

# **Virginia**

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Standards of Learning Assessments

*Blueprint*

*Grade 3*

*Science Test*

*for the*

*2003 Science Standards of Learning*

This revised blueprint will be effective with the 2005-2006 administration of the Standards of Learning Tests.

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# Grade 3 Science Blueprint

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# Standards of Learning (SOL) Test Blueprint

## Introduction

### What is a test blueprint?

A test blueprint is a guide for test construction and use. The Standards of Learning (SOL) test blueprints serve a number of purposes. They serve as a guide to test developers as they write test questions and construct the SOL tests. These blueprints also serve as a guide to educators, parents, and students in that they show:

- (a) the SOL covered by the test and which, if any, have been excluded;
- (b) which SOL are assigned to each reporting category;
- (c) the number of test items in each reporting category and on the total test;
- (d) general information about how the test questions were constructed; and
- (e) the materials that students are allowed to use while taking the test.

### How is the test blueprint organized?

The blueprint contains the following information:

1. **Test Development Guidelines**: guidelines used by the testing contractor and the members of the Content Review Committees in developing the SOL tests. This section contains two parts:
  - A. **General Considerations** — lists general considerations that were used in developing the test as well as considerations specific to a particular content area.
  - B. **Ancillary Materials** — lists any materials that students are allowed to use while taking the test.
2. **Blueprint Summary Table**: a summary of the blueprint which displays the following information:
  - reporting categories for the test;
  - number of test items in each reporting category;
  - Standards of Learning (SOL) included in each reporting category. SOL are identified by numbers and letters that correspond to the original SOL document;
  - SOL which are excluded from the SOL test;
  - number of operational items on the test;
  - number of field-test items on the test; and
  - total number of items (operational and field-test items) on the test.
3. **Expanded Blueprint**: provides the same information as the **Blueprint Summary Table** except that the full text of each SOL is included.

### **What is a reporting category?**

Each test assesses a number of SOL. In the test blueprint, SOL are grouped into categories that represent related content or skills. These categories are labeled *Reporting Categories*. For example, a reporting category for the Grade 3 science test is “Force, Motion, Energy, and Matter.” Each of the SOL in this reporting category addresses a skill involved in investigating or understanding the concepts of force, motion, energy, or matter. When the results of the SOL tests are reported, the scores will be presented in terms of scores for each reporting category and a total test score.

### **Are some SOL assigned to more than one reporting category?**

Letters under a particular SOL are sometimes coded to different reporting categories. For example, the SOL 2.7a which deals with the effects that weather and seasonal changes have on the growth and behavior of living things is assigned to the reporting category “Life Processes and Living Systems.” However, SOL 2.7b which deals with the effects of weather and seasonal changes on weathering and erosion of the land surface is assigned to the reporting category “Earth/Space Systems and Cycles.” Each lettered SOL is assigned to only reporting category.

### **Will all SOL listed in the blueprint be assessed each time the SOL tests are given?**

Each SOL will not be assessed on every SOL test form. To keep the length of a test reasonable, the test will measure a selection of SOL within a reporting category. However, every SOL that is not excluded in the blueprint is eligible for inclusion on each form of an SOL test. Over time all SOL in a reporting category will be assessed.

# Grade 3 Science Test Development Guidelines

## *A. General Considerations*

1. All items included in this test will address the knowledge and skills specified in the 2003 Virginia Standards of Learning in Science for grades K-3.
2. Items will be examined for any content or context that stereotypes, offends, or unfairly penalizes students based on age, gender, economic status, race, ethnicity, religion, or geographic region.
3. The test will be untimed.
4. There is no penalty for guessing. Students will be scored on the number of correct answers out of the total number of operational items on the test.
5. The questions will be appropriate in terms of understandings and experiences that accompany an active science program.
6. Information will be presented through written text or through visual materials such as graphs, tables, models, or other illustrations.
7. Questions will require students to apply previously acquired knowledge and/or to use information that is provided in the question itself.
8. Measurements will be given in SI (metric), or English units where appropriate.
9. Calculators are **not** permitted on this test.
10. Students will be permitted scratch paper at any time during the test.
11. Students will be permitted to use standard (e.g., inches) and metric rulers during the test.

## *B. Ancillary Materials*

Refer to the current examiner's manual or the Department of Education's Web site for ancillary materials that may be used.

## Grade 3 Science Test Blueprint Summary Table

Reporting Categories	Number of Items	Kindergarten SOL	Grade 1 SOL	Grade 2 SOL	Grade 3 SOL
Scientific Investigation, Reasoning, and Logic	10	K.1a-j K.2 a, b	1.1a-h	2.1a-h	3.1a-k
Force, Motion, Energy, and Matter	10	K.3a, b K.4a-e K.5a-c	1.2a-d 1.3a-c	2.2a, b 2.3a, b	3.2a-d 3.3a-c
Life Processes and Living Systems*	10	K.6a-c	1.4a-c 1.5a-c	2.4a, b 2.5a, b 2.7a 2.8a-c	3.4a, b 3.5a-c 3.6a-c 3.10a
Earth / Space Systems and Cycles*	10	K.7a, b K.8a-d K.9a, b K.10a-c	1.6a, b 1.7a-c 1.8a-c	2.6a, b 2.7b	3.7a-d 3.8a, b 3.9a-d 3.10b-d 3.11a-d
SOL Excluded From This Test		None			
Total Number of Operational Items	40				
Field-Test Items**	10				
Total Number of Items	50				

\*Standards from these Resource strands are incorporated in these Reporting Categories.

\*\*These field-test items will *not* be used to compute students' scores on the test.

## Expanded Blueprint

<b>Reporting Category:</b> Scientific Investigation, Reasoning, and Logic <b>Number of Items:</b> 10
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### **Kindergarten SOL in This Reporting Category:**

- K.1 The student will conduct investigations in which
- basic properties of objects are identified by direct observation;
  - observations are made from multiple positions to achieve different perspectives;
  - objects are described both pictorially and verbally;
  - a set of objects is sequenced according to size;
  - a set of objects is separated into two groups based on a single physical attribute;
  - nonstandard units are used to measure common objects;
  - a question is developed from one or more observations;
  - picture graphs are constructed using 10 or fewer units;
  - an unseen member in a sequence of objects is predicted; and
  - unusual or unexpected results in an activity are recognized.
- K.2 Students will investigate and understand that humans have senses that allow one to seek, find, take in, and react or respond to information in order to learn about one's surroundings. Key concepts include
- five senses and corresponding sensing organs (taste – tongue, touch – skin, smell – nose, hearing – ears, and sight – eyes); and
  - sensory descriptors (sweet, sour, bitter, salty, rough/smooth, hard/soft, cold, warm, hot, loud/soft, high/low, bright/dull).

### **Grade 1 SOL in This Reporting Category:**

- 1.1 The student will conduct investigations in which
- differences in physical properties are observed using the senses;
  - simple tools are used to enhance observations;
  - objects or events are classified and arranged according to attributes or properties;
  - observations and data are communicated orally and with simple graphs, pictures, written statements, and numbers;
  - length, mass, and volume are measured using standard and nonstandard units;
  - predictions are based on patterns of observation rather than random guesses;
  - simple experiments are conducted to answer questions; and
  - inferences are made and conclusions are drawn about familiar objects and events.

### **Grade 2 SOL in This Reporting Category:**

- 2.1 The student will conduct investigations in which
- observation is differentiated from personal interpretation, and conclusions are drawn based on observations;

- b) observations are repeated to ensure accuracy;
- c) two or more attributes are used to classify items;
- d) conditions that influence a change are defined;
- e) length, volume, mass, and temperature measurements are made in metric units (centimeters, meters, liters, degrees Celsius, grams, kilograms) and standard English units (inches, feet, yards, cups, pints, quarts, gallons, degrees Fahrenheit, ounces, pounds);
- f) pictures and bar graphs are constructed using numbered axes;
- g) unexpected or unusual quantitative data are recognized; and
- h) simple physical models are constructed.

**Grade 3 SOL in This Reporting Category:**

- 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.

**Reporting Category:** Force, Motion, Energy, and Matter  
**Number of Items:** 10

**Kindergarten SOL in This Reporting Category:**

**Force, Motion, and Energy**

- 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) attraction/nonattraction, push/pull, attract/repel, and metal/nonmetal; and
  - b) useful applications (refrigerator magnet, can opener, magnetized screwdriver, and magnetic games).

**Matter**

- 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 (red, orange, yellow, green, blue, purple), white, and black;
  - b) shapes (circle, triangle, square, and rectangle) and forms (flexible/stiff, straight/curved);

- c) textures (rough/smooth) and feel (hard/soft);
- d) relative size and weight (big/little, large/small, heavy/light, wide/thin, long/short); and
- e) position (over/under, in/out, above/below, left/right) and speed (fast/slow).

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 states (solid, liquid, gas);
- b) the natural flow of water is downhill; and
- c) some materials float in water, while others sink.

### **Grade 1 SOL in This Reporting Category:**

#### **Force, Motion, and Energy**

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;
- c) pushes or pulls can change the movement of an object; and
- d) the motion of objects may be observed in toys and in playground activities.

#### **Matter**

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 common solids will dissolve in water, but others will not; and
- c) some substances will dissolve more readily in hot water than in cold water.

### **Grade 2 SOL in This Reporting Category:**

#### **Force, Motion, and Energy**

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 including the magnetic compass.

#### **Matter**

2.3 The student will investigate and understand basic properties of solids, liquids, and gases. Key concepts include

- a) mass and volume; and
- b) processes involved with changes in matter from one state to another (condensation, evaporation, melting, and freezing).

### **Grade 3 SOL in This Reporting Category:**

#### **Force, Motion, and Energy**

- 3.2 The student will investigate and understand simple machines and their uses. Key concepts include
- types of simple machines (lever, screw, pulley, wheel and axle, inclined plane, and wedge);
  - how simple machines function;
  - compound machines (scissors, wheelbarrow, and bicycle); and
  - examples of simple and compound machines found in the school, home, and work environment.

#### **Matter**

- 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
- objects are made of one or more materials;
  - materials are composed of parts that are too small to be seen without magnification; and
  - physical properties remain the same as the material is reduced in size.

**Reporting Category:** Life Processes and Living Systems (Standards from the Resources strands are incorporated in this Reporting Category.)

**Number of Items:** 10

### **Kindergarten SOL in This Reporting Category:**

#### **Life Processes**

- K.6 The student will investigate and understand basic needs and life processes of plants and animals. Key concepts include
- living things change as they grow, and they need food, water, and air to survive;
  - plants and animals live and die (go through a life cycle); and
  - offspring of plants and animals are similar but not identical to their parents and to one another.

### **Grade 1 SOL in This Reporting Category:**

#### **Life Processes**

- 1.4 The student will investigate and understand that plants have life needs and functional parts and can be classified according to certain characteristics. Key concepts include
- needs (food, air, water, light, and a place to grow);
  - parts (seeds, roots, stems, leaves, blossoms, fruits); and
  - characteristics (edible/nonedible, flowering/nonflowering, evergreen/deciduous).

- 1.5 The student will investigate and understand that animals, including people, have life needs and specific physical characteristics and can be classified according to certain characteristics. Key concepts include
- a) life needs (air, food, water, and a suitable place to live);
  - b) physical characteristics (body coverings, body shape, appendages, and methods of movement); and
  - c) other characteristics (wild/tame, water homes/land homes).

### **Grade 2 SOL in This Reporting Category:**

#### **Life Processes**

- 2.4 The student will investigate and understand that plants and animals undergo a series of orderly changes in their life cycles. Key concepts include
- a) some animals (frogs and butterflies) undergo distinct stages during their lives, while others generally resemble their parents; and
  - b) flowering plants undergo many changes, from the formation of the flower to the development of the fruit.

#### **Living Systems**

- 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; and
  - b) habitats change over time due to many influences.

#### **Earth Patterns, Cycles, and Change**

- 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include
- a) effects on growth and behavior of living things (migration, hibernation, camouflage, adaptation, dormancy).

#### **Resources**

- 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 (fiber, cotton, oil, spices, lumber, rubber, medicines, and paper);
  - b) the availability of plant products affects the development of a geographic area; and
  - c) plants provide homes and food for many animals and prevent soil from washing away.

### **Grade 3 SOL in This Reporting Category:**

## **Life Processes**

- 3.4 The student will investigate and understand that behavioral and physical adaptations allow animals to respond to life needs. Key concepts include
- methods of gathering and storing food, finding shelter, defending themselves, and rearing young; and
  - hibernation, migration, camouflage, mimicry, instinct, and learned behavior.

## **Living Systems**

- 3.5 The student will investigate and understand relationships among organisms in aquatic and terrestrial food chains. Key concepts include
- producer, consumer, decomposer;
  - herbivore, carnivore, omnivore; and
  - predator and prey.
- 3.6 The student will investigate and understand that environments support a diversity of plants and animals that share limited resources. Key concepts include
- water-related environments (pond, marshland, swamp, stream, river, and ocean environments);
  - dry-land environments (desert, grassland, rain forest, and forest environments); and
  - population and community.
- 3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include
- the interdependency of plants and animals.

**Reporting Category:** Earth/Space Systems and Cycles (Standards from the Resources strand are incorporated in this Reporting Category.)

**Number of Items:** 10

## **Kindergarten SOL in This Reporting Category:**

### **Interrelationships in Earth/Space Systems**

- K.7 The student will investigate and understand that shadows occur when light is blocked by an object. Key concepts include
- shadows occur in nature when sunlight is blocked by an object; and
  - shadows can be produced by blocking artificial light sources.

## **Earth Patterns, Cycles, and Change**

- K.8 The student will investigate and understand simple 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;
  - c) animal and plant growth; and
  - d) home and school routines.

- K.9 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 noted and measured.

### **Resources**

- K.10 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 preserve resources for future use.

### **Grade 1 SOL in This Reporting Category:**

#### **Interrelationships in Earth/Space Systems**

- 1.6 The student will investigate and understand the basic relationships between the sun and the Earth. Key concepts include
- a) the sun is the source of heat and light that warms the land, air, and water; and
  - b) night and day are caused by the rotation of the Earth

#### **Earth Patterns, Cycles, and Change**

- 1.7 The student will investigate and understand the relationship of seasonal change and weather to the activities and life processes of plants and animals. Key concepts include how temperature, light, and precipitation bring about changes in
- a) plants (growth, budding, falling leaves, and wilting);
  - b) animals (behaviors, hibernation, migration, body covering, and habitat); and
  - c) people (dress, recreation, and work).

### **Resources**

- 1.8 The student will investigate and understand that natural resources are limited. Key concepts include

- a) identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil);
- b) factors that affect air and water quality; and
- c) recycling, reusing, and reducing consumption of natural resources.

**Grade 2 SOL in This Reporting Category:**

**Interrelationships in Earth/Space Systems**

- 2.6 The student will investigate and understand basic types, changes, and patterns of weather. Key concepts include
- a) temperature, wind, precipitation, drought, flood, and storms; and
  - b) the uses and importance of measuring and recording weather data.

**Earth Patterns, Cycles, and Change**

- 2.7 The student will investigate and understand that weather and seasonal changes affect plants, animals, and their surroundings. Key concepts include
- b) weathering and erosion of the land surface.

**Grade 3 SOL in This Reporting Category:**

**Interrelationships in Earth/Space Systems**

- 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.

**Earth Patterns, Cycles, and Change**

- 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.
- 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.

## Resources

- 3.10 The student will investigate and understand that natural events and human influences can affect the survival of species. Key concepts include
- 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.
- 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.