

# **Virginia**

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Standards of Learning Assessments

*Blueprint*

*Grade 5*

*Science Test*

*for the*

*2003 Science Standards of Learning*

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

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# Grade 5 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 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;
  - Standards of Learning (SOL) included in each reporting category; SOL are identified by numbers and letters that correspond to the original SOL document
  - number of test items in each reporting category;
  - total number of operational items on the test;
  - total number of field items on the test;
  - total number of items (operational and field test items) on the test; and
  - SOL which are excluded from the SOL 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 5 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 4.8b which deals with understanding that animals and plants are important Virginia natural resources is assigned to the reporting category “Life Processes and Living Systems.” However, SOL 4.8c which deals with understanding that minerals, rocks, ores, and energy sources are important Virginia natural resources is assigned to the reporting category “Earth/Space Systems and Cycles.” Each lettered SOL is assigned to only one 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 the 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 5 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 4-5.
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. Students will be permitted to use standard (e.g., inches) and metric rulers during the test.
10. Students will be permitted scratch paper at any time during the test.
11. Student will be permitted to use a four-function calculator 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 5 Science Test Blueprint Summary Table

Reporting Categories	Number of Items	Grade 4 SOL	Grade 5 SOL
Scientific Investigation	10	4.1a-h	5.1a-h
Force, Motion, Energy, and Matter	10	4.2a-d 4.3a-f	5.2a-c 5.3a-e 5.4a-c
Life Processes and Living Systems*	10	4.4a-d 4.5a-f 4.8b	5.5a-d
Earth/Space Systems and Cycles*	10	4.6a, b 4.7a-d 4.8a, c, d	5.6a-c 5.7a-f
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 <b>Number of Items:</b> 10
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### **Grade 4 SOL in This Reporting Category:**

- 4.1 The student will plan and conduct investigations in which
- distinctions are made among observations, conclusions, inferences, and predictions;
  - hypotheses are formulated based on cause-and-effect relationships;
  - variables that must be held constant in an experimental situation are defined;
  - appropriate instruments are selected to measure linear distance, volume, mass, and temperature;
  - appropriate metric measures are used to collect, record, and report data;
  - data are displayed using bar and basic line graphs;
  - numerical data that are contradictory or unusual in experimental results are recognized; and
  - predictions are made based on data from picture graphs, bar graphs, and basic line graphs.

### **Grade 5 SOL in This Reporting Category:**

- 5.1 The student will plan and conduct investigations in which
- rocks, minerals, and organisms are identified using a classification key;
  - estimations of length, mass, and volume are made;
  - appropriate instruments are selected and used for making quantitative observations of length, mass, volume, and elapsed time;
  - accurate measurements are made using basic tools (thermometer, meter stick, balance, graduated cylinder);
  - data are collected, recorded, and reported using the appropriate graphical representation (graphs, charts, diagrams);
  - predictions are made using patterns, and simple graphical data are extrapolated;
  - manipulated and responding variables are identified; and
  - an understanding of the nature of science is developed and reinforced.

<b>Reporting Category:</b> Force, Motion, Energy, and Matter <b>Number of Items:</b> 10
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### **Grade 4 SOL in This Reporting Category:**

- 4.2 The student will investigate and understand characteristics and interaction of moving objects. Key concepts include
- motion is described by an object's direction and speed;
  - forces cause changes in motion;
  - 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 (open/closed, parallel/series);
  - c) static electricity;
  - d) the ability of electrical energy to be transformed into heat, light, and mechanical energy;
  - e) simple electromagnets and magnetism; and
  - f) historical contributions in understanding electricity.

**Grade 5 SOL in This Reporting Category:**

- 5.2 The student will investigate and understand how sound is transmitted and is used as a means of communication. Key concepts include
- a) frequency, waves, wavelength, vibration;
  - b) the ability of different media (solids, liquids, and gases) to transmit sound; and
  - c) uses and applications (voice, sonar, animal sounds, and musical instruments).
- 5.3 The student will investigate and understand basic characteristics of visible light and how it behaves. Key concepts include
- a) the visible spectrum and light waves;
  - b) refraction of light through water and prisms;
  - c) reflection of light from reflective surfaces (mirrors);
  - d) opaque, transparent, and translucent; and
  - e) historical contributions in understanding light.
- 5.4 The student will investigate and understand that matter is anything that has mass, takes up space, and occurs as a solid, liquid, or gas. Key concepts include
- a) atoms, elements, molecules, and compounds;
  - b) mixtures including solutions; and
  - c) the effect of heat on the states of matter.

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

**Number of Items:** 10

**Grade 4 SOL in This Reporting Category:**

- 4.4 The student will investigate and understand basic plant anatomy and life processes. Key concepts include
- a) the structures of typical plants (leaves, stems, roots, and flowers);
  - b) processes and structures involved with reproduction (pollination, stamen, pistil, sepal, embryo, spore, and seed);

- c) photosynthesis (sunlight, chlorophyll, water, carbon dioxide, oxygen, and sugar); and
  - d) dormancy.
- 4.5 The student will investigate and understand how plants and animals in an ecosystem interact with one another and the nonliving environment. Key concepts include
- a) behavioral and structural adaptations;
  - b) organization of communities;
  - c) flow of energy through food webs;
  - d) habitats and niches;
  - e) life cycles; and
  - f) influence of human activity on ecosystems.
- 4.8 The student will investigate and understand important Virginia natural resources. Key concepts include
- b) animals and plants;

**Grade 5 SOL in This Reporting Category:**

- 5.5 The student will investigate and understand that organisms are made of cells and have distinguishing characteristics. Key concepts include
- a) basic cell structures and functions;
  - b) kingdoms of living things;
  - c) vascular and nonvascular plants; and
  - d) vertebrates and invertebrates.

<p><b>Reporting Category:</b> Earth/Space Systems and Cycles (Standards from the Resources strands are incorporated in this Reporting Category.)</p> <p><b>Number of Items:</b> 10</p>
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**Grade 4 SOL in This Reporting Category:**

- 4.6 The student will investigate and understand how weather conditions and phenomena occur and can be predicted. Key concepts include
- a) weather measurements and meteorological tools (air pressure – barometer, wind speed – anemometer, rainfall – rain gauge, and temperature – thermometer); and
  - b) weather phenomena (fronts, clouds, and storms).
- 4.7 The student will investigate and understand the relationships among the Earth, moon, and sun. Key concepts include
- a) the motions of the Earth, moon, and sun (revolution and rotation);
  - b) the causes for the Earth’s seasons and phases of the moon;
  - c) the relative size, position, age, and makeup of the Earth, moon, and sun; and
  - d) historical contributions in understanding the Earth-moon-sun system.

- 4.8 The student will investigate and understand important Virginia natural resources. Key concepts include
- a) watershed and water resources;
  - c) minerals, rocks, ores, and energy sources; and
  - d) forests, soil, and land.

**Grade 5 SOL in This Reporting Category:**

- 5.6 The student will investigate and understand characteristics of the ocean environment. Key concepts include
- a) geological characteristics (continental shelf, slope, rise);
  - b) physical characteristics (depth, salinity, major currents); and
  - c) biological characteristics (ecosystems).
- 5.7 The student will investigate and understand how the Earth's surface is constantly changing. Key concepts include
- a) the rock cycle including identification of rock types;
  - b) Earth history and fossil evidence;
  - c) the basic structure of the Earth's interior;
  - d) plate tectonics (earthquakes and volcanoes);
  - e) weathering and erosion; and
  - f) human impact.