

# **Virginia**

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**Standards of Learning Assessments**

**Test Blueprint**  
**Grade 5 Science**  
**2018 Science**  
**Standards of Learning**

**This test blueprint will be effective with the administration of the spring 2023 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 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 4.4b, which covers common and extreme weather events and how they affect ecosystems, is assigned to the reporting category *Living Systems and Ecosystem Interactions* in the Grade 5 Science SOL test. However, 4.4a, weather measurements create a record that can be used to make weather predictions, is assigned to the reporting category *Earth/Space Systems and Earth Resources*.


### 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. Every 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 4 and Grade 5 Standards of Learning, amplified by the Curriculum Frameworks, define the essential understandings, knowledge, and skills that are measured by the Standards of Learning tests. The Curriculum Frameworks identify essential understandings, define essential content knowledge, and describe essential skills students need to master.

## Grade 5 Science Test Blueprint Summary Table

Reporting Category 	Grade 4 Standards of Learning	Grade 5 Standards of Learning	Number of Items
<b>Force, Motion, Energy, and Matter</b>		5.2 a-d 5.3 a-e 5.7 a-c	<b>10</b>
<b>Electricity, Sound, and Light</b>		5.4 a-e 5.5 a-d 5.6 a-d	<b>10</b>
<b>Living Systems and Ecosystem Interactions</b>	4.2 a-c 4.3 a-d 4.4 b 4.7 c		<b>10</b>
<b>Earth/Space Systems and Earth Resources</b>	4.4 a, c 4.5 a-c 4.6 a-d 4.7 a, b 4.8 a-d	5.8 a-e 5.9 a-c	<b>10</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>

 The Scientific and Engineering Practices are embedded into test items to varying degrees.

\*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

### Scientific and Engineering Practices

- 4.1 The student will demonstrate an understanding of scientific and engineering practices by
- a) asking questions and defining problems
    - identify scientific and non-scientific questions
    - develop hypotheses as cause-and-effect relations
    - define a simple design problem that can be solved through the development of an object, tool, process, or system
  - b) planning and carrying out investigations
    - identify variables when planning an investigation
    - collaboratively plan and conduct investigations
    - use tools and/or materials to design and/or build a device that solves a specific problem
    - take metric measurements using appropriate tools
    - measure elapsed time
  - c) interpreting, analyzing, and evaluating data
    - organize and represent data in bar graphs and line graphs
    - interpret and analyze data represented in bar graphs and line graphs
    - compare two different representations of the same data (e.g., a set of data displayed on a chart and a graph)
    - analyze data from tests of an object or tool to determine whether it works as intended
  - d) constructing and critiquing conclusions and explanations
    - use evidence (i.e., measurements, observations, patterns) to construct or support explanations and to make inferences
  - e) developing and using models
    - develop and/or use models to explain natural phenomena
    - identify limitations of models
  - f) obtaining, evaluating, and communicating information
    - read and comprehend reading-level-appropriate texts and/or other reliable media
    - communicate scientific information, design ideas, and/or solutions with others
- 5.1 The student will demonstrate an understanding of scientific and engineering practices by
- a) asking questions and defining problems
    - ask testable questions based on observations and predict reasonable outcomes based on patterns
    - develop hypotheses as cause-and-effect relationship
    - define design problems that can be solved through the development of an object, tool, process, or system
  - b) planning and carrying out investigations

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This revised test blueprint will be effective beginning with the spring 2023 test administration.

- collaboratively plan and conduct investigations to produce data
  - identify independent variables, dependent variables, and constants
  - determine data that should be collected to answer a testable question
  - take metric measurements using appropriate tools
  - use tools and/or materials to design and/or build a device that solves a specific problem
- c) interpreting, analyzing, and evaluating data
- represent and analyze data using tables and graphs
  - organize simple data sets to reveal patterns that suggest relationships
  - compare and contrast data collected by different groups and discuss similarities and differences in their findings
  - use data to evaluate and refine design solutions
- d) constructing and critiquing conclusions and explanations
- construct and/or support arguments with evidence, data, and/or a model
  - describe how scientific ideas apply to design solutions
  - generate and compare multiple solutions to problems based on how well they meet the criteria and constraints
- e) developing and using models
- develop models using an analogy, example, or abstract representation to describe a scientific principle or design solution
  - identify limitations of models
- f) obtaining, evaluating, and communicating information
- read and comprehend reading-level-appropriate texts and/or other reliable media
  - communicate scientific information, design ideas, and/or solutions with others

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

**Number of Items: 10**

**Standards of Learning:**

- 5.2 The student will investigate and understand that energy can take many forms. Key ideas include
- a) energy is the ability to do work or to cause change;
  - b) there are many different forms of energy;
  - c) energy can be transformed; and
  - d) energy is conserved.
- 5.3 The student will investigate and understand that there is a relationship between force and energy of moving objects. Key ideas include
- a) moving objects have kinetic energy;
  - b) motion is described by an object's direction and speed;
  - c) changes in motion are related to net force and mass;
  - d) when objects collide, the contact forces transfer energy and can change objects' motion; and
  - e) friction is a force that opposes motion.

- 5.7 The student will investigate and understand that matter has properties and interactions. Key ideas include
- matter is composed of atoms;
  - substances can be mixed together without changes in their physical properties; and
  - energy has an effect on the phases of matter.

**Reporting Category: Electricity, Sound, and Light**

**Number of Items: 10**

**Standards of Learning:**

- 5.4 The student will investigate and understand that electricity is transmitted and used in daily life. Key ideas include
- electricity flows easily through conductors but not insulators;
  - electricity flows through closed circuits;
  - static electricity can be generated by rubbing certain materials together;
  - electrical energy can be transformed into radiant, mechanical, and thermal energy; and
  - a current flowing through a wire creates a magnetic field.
- 5.5 The student will investigate and understand that sound can be produced and transmitted. Key ideas include
- sound is produced when an object or substance vibrates;
  - sound is the transfer of energy;
  - different media transmit sound differently; and
  - sound waves have many uses and applications.
- 5.6 The student will investigate and understand that visible light has certain characteristics and behaves in predictable ways. Key ideas include
- visible light is radiant energy that moves in transverse waves;
  - the visible spectrum includes light with different wavelengths;
  - matter influences the path of light; and
  - radiant energy can be transformed into thermal, mechanical, and electrical energy.

**Reporting Category: Living Systems and Ecosystem Interactions**

**Number of Items: 10**

**Standards of Learning:**

- 4.2 The student will investigate and understand that plants and animals have structures that distinguish them from one another and play vital roles in their ability to survive. Key ideas include
- the survival of plants and animals depends on photosynthesis;
  - plants and animals have different structures and processes for obtaining energy; and
  - plants and animals have different structures and processes for creating offspring.
- 4.3 The student will investigate and understand that organisms, including humans, interact with one another and with the nonliving components in the ecosystem. Key ideas include



- a) interrelationships exist in populations, communities, and ecosystems;
  - b) food webs show the flow of energy within an ecosystem;
  - c) changes in an organism’s niche and habitat may occur at various stages in its life cycle; and
  - d) classification can be used to identify organisms.
- 4.4 The student will investigate and understand that weather conditions and phenomena affect ecosystems and can be predicted. Key ideas include
- b) common and extreme weather events affect ecosystems.
- 4.7 The student will investigate and understand that the ocean environment has characteristics. Key characteristics include
- c) interaction of organisms in the ocean.

**Reporting Category: Earth/Space Systems and Earth Resources**

**Number of Items: 10**

**Standards of Learning:**

- 4.4 The student will investigate and understand that weather conditions and phenomena affect ecosystems and can be predicted. Key ideas include
- a) weather measurements create a record that can be used to make weather predictions; and
  - c) long term seasonal weather trends determine the climate of a region.
- 4.5 The student will investigate and understand that the planets have characteristics and a specific place in the solar system. Key ideas include
- a) planets rotate on their axes and revolve around the sun;
  - b) planets have characteristics and a specific order in the solar system; and
  - c) the sizes of the sun and planets can be compared to one another.
- 4.6 The student will investigate and understand that there are relationships among Earth, the moon, and the sun. Key relationships include
- a) the motions of Earth, the moon, and the sun;
  - b) the causes for Earth’s seasons;
  - c) the causes for the four major phases of the moon and the relationship to the tide cycles; and
  - d) the relative size, position, age and makeup of Earth, the moon, and the sun.
- 4.7 The student will investigate and understand that the ocean environment has characteristics. Key characteristics include
- a) geology of the ocean floor; and
  - b) physical properties and movement of ocean water.
- 4.8 The student will investigate and understand that Virginia has important natural resources. Key resources include
- a) watersheds and water;

- b) plants and animals;
  - c) minerals, rocks, and ores; and
  - d) forests, soil, and land.
- 5.8 The student will investigate and understand that Earth constantly changes. Key ideas include
- a) Earth's internal energy causes movement of material within the Earth;
  - b) plate tectonics describe movement of the crust;
  - c) the rock cycle models the transformation of rocks;
  - d) processes such as weathering, erosion, and deposition change the surface of the Earth; and
  - e) fossils and geologic patterns provide evidence of Earth's change.
- 5.9 The student will investigate and understand that the conservation of energy resources is important. Key ideas include
- a) some sources of energy are considered renewable and others are not;
  - b) individuals and communities have means of conserving both energy and matter; and
  - c) advances in technology improve the ability to transfer and transform energy.