



Science Standards of Learning Curriculum Framework

Grade Three

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Grade Three Science Strand

Scientific Investigation, Reasoning, and Logic

This strand represents a set of systematic inquiry skills that defines what a student should 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 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. (Please note Appendix, “Science Skills, Scope, & Sequence.”) It is important that the classroom teacher understands 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.

Strand: Scientific Investigation, Reasoning, and Logic

Standard 3.1

The student will plan and conduct investigations in which

- a) predictions and observations are made;
- b) objects with similar characteristics are classified into at least two sets and two subsets;
- c) questions are developed to formulate hypotheses;
- d) volume is measured to the nearest milliliter and liter;
- e) length is measured to the nearest centimeter;
- f) mass is measured to the nearest gram;
- g) data are gathered, charted, and graphed (line plot, picture graph, and bar graph);
- h) temperature is measured to the nearest degree Celsius;
- i) time is measured to the nearest minute;
- j) inferences are made and conclusions are drawn; and
- k) natural events are sequenced chronologically.

Understanding the Standard

The skills defined in standard 3.1 are intended to define the “investigate” component of 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. Standard 3.1 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 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.

Standard 3.1

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• Questions frequently arise from observations. Hypotheses can be developed from those questions. Data gathered from an investigation may support a hypothesis.• Complete observations are made using all of the senses. Simple instruments can help extend the senses.• <i>Predictions</i> 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.• An <i>inference</i> 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• develop hypotheses from simple questions. These questions should be related to the concepts in the third grade standards. Hypotheses should 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.”• make and communicate predictions about the outcomes of investigations.• make and communicate careful observations.• 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)• 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 — plant and animal life cycles, phases of the moon, the water cycle, and tidal change)

Standard 3.1 (continued)

Overview	Essential Knowledge, Skills, and Processes
<ul style="list-style-type: none">• 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. <i>(See Grade 3 Mathematics Curriculum Framework, Standard 3.21, page 32.)</i>• A picture graph is similar to a bar graph except that it uses symbols to represent quantities.	<ul style="list-style-type: none">• 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.

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.

Strand: Force, Motion, and Energy

Standard 3.2

The student will investigate and understand simple machines and their uses. Key concepts include

- a) types of simple machines (lever, screw, pulley, wheel and axle, inclined plane, and wedge);
- b) how simple machines function;
- c) compound machines (scissors, wheelbarrow, and bicycle); and
- d) examples of simple and compound machines found in the school, home, and work environment.

Understanding the Standard

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.2

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• 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 <i>lever</i> 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 <i>inclined plane</i> 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 <i>wedge</i> is wide at one end and pointed at the other to help cut or split other objects. Examples include a knife or ax.• The <i>wheel and axle</i> 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 doorknob.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• identify and differentiate the six types of simple machines: lever, screw, pulley, wheel and axle, inclined plane, and wedge.• 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.• 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.• design and construct an apparatus that contains a simple machine.• identify and classify the simple machines which compose a compound machine, such as scissors, wheelbarrow, and bicycle.

Standard 3.2 (continued)

Overview	Essential Knowledge, Skills, and Processes
<ul style="list-style-type: none">• The <i>screw</i> 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 <i>pulley</i> 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.• 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 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.

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;
- b) materials are composed of parts that are too small to be seen without magnification; and
- c) physical properties remain the same as the material is reduced in size.

Understanding the Standard

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 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., 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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.3

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• Objects are made of one or more materials.• All materials are composed of parts too small to be seen without magnification.• Physical properties remain the same even if the material (e.g., plastic, paper, metal, ice) is reduced in size.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• 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 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.• explain that physical properties are observable characteristics that enable one to differentiate objects.• 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, 1.4, 1.5, 2.4, 3.4, and 4.4.

Standard 3.4

The student will investigate and understand that behavioral and physical adaptations allow animals to respond to life needs. Key concepts include

- a) methods of gathering and storing food, finding shelter, defending themselves, and rearing young; and
- b) hibernation, migration, camouflage, mimicry, instinct, and learned behavior.

Understanding the Standard

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.4

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• Physical adaptations help animals survive in their environment. Examples include camouflage and mimicry.• Behavioral adaptations allow animals to respond to life needs. Examples include hibernation, migration, instinct, and learned behavior.• In order to survive, animals act in different ways to gather and store food, find shelter, defend themselves, and rear their young.• Some animals go into a deep winter sleep in which their body activities slow down and they can live off stored food (hibernation).• Some animals go on a long-distance journey from one place to another as seasons change (migration).• Various animals blend into their environments to protect themselves from enemies (camouflage).• 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.)	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• describe and explain the terms <i>hibernation</i>, <i>migration</i>, <i>camouflage</i>, <i>mimicry</i>, <i>instinct</i>, and <i>learned behavior</i>.• give examples of methods that animals use to gather and store food, find shelter, defend themselves, and rear young.• compare the physical characteristics of animals, and explain how the animals are adapted to a certain environment.• explain how an animal’s behavioral adaptations help it live in its specific habitat.• design and construct a model of a habitat for an animal with a specific adaptation.• distinguish between physical and behavioral adaptations of animals.• create (model) a camouflage pattern for an animal living in a specific dry-land or water-related environment. (Relates to 3.6.)• compare and contrast instinct and learned behavior.

Standard 3.4 (continued)

Overview	Essential Knowledge, Skills, and Processes
<ul style="list-style-type: none">• Some animals are born with natural behaviors that they need in order to survive in their environments. 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.	

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 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.

Strand: Living Systems

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.

Understanding the Standard

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 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, 1.4, 1.5, 2.4, 3.4, 4.4, and 6.7. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.5

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• 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 its own food from sunlight, air, and water. Green plants are <i>producers</i>.• A <i>consumer</i> 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 living things. These organisms are <i>decomposers</i>.• 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).	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• distinguish among producers, consumers, herbivores, omnivores, carnivores, and decomposers.• create and interpret a model of a food chain showing producers and consumers.• explain how a change in one part of a food chain might affect the rest of the food chain.• identify sequences of feeding relationships in a food chain.• differentiate between predators and prey.• infer that most food chains begin with a green plant.

Strand: Living Systems

Standard 3.6

The student will investigate and understand that environments support a diversity of plants and animals that share limited resources. Key concepts include

- a) water-related environments (pond, marshland, swamp, stream, river, and ocean environments);
- b) dry-land environments (desert, grassland, rain forest, and forest environments); and
- c) population and community.

Understanding the Standard

Students should become familiar with several specific examples of aquatic and terrestrial environments and the plants and animals unique to them. The water-related environments to be discussed are the pond, marshland, swamp, stream, river, and ocean, and the dry-land environments to be discussed are the desert, grassland, rain forest, and forest. Water-related and dry-land environments contain many types of plants and animals that often compete for the same natural resources. These resources are often shared. It is intended that students will actively develop scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.6

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• Water-related environments include those with fresh water or salt water. Examples include ponds, marshes, swamps, streams, rivers, and oceans.• Dry-land environments include deserts, grasslands, rain forests, and forests.• There are distinct differences among pond, marshland, swamp, stream, river, ocean, desert, grassland, rainforest, and forest environments.• A <i>population</i> is a group of organisms of the same kind that lives in the same place. Examples of a population are a group of swans in a pond, a school of fish in a river, and a herd of cattle in the grassland.• A <i>community</i> 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• describe major water-related environments and examples of animals and plants that live in each.• describe major dry-land environments and examples of animals and plants that live in each.• compare and contrast water-related and dry-land environments.• distinguish between a population and a community.• explain how animals and plants use resources in their environment.• analyze models or diagrams of different water-related environments in order to describe the community of organisms each contains and interpret how the organisms use the resources in that environment.• analyze models or diagrams of different dry-land environments in order to describe the community of organisms each contains and interpret how the organisms use the resources in that environment.• predict what would occur if a population in a specific environment were to die.

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, 1.6, 2.6, 3.7, 4.6, 5.6, and 6.8.

Strand: Interrelationships in Earth/Space Systems

Standard 3.7

The student will investigate and understand the major components of soil, its origin, and 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

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.7

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• 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 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.• <i>Topsoil</i> is the upper soil surface and a natural product of subsoil and bedrock. Topsoil is best for plant growth.• <i>Subsoil</i> and <i>bedrock</i> 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.• <i>Humus</i> is decayed matter in soil. It adds nutrients to the soil. It is located in the topsoil.• <i>Clay</i> contains tiny particles of soil that hold water well and provides nutrients.• <i>Sand</i> is made up of small grains of worn-down rock, has few nutrients, and does not hold water well.• <i>Silt</i> is made up of very small broken pieces of rock. Its particles are larger than clay and smaller than sand.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• observe and recognize that soil, as a natural resource, provides the support and nutrients necessary for plant growth.• explain how soil forms over time.• analyze and describe the different components of soil, including rock fragments, clay, silt, sand, and humus.• comprehend the key terminology related to soil, including <i>humus</i>, <i>nutrients</i>, <i>topsoil</i>, and <i>bedrock</i>.• interpret and illustrate a basic diagram showing major soil layers, including bedrock, subsoil, and topsoil.• 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.

Standard 3.7 (continued)

Overview	Essential Knowledge, Skills, and Processes
<ul style="list-style-type: none">• Since soil takes a long time to form, it should be conserved, not wasted.	

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. 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, 1.7, 2.7, 3.8, 3.9, 4.7, and 5.7.

Strand: Earth Patterns, Cycles, and Change

Standard 3.8

The student will investigate and understand basic patterns and cycles occurring in nature. Key concepts include

- a) patterns of natural events (day and night, seasonal changes, phases of the moon, and tides); and
- b) animal and plant life cycles.

Understanding the Standard

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.8

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• A <i>cycle</i> is a repeated pattern. A <i>sequence</i> 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 days, or one year, to make one revolution.• The cycle of phases of the moon occurs as the moon makes one revolution around the Earth. The shapes we see follow 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, 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 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• explain how some events in nature occur in a pattern or cycle, such as the seasons, day and night, phases of the moon, 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, and describe the changing pattern of the moon as it revolves around the Earth.• 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, undergo during their life cycle.

Strand: Earth Patterns, Cycles, and Change

Standard 3.9

The student will investigate and understand the water cycle and its relationship to life on Earth. Key concepts include

- a) the energy from the sun drives the water cycle;
- b) processes involved in the water cycle (evaporation, condensation, precipitation);
- c) water is essential for living things; and
- d) water supply and water conservation.

Understanding the Standard

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.9

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• 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 (evaporation). The gas is cooled and changed back to a liquid (condensation). 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• 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.• 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.• 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.• appraise the importance of water to people and to other living things.• realize living things get water from the environment in different ways.

Grade Three Science Strand

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, 1.8, 2.8, 3.10, 3.11, 4.8, and 6.9.

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.

Understanding the Standard

This standard reinforces the concept that plants and animals are dependent upon each other for survival. Living things depend on other living things 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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.10

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• Every living thing depends on every other living thing to survive. This is called <i>interdependency</i>.• 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• 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 habitat.• describe how conservation practices can affect the survival of a species.• describe a conservation practice in the local community.

Standard 3.11

The student will investigate and understand different sources of energy. Key concepts include

- a) the sun's ability to produce light and heat energy;
- b) sources of energy (sunlight, water, wind);
- c) fossil fuels (coal, oil, natural gas) and wood; and
- d) renewable and nonrenewable energy resources.

Understanding the Standard

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 scientific investigation, reasoning, and logic skills (3.1) in the context of the key concepts presented in this standard.

Standard 3.11

Overview	Essential Knowledge, Skills, and Processes
<p>The concepts developed in this standard include the following:</p> <ul style="list-style-type: none">• 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.	<p>In order to meet this standard, it is expected that students should be able to</p> <ul style="list-style-type: none">• explain that the sun is the major source of energy for the Earth.• analyze the advantages and disadvantages of using different naturally occurring energy sources.• 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.• design a basic investigation to determine the effects of sunlight on warming various objects and materials, including water.• compare and contrast renewable and nonrenewable energy sources.