

# **Virginia**

Standards of Learning Assessments

**Test Blueprint**

## **Grade 5 Science**

**2010 Science  
Standards of Learning**

**This revised test blueprint will be effective with the administration of the 2012-2013 Science Standards of Learning (SOL) tests.**

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# Grade 5 Science Standards of Learning

## Test Blueprint

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## **General Test Information**

### **Test Blueprint**

Much like the blueprint for a building, a test blueprint serves as a guide for test construction. The blueprint indicates the content areas that will be addressed by the test and the number of items that will be included by content area and for the test as a whole. There is a blueprint for each test (e.g., grade 3 reading, grade 5 mathematics, grade 8 science, Virginia and United States History).

### **Reporting Categories**

Each test covers a number of Standards of Learning (SOL). In the test blueprint, the SOL are grouped into categories that address related content and skills. These categories are labeled as reporting categories. For example, a reporting category for the Grade 5 Science Standards of Learning 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 for each reporting category and as a total test score.

### **Assignment of Standards of Learning to Reporting Category**

Different parts of a Standard of Learning may be assigned to different reporting categories. For example, Grade 4 Science SOL 4.9b, which covers plants and animals in Virginia, is assigned to the reporting category *Life Processes and Living Systems* in the Grade 5 Science SOL test. However, 4.9a, which involves water, natural, and mineral resources, is assigned to the reporting category *Earth/Space Systems and Cycles*.

### **Standards of Learning Excluded from Testing**

In some content areas, there are SOL that do not lend themselves to assessment within the current format of the SOL tests. The SOL not tested are listed as “Excluded from Testing” at the end of the blueprint for each test. In Grade 5 Science there are no SOL that are excluded within the current format of the SOL tests.

### **Coverage of Standards of Learning**

Due to the large number of SOL in each grade level content area, *every* Standard of Learning will not be assessed on every version (form) of an SOL test. By necessity, to keep the length of a test reasonable, each version will sample from the SOL within a reporting category. All SOL in the blueprint will be tested within a three year period, and *all of these* SOL are eligible for inclusion on each version of an SOL test.

### **Use of the Curriculum Framework**

The Grade 5 Science Standards of Learning, amplified by the Curriculum Framework, define the essential understandings, knowledge, and skills that are measured by the Standards of Learning tests. The Curriculum Framework enhances understanding of the SOL, defines essential content knowledge, and describes essential skills and processes students need to master.

**Grade 5 Science  
Test Blueprint Summary Table**

<b>Reporting Category</b>	<b>Grade 4 Standards of Learning</b>	<b>Grade 5 Standards of Learning</b>	<b>Number of Items</b>
<b>Assessed with Other SOL</b>	<b>4.1m</b>	<b>5.1k</b>	
<b>Scientific Investigation</b>	<b>4.1a-l</b>	<b>5.1a-j</b>	<b>10</b>
<b>Force, Motion, Energy, and Matter</b>	<b>4.2a-d 4.3a-f</b>	<b>5.2a-d 5.3a-e 5.4a-e</b>	<b>10</b>
<b>Life Processes and Living Systems</b>	<b>4.4a-d 4.5a-f 4.9b</b>	<b>5.5a-c</b>	<b>10</b>
<b>Earth/Space Systems and Cycles</b>	<b>4.6a-c 4.7a-c 4.8a-e 4.9a, c-d</b>	<b>5.6a-c 5.7a-g</b>	<b>10</b>
<b>Excluded from Testing</b>	<b>None</b>		
<b>Number of Operational Items</b>			<b>40</b>
<b>Number of Field Test Items*</b>			<b>10</b>
<b>Total Number of Items on Test</b>			<b>50</b>

\*Field test items are being tried out with students for potential use on subsequent tests and will not be used to compute students' scores on the test.

## **Grade 5 Science Expanded Test Blueprint**

### **Assessed with Other Science Standards of Learning**

The following skill-based standards will be assessed through the reporting categories by applying them to other Standards of Learning content:

#### Grade 4 Standards of Learning

- 4.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- m) current applications are used to reinforce science concepts.

#### Grade 5 Standards of Learning

- 5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
- k) current applications are used to reinforce science concepts.

### **Reporting Category: Scientific Investigation**

**Number of Items: 10**

#### **Standards of Learning:**

#### Grade 4 Standards of Learning

- 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; and

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- l) models are constructed to clarify explanations, demonstrate relationships, and solve needs.

### Grade 5 Standards of Learning

- 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; and
  - j) models are constructed to clarify explanations, demonstrate relationships, and solve needs.

### **Reporting Category: Force, Motion, Energy, and Matter**

**Number of Items: 10**

### **Standards of Learning:**

### Grade 4 Standards of Learning

- 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.
- 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.

### Grade 5 Standards of Learning

- 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.
- 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.
- 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.

### **Reporting Category: Life Processes and Living Systems**

**Number of Items: 10**

### **Standards of Learning:**

### Grade 4 Standards of Learning

- 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.
- 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.
- 4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
- b) animals and plants.

### Grade 5 Standards of Learning

- 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.

### **Reporting Category: Earth/Space Systems and Cycles**

**Number of Items: 10**

### **Standards of Learning:**

### Grade 4 Standards of Learning

- 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.
- 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.

- 4.8 The student will investigate and understand the relationships among Earth, the moon, and the sun. Key concepts include
- the motions of Earth, the moon, and the sun;
  - the causes for Earth's seasons;
  - the causes for the phases of the moon;
  - the relative size, position, age, and makeup of Earth, the moon, and the sun; and
  - historical contributions in understanding the Earth-moon-sun system.
- 4.9 The student will investigate and understand important Virginia natural resources. Key concepts include
- watersheds and water resources;
  - minerals, rocks, ores, and energy sources; and
  - forests, soil, and land.

### Grade 5 Standards of Learning

- 5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
- geological characteristics;
  - physical characteristics; and
  - ecological characteristics.
- 5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include
- identification of rock types;
  - the rock cycle and how transformations between rocks occur;
  - Earth history and fossil evidence;
  - the basic structure of Earth's interior;
  - changes in Earth's crust due to plate tectonics;
  - weathering, erosion, and deposition; and
  - human impact.