achieve, the College Board, and ACT were partners with NGA and CCSSO, their earlier work with states in the ADP Network provided a foundation upon which the Common Core Standards were developed. As such, Virginia's 2009 *Mathematics Standards of Learning* have a strong alignment to the Mathematics Common Core State Standards. Both the Common Core State Standards (CCSS) and the Virginia Standards of Learning (SOL) are rigorous and provide a detailed account of mathematics expectations for student learning and understanding. The content topics covered in both documents are clearly defined and sequential. By the time students have progressed into high school mathematics content through the CCSS or SOL, students have received most of the same mathematical content delivered through different learning progressions. While learning progressions may not completely mirror one another, the content from both is aligned.

Summary of Major Elements

A preliminary analysis of the content included in Virginia's 2009 *Mathematics Standards of Learning* as compared with the Mathematics Common Core State Standards will be provided at the Board meeting.

Superintendent's Recommendation:

The Superintendent of Public Instruction recommends that the Board of Education receive the Report on the Preliminary Analysis of Virginia's *2009 Mathematics Standards of Learning* Compared to the Common Core State Standards in Mathematics

Impact on Resources:

This analysis has been completed using existing resources within the agency. If the agency is required to absorb additional responsibilities related to this activity, other services may be affected.

Timetable for Further Review/Action:

The Department of Education staff will involve mathematics educators in local school divisions and continue to analyze the Common Core State Standards as compared to the Standards of Learning. A final report will be presented to the Board in the fall.

Virginia will continue to monitor work at the national level related to the Common Core State Standards and the Common Assessments. The state will take the opportunity to benefit from Common Core products and processes, which are being developed in the public domain. In the meantime, Virginia's Curriculum Framework, other instructional material, and professional development events continue to support mathematics teaching and learning in the Commonwealth. New enhanced mathematics assessments will be administered for the first time in Virginia in 2011-2012, two years before the Common Standards assessment consortia anticipate administration of the common assessments.