



**NGSSS**  
Science & Social Studies  
Assessments

# **Statewide Science Assessment Test Item Specifications**

**DRAFT**

**Grade 5**



**FLORIDA DEPARTMENT OF EDUCATION**  
[www.fldoe.org](http://www.fldoe.org)

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## INTRODUCTION

The Next Generation Sunshine State Standards (NGSSS) for science were adopted by the Florida State Board of Education in February 2008 (available online at <http://www.floridastandards.org/Standards/FLStandardSearch.aspx>).

For grades K–8, the NGSSS are divided into benchmarks that identify what a student should know and be able to do at each grade level. This document, *Statewide Science Assessment Test Item Specifications, Grade 5 (Specifications)*, provides information about the benchmarks, the stimulus types, and the test items designed to assess the standards for grades 3–5.

The Statewide Science Assessments measure achievement of grade 5 and grade 8 Florida students in science. The Biology 1 End-of-Course (EOC) Assessment measures achievement of Florida students enrolled in Biology 1, or an equivalent course, by assessing student progress on benchmarks from the NGSSS that are assigned to the Biology 1 course.

### **Origin and Purpose of the *Specifications***

The Florida Department of Education and committees of experienced Florida educators developed and approved the *Specifications*. The *Specifications* is a resource that defines the content and format of the test and test items for item writers and reviewers. The grade-level *Specifications* indicates the alignment of test items with the NGSSS. It also serves to provide all stakeholders with information about the format and function of the Statewide Science Assessments.

### **Scope of this Document**

The *Specifications* for grade 5 provides general and grade-specific guidelines for the development of all test items used in the Statewide Science Assessment for grade 5. Two additional *Specifications* documents provide the same information for the Statewide Science Assessment grade 8 and the Biology 1 EOC Assessment.

The Overall Considerations section in this Introduction provides an explanation of the science concepts assessed by the test. The Criteria for Statewide Science Assessment Test Items section addresses cognitive-complexity levels as well as the review processes used to ensure the quality of the stimuli and test items. The same section explains the general guidelines for selection and development of multiple-choice items. The Individual Benchmark Specifications section contains specific information about each benchmark. This section provides benchmark clarification statements, assessment limits, stimulus attributes, response attributes, prior knowledge, and a sample item for each benchmark grouping.

## Overall Considerations

This section of the *Specifications* describes the guidelines that apply to all test items developed for the Statewide Science Assessments for grade 5 and grade 8.

Overall considerations are broad item-development issues that should be addressed during the development of test items. Sections of Criteria for Statewide Science Assessment Test Items relate more specifically to one aspect of the development (e.g., assessment limits, stimulus attributes).

1. Each test item should be written to measure primarily one benchmark; however, other benchmarks may also be reflected in the item context (scenario).
2. Some benchmarks are combined for assessment. The individual specification and Appendix B indicate which benchmarks are combined. Test items may be written to “also assesses” benchmarks; however, the overall theme of the benchmark grouping should be evident in the items.
3. Test items should be appropriate for students in terms of grade-level instruction, experience and difficulty, cognitive development, and reading level. The reading level of the test items should be on grade level, except for specifically assessed science terms or concepts. The Individual Benchmark Specifications and the grade 5 Item Writer Glossary found in Appendix C provide information to the writer on which science terms are appropriate for use in test items at grade 5. For grade 8, words found in the benchmarks and the glossary are appropriate for use in test items unless otherwise noted in the *Specifications*. The grade 8 glossary is provided as a reference of the terms and concepts that are appropriate for grade 8.
4. Test items should assess the application of the concept rather than the memorization of science fact, law, or theory unless otherwise noted in the Individual Benchmark Specifications.
5. Test items will not require the student to define terms.
6. Test items that include a collection of data should require the student to analyze or interpret that data (e.g., use data from a scenario to identify a trend) rather than retrieve information directly from a passage, chart, graph, or table.
7. Test items or illustrations for grades 5 and 8 may use the following common elementary laboratory tools: balance, battery, beaker, compass, electronic balance scale, eyedropper, flashlight, globe, graduated cylinder, light bulb, magnet, magnifying glass or hand lens, metric measuring tape, metric ruler, microscope, microscope slide, mirror, model, safety goggles, spring scales, stopwatch, streak plate, telescope, test tube, thermometer, topographic map, and tuning fork.
8. Test items or illustrations for grade 8 may use the following common middle-school laboratory tools in addition to the elementary laboratory tools: dissection equipment, electronic balance, flask, hot plate, meter stick, petri dish, pH sensors, pipette, prism, probe, pulley, test strips, and triple-beam balance.

9. Test items referring to technologies familiar to elementary and middle-school students may include computers and computer models (simulations).
10. Test items will not require the creation of a chart, graph, or table.
11. At grade 5, all test items should be written in a conceptual nature. Grade 5 test items should not require the use of a calculator. At grade 8, students are allowed to use a four-function calculator, although test items should not require its use.
12. Test items may require the student to apply knowledge of the science concepts described in the prior knowledge benchmarks from lower grades; however, that knowledge should NOT be assessed in isolation.
13. Each test item should be written clearly and unambiguously to elicit the desired response.
14. Test items will not require the memorization of equations or formulas unless otherwise noted in the Individual Benchmark Specifications. A reference sheet is not provided to students. If equations or formulas are needed, they must be included in the test item.
15. Test items will not require memorization of the periodic table. For grade 8, a periodic table is provided to the students and is also found in Appendix F.
16. Test items should not disadvantage or exhibit disrespect to anyone in regard to age, gender, race, ethnicity, language, religion, socioeconomic status, disability, occupation, or geographic region.

## **Item Contexts (Scenarios)**

The context in which a test item is presented is called the item context or scenario. Test items should be placed in a context.

1. The test item context should be designed to interest students at the assessed grade level. Scenarios should be appropriate for students in terms of grade-level experience and difficulty, cognitive development, and reading level.
2. The context should be directly related to the question asked. The context should lead the student cognitively to the question. Every effort should be made to keep test items as concise as possible without losing cognitive flow or missing the overall idea or concept.
3. Item contexts should not refer to students using textbooks or the internet as resources. Item contexts should focus on the students engaging in science learning rather than reading about science. Item contexts should avoid using a simple classroom scenario.
4. Item contexts and illustrations depicting individuals conducting laboratory investigations should include proper safety equipment and model safe laboratory procedures.
5. Scenarios describing scientific investigations should model current science methodology and adhere to the International Rules for Pre-college Science Research: Guidelines for Science and Engineering Fairs unless otherwise noted in the benchmark clarification statements. These rules and guidelines can be found using the link <https://www.societyforscience.org/isef/international-rules/>.
6. The test item content should be timely and not likely to become dated.

## CRITERIA FOR STATEWIDE SCIENCE ASSESSMENT TEST ITEMS

All Statewide Science Assessment test items are in multiple-choice (MC) format. The general specifications on pages 4 through 17 cover the following criteria for the Statewide Science Assessment:

- Use of Graphics
- Item Style and Format
- Scope of Test Items
- Guidelines for Item Writers
- Item Difficulty
- Cognitive Complexity of Statewide Science Assessment Test Items
- Universal Design

### Use of Graphics

Graphics are used to provide both necessary and supplemental information—that is, some graphics contain information that is necessary for answering the question, while other graphics illustrate or support the context of the question. Scenarios may include diagrams, illustrations, charts, or tables, unless otherwise noted in the Individual Benchmark Specifications.

1. Test items should not begin with art. Art in test items is always preceded by text.
2. All tables, charts, and graphs should be titled. Titles should be in all caps, boldfaced, and centered.
3. Illustrations and pictures are either titled or introduced. If a title is used, the title shall be set in boldface with all caps and placed above or below the illustration or picture.
4. Whenever possible, the components of graphics should be labeled.

### Item Style and Format

This section presents stylistic guidelines and formatting directions that should be followed while developing test items.

#### General Guidelines

1. Test items should be clear and concise and should use vocabulary and sentence structure appropriate for the assessed grade level. Writers should refer to the resources provided during item writer training and to the Glossary in the back of the *Specifications* to determine whether the language used in the test item is grade-level appropriate.
2. Whenever possible, test items should be written in active voice rather than in passive voice.
3. Scientific concepts should be grade appropriate. Writers should refer to the Prior Knowledge information in the Individual Benchmark Specifications section, the instructional foundation for each benchmark grouping. The grades K–2 benchmarks are found on pages 22–28.
4. Test items should have only one correct answer. The words *most likely* or *best* should only be used when appropriate to the question.



5. The final sentence of all test item stems must be expressed as a question.
6. At grade 5, test items addressing temperature should use degrees Celsius with the approximate whole number equivalent in degrees Fahrenheit, e.g., 37°C (99°F). At grade 8, temperatures should be given in degrees Celsius unless otherwise noted in the Individual Benchmark Specifications.
7. Metric units of measure should be used in scenarios addressing mass, length, weight, and/or volume. International System of Units (SI) should be used unless otherwise noted in the Individual Benchmark Specifications.
8. Test items requiring art should be to scale whenever possible. If needed for clarity, a *not-to-scale* text box should be included at the bottom left of the art. In items with graphics as answer options, the stem may contain the statement “Options are not to scale.” This will avoid repetitive placement of the *not-to-scale* box with each option.
9. Graphics in test items should be clearly labeled and contain all necessary information.
10. Test items referring to new developments or discoveries should include phrases similar to *according to current knowledge* or *based on current knowledge*.
11. Test item questions using the word *not* should emphasize the word *not* using all uppercase letters (e.g., *Which of the following is NOT an example of . . .*).
12. As appropriate, boldface type should be used to emphasize key words in the test item question (e.g., **least, most, greatest, percent, best**).
13. Name(s) should be used whenever possible to avoid gender-specific pronouns (e.g., instead of *The student will make changes so that he . . .*, use *John and Maria will make changes so that they . . .*).
14. Use a variety of names, including names representing current student names and different ethnic groups appropriate for Florida.
15. Grade 8 test items may express values using scientific notation; however, test items should not require calculations involving scientific notation. Use of scientific notation is not appropriate at grade 5.
16. Decimal numbers between –1 and 1 should have a leading zero.
17. SI units should be expressed in a single type of unit when possible (e.g., 1.4 kilograms instead of 1 kilogram 400 grams).
18. Decimal notation should be used for numbers with SI units (e.g., 1.5 grams instead of  $1\frac{1}{2}$  grams).
19. Commas should be used in numbers greater than or equal to 1,000 except for numbers having an SI unit. In this case, numbers with four digits should be presented without a comma or a space (e.g., 9960 meters). Numbers with more than four digits should be presented with a thin space inserted in place of a comma (e.g., 10 123 kilograms).

20. The first occurrence of units of measure should be written out in the test item stem, e.g., kilograms (kg). In graphics, an abbreviation may be used (e.g., g or cm). To avoid confusion between the preposition *in* and the abbreviation for inches, only units of measure in graphics should be presented, e.g., height (cm) NOT height (in cm).
21. In titles of tables and charts and in labels for axes, the unit of measure should be included, preferably in lowercase and in parentheses, e.g., height (m).
22. In most cases, scenarios involving elements, chemical formulas, or chemical symbols and/or equations should be written out followed by the abbreviation, e.g., carbon dioxide (CO<sub>2</sub>).
23. Test items assessing concepts that require equations should include the equation with the test item unless otherwise noted in the Individual Benchmark Specifications. Test items will not require the memorization of formulas.
24. In the item stem, values needed to compute answers should be presented as numerals.

### **Multiple-Choice (MC) Items**

1. MC items should take approximately one minute per item to answer.
2. MC items are worth one point each.
3. MC items should have four answer options (A, B, C, D or F, G, H, I for alternating items).
4. The correct response should be indicated.
5. The rationale for distractors (incorrect answer choices) should be indicated. The rationale should include information explaining why a student would select that distractor.
6. Distractor rationales should represent computational or conceptual errors commonly made by students who have not mastered the assessed concepts.
7. Each distractor should be a believable answer for someone who does not really know the correct answer.
8. Whenever possible, distractors should include common science misconceptions.
9. All distractors should be written in a style appropriate to the question asked. For example, a “how” question should have distractors that explain how.
10. Paired comparison structure of options should be avoided.
11. Options should have parallel structure whenever possible. Test item options should not have an outlier (e.g., an answer option that is significantly longer than or different from the other options).
12. Test items should not be clued or answered by information in the stem or other options.
13. Options such as *none of the above*, *all of the above*, *not here*, *not enough information*, or *cannot be determined* should not be used. These responses should not be used as distractor rationales.

14. If an option is a single word or a phrase, the option should start with a lowercase letter. If an option is a sentence, the sentence should be conventionally capitalized and punctuated. Options that are imperatives should be treated as sentences.
15. In most cases, answer options should be arranged vertically beneath the item stem.
16. If four graphics are labeled horizontally or vertically and horizontally, the option labeling should be as follows:
 

A. B. C. D. or A. C.  
B. D.
17. If the answer options for a test item are strictly numerical, they should be arranged in ascending or descending order, with the place values of digits aligned. When the test item requires the identification of a choice from the item stem, table, chart, or illustration, the options should be arranged as they are presented in the item stem, table, chart, or illustration.
18. If the answer options for a test item are neither strictly numerical nor denominate numbers, the options should be arranged by the logic presented in the test item, by alphabetical order, or by length. Options may also be ordered in reverse alphabetical order or from longest to shortest. Answers that are one word in length should be in alphabetical or reverse alphabetical order.

### **Context-Dependent Item Sets**

Context-dependent (CD) item sets are groups of test items that are written to a common stimulus. The stimulus provides a basis for testing student understanding of science concepts or processes, critical thinking, or problem solving.

1. The stimulus for the CD set may be a **short** passage describing a scientific event or investigation. The stimulus may also include illustrations, graphics, tables, and/or graphs.
2. As a general rule, the stimulus content should focus primarily on two science areas from the NGSSS (Nature of Science, Earth and Space Science, Life Science, or Physical Science).
3. The reading level of the stimulus, excluding science terms, should be on grade level.
4. Test items will be written so that students with benchmark mastery use scientific knowledge and the information in the passage to answer the test items in the set.
5. Test items will not be clued or answered by information in the passage or other test items in the CD set.
6. Test items may require the student to analyze, interpret, evaluate, and/or draw inferences from the information in the stimulus.
7. As many test items as possible should be written to the stimulus. Those test items should represent an appropriate variety of benchmarks. On a test, a minimum of two different benchmarks should be assessed in the CD set.
8. Titles for passages in context-dependent sets are required.

The following CD set is provided as an example of three items written to a common stimulus.

## Properties of Sugar

Ms. Northrup's class is learning about the properties of matter. She wrote three questions about sugar on the board and then demonstrated an activity for each. The students recorded their observations at the end of each activity.

**Question 1: Can sugar be separated from another material after they are mixed together?**

**Activity 1:**

- Pour a mixture of sugar and gravel into a sieve.

**Question 2: Do equal amounts of sugar always dissolve in water in the same amount of time?**

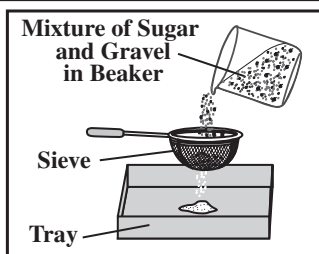
**Activity 2:**

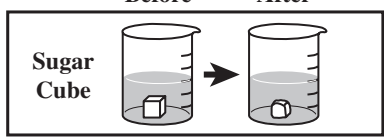
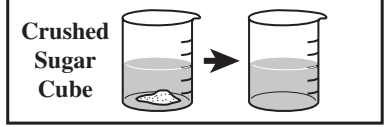
- Use two sugar cubes.
- Place one sugar cube in a beaker labeled X. Crush the other sugar cube and place in a beaker labeled Y.
- Add 200 milliliters (mL) of water to each beaker.
- Stir the water and sugar in each beaker with a spoon for two minutes.



**Question 3: What happens when sugar is placed above a candle flame?**

**Activity 3:**

- Place sugar in a glass beaker.
- Using beaker tongs, hold the beaker above a candle flame for two minutes.

<b>Activity 1</b>	 <p style="text-align: center;"><b>Mixture of Sugar and Gravel in Beaker</b></p> <p style="text-align: center;">Sieve Tray</p>	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="background-color: #e0e0e0;">Student Observations</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">In Tray</td> <td>Sugar</td> </tr> <tr> <td>In Sieve</td> <td>Gravel</td> </tr> </tbody> </table>	Student Observations		In Tray	Sugar	In Sieve	Gravel
	Student Observations							
In Tray	Sugar							
In Sieve	Gravel							

<b>Activity 2</b>	<p style="text-align: center;"><b>Before      After</b></p>  <p style="text-align: center;">Sugar Cube</p>	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="background-color: #e0e0e0;">Student Observations</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Sugar Cube</td> <td>Some sugar dissolved</td> </tr> <tr> <td>Crushed Sugar Cube</td> <td>All sugar dissolved</td> </tr> </tbody> </table>	Student Observations		Sugar Cube	Some sugar dissolved	Crushed Sugar Cube	All sugar dissolved
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	Sugar Cube		Some sugar dissolved					
Crushed Sugar Cube	All sugar dissolved							
 <p style="text-align: center;">Crushed Sugar Cube</p>								

<b>Activity 3</b>	<p style="text-align: center;"><b>Before</b></p> 	<table border="1" style="margin: auto; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="background-color: #e0e0e0;">Student Observations</th> </tr> </thead> <tbody> <tr> <td style="width: 30%;">Sugar Before Placing above Flame</td> <td>White</td> </tr> <tr> <td>Sugar After Placing above Flame</td> <td>Dark brown</td> </tr> </tbody> </table>	Student Observations		Sugar Before Placing above Flame	White	Sugar After Placing above Flame	Dark brown
	Student Observations							
	Sugar Before Placing above Flame		White					
Sugar After Placing above Flame	Dark brown							
<p style="text-align: center;"><b>After</b></p> 								

**To answer this question, refer to the “Properties of Sugar” passage, illustrations, and charts.**

How are activities 1, 2, and 3 the same?

- ★A. They all have questions that can be tested.
- B. They all show chemical changes happening.
- C. They all show sugar compared to another material.
- D. They all have questions answered using control groups.

**To answer this question, refer to the “Properties of Sugar” passage, illustrations, and charts.**

Which property of the particles is used to separate the mixture in activity 1?

- A. color
- B. magnetism
- C. shape
- ★D. size

**To answer this question, refer to the “Properties of Sugar” passage, illustrations, and charts.**

Which of the following **most likely** happened to the sugar in activity 3?

- A. Most of the sugar boiled.
- B. Most of the sugar evaporated.
- C. The sugar increased in volume.
- ★D. The sugar changed into a new substance.

## Scope of Test Items

The scope of Statewide Science Assessment test items for grades 3–5 is presented in Appendix B. The benchmarks serve as the objectives to which the test items are written. Additional guidelines or restrictions are located in the Individual Benchmark Specifications.

## Guidelines for Item Writers

Statewide Science Assessment item writers must have a comprehensive knowledge of the assessed science curriculum and a strong understanding of the scientific concepts and cognitive abilities of the students taking the test. Item writers should know and consistently apply the guidelines established in this *Specifications* document, as well as contribute to the goal of developing test content that allows students to perform at their best. Item writers are also expected to use their best judgment in writing test items that measure the science benchmarks of the NGSSS without introducing extraneous elements that reflect bias for or against a group of students.

Item writers for the Statewide Science Assessment must submit test items in a particular format and must include the following information about each test item. Because test items are rated by committees of Florida educators following submission to the FDOE, familiarity with the directions for rating test items (found in Appendix A) would prove useful to all item writers.

<b>Format</b>	Item writers must submit test items in the agreed-upon template. All appropriate sections of the template should be completed before the test items are submitted.
<b>Sources</b>	Item writers are expected to provide sources for all verifiable information included in the test item. Acceptable sources include science magazines, science journals, or internet sites maintained by reputable organizations such as government agencies, universities, or research centers.
<b>Correct Response</b>	Item writers must supply the correct response. Each distractor should be a believable answer for someone who does not know the correct answer. Rationales must include an explanation of why a student would choose a certain distractor.
<b>Submission of Items</b>	When submitting test items, item writers must balance several factors. Test item submissions should: <ul style="list-style-type: none"><li>• be written to the appropriate cognitive complexity;</li><li>• be written to the appropriate content focus;</li><li>• include the content source for the test items;</li><li>• have a balance in location of the correct answer within benchmarks;</li><li>• have a balance and variety of names;</li><li>• use names representative of elementary and middle-school students in Florida; and</li><li>• be scientifically accurate.</li></ul>

## **COGNITIVE COMPLEXITY OF STATEWIDE SCIENCE ASSESSMENT TEST ITEMS**

Educational standards and assessments can be aligned based on the category of content covered and also on the complexity of knowledge required. The Statewide Science Assessment test items, while assessing Florida’s NGSSS, must also reflect this goal and standard. It is important to develop test items that elicit student responses that demonstrate the complexity of knowledge and skills required to meet these objectives. The degree of challenge of Statewide Science Assessment items is currently categorized in two ways: **item difficulty** and **cognitive complexity**.

### **Item Difficulty**

After a test item appears on a test, item difficulty refers to the actual percentage of students who chose the correct answer. The classification scheme used for item difficulty is based on the following:

- Easy**            More than 70 percent of the students responded correctly.
- Average**        Between 40 percent and 70 percent of the students responded correctly.
- Challenging**    Less than 40 percent of the students responded correctly.

## Cognitive Complexity

Cognitive complexity refers to the cognitive demand associated with a test item. The cognitive classification system implemented by the FDOE is based upon Dr. Norman L. Webb’s Depth of Knowledge (DOK) levels. The rationale for classifying a test item by its DOK level of complexity focuses on the *expectations made of the test item*, not on the *ability of the student*. When classifying a test item’s demands on thinking (i.e., what the test item requires the student to recall, understand, analyze, and do), it is assumed that the student is familiar with the basic concepts of the task. Test items are chosen for the Statewide Science Assessment based on the NGSSS and their grade-level appropriateness, but the complexity of the test items remains independent of the particular curriculum a student has experienced. On any given assessment, the cognitive complexity of a multiple-choice item may be affected by the distractors (answer options). The cognitive complexity of a test item depends on the grade level of the assessment; a test item that has a high level of cognitive complexity at one grade may not be as complex at a higher grade.

The categories—low complexity, moderate complexity, and high complexity—form an ordered description of the demands a test item may make on a student. For example, low-complexity test items may require a student to solve a one-step problem. Moderate-complexity test items may require multiple steps. However, the number of steps is not always indicative of cognitive level. High-complexity test items may require a student to analyze and synthesize information. The distinctions made in item complexity ensure that test items will assess the depth of student knowledge at each benchmark. The intent of the item writer weighs heavily in determining the complexity of a test item. The three Statewide Science Assessment test items that follow illustrate how a single concept may be assessed by test items with increasing cognitive complexity.

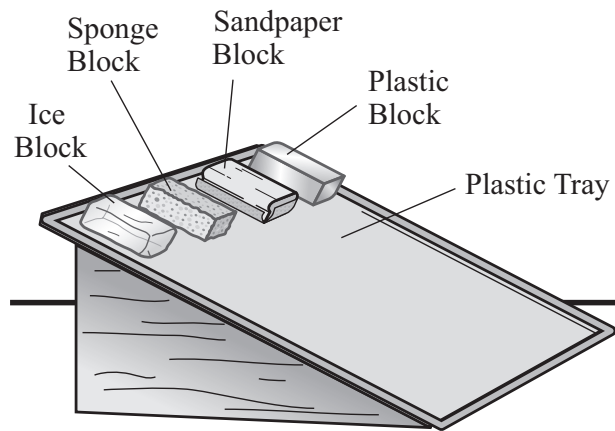
The pages that follow illustrate some of the varying demands that test items might make at each complexity level for the Statewide Science Assessment. Note that test items may fit one or more descriptions. In most instances, these test items are classified in the highest level of complexity demanded by the test item. Caution must be used in referring to the table of descriptors that is provided for each cognitive-complexity level. This table is provided for ease of reference, but the ultimate determination of item complexity should be made considering the overall cognitive demand placed on a student. Another table provides the breakdown of the percentage of points by cognitive-complexity level.



## Low Complexity

Science low-complexity test items rely heavily on the recall and recognition of previously learned concepts and principles. Test items typically specify what the student is to do, which often is to carry out some procedure that can be performed mechanically. It is not left to the student to come up with an original method or solution.

Felipe and Marsha were studying forces and decided to do an experiment. They placed four equally sized blocks made of different materials on an elevated plastic tray. They watched each of the blocks move down the tray. Their setup is shown below.



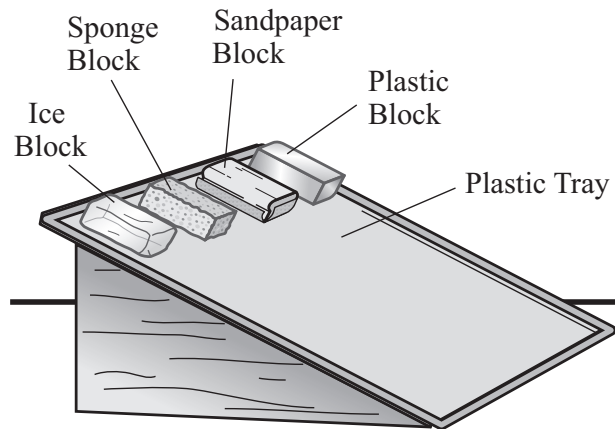
Which of the following forces causes the blocks to move down the tray?

- A. electric
- B. friction
- ★ C. gravity
- D. magnetic

## Moderate Complexity

Science moderate-complexity test items involve more flexible thinking than low-complexity test items do. They require a response that goes beyond the habitual, is not specified, and ordinarily involves more than a single step or thought process. The student is expected to decide what to do—using informal methods of reasoning and problem-solving strategies— and to bring together skill and knowledge from various domains.

Felipe and Marsha were studying forces and decided to do an experiment. They placed four equally sized blocks made of different materials on an elevated plastic tray. They watched each of the blocks move down the tray. Their setup is shown below.



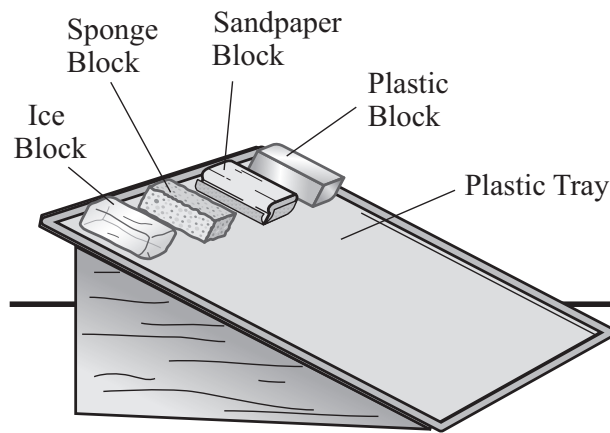
Which block would experience the **least** amount of friction as it moved down the tray?

- ★ A. Ice Block
- B. Sponge Block
- C. Sandpaper Block
- D. Plastic Block

## High Complexity

Science high-complexity test items make heavy demands on student thinking. Students must engage in abstract reasoning, planning, analysis, judgment, and creative thought. The test items require that the student think in an abstract and sophisticated way, often involving multiple steps.

Felipe and Marsha were studying forces and decided to do an experiment. They placed four equally sized blocks made of different materials on an elevated plastic tray. They watched each of the blocks move down the tray. Their setup is shown below.



Which of the following conclusions can Felipe and Marsha make about the forces that cause the blocks to move down the tray?

- A. The force of friction is the same on each block.
- B. The force of friction causes the speed of each block to increase.
- C. The force of gravity causes all the blocks to move at the same speed.
- ★ D. The force of gravity is greater than the force of friction on all the blocks.

The following table is provided for ease of reference; however, caution must be used in referring to this table of descriptors for each cognitive-complexity level. The ultimate determination of an item's cognitive complexity should be made considering the intent of the overall cognitive demand placed on a student.

<b>Examples of Science Activities across Cognitive-Complexity Levels</b>		
<b>Low-Complexity Science</b>	<b>Moderate-Complexity Science</b>	<b>High-Complexity Science</b>
<ul style="list-style-type: none"> <li>• Retrieve information from a chart, table, diagram, or graph.</li> <li>• Recognize a standard scientific representation of a simple phenomenon or identify common examples.</li> <li>• Complete a familiar single-step procedure or solve a problem using a known formula.</li> </ul>	<ul style="list-style-type: none"> <li>• Interpret data from a chart, table, or simple graph.</li> <li>• Determine the best way to organize or present data from observations, an investigation, or experiments.</li> <li>• Describe or explain examples and non-examples of scientific processes or concepts.</li> <li>• Specify or explain relationships among different groups, facts, properties, or variables.</li> <li>• Differentiate structure and functions of different organisms or systems.</li> <li>• Predict or determine the next logical step or outcome.</li> <li>• Apply and use concepts from a standard scientific model or theory.</li> </ul>	<ul style="list-style-type: none"> <li>• Analyze data from an investigation or experiment and formulate a conclusion.</li> <li>• Develop a generalization from multiple data sources.</li> <li>• Analyze and evaluate an experiment with multiple variables.</li> <li>• Analyze an investigation or experiment to identify a flaw and propose a method for correcting it.</li> <li>• Analyze a problem, situation, or system and make long-term predictions.</li> <li>• Interpret, explain, or solve a problem involving complex spatial relationships.</li> </ul>

The table below presents the range for the percent of raw score points by cognitive complexity on Statewide Science Assessments for grade 5 and grade 8 and the Biology 1 EOC Assessment.

**Percentage of Points by Cognitive-Complexity Level for  
Statewide Science Assessments and Biology 1 EOC Assessment**

Assessment	Low	Moderate	High
5	10%–20%	60%–80%	10%–20%
8	10%–20%	60%–80%	10%–20%
Biology 1	10%–20%	60%–80%	10%–20%

## Universal Design

The application of universal design principles helps develop assessments that are usable to the greatest number of test takers, including students with disabilities and nonnative speakers of English. To support the goal of providing access to all students, the test maximizes readability, legibility, and compatibility with accommodations, and test development includes a review for potential bias and sensitivity issues.

The FDOE trains both internal and external reviewers to revise test items, allowing for the widest possible range of student participation. Item writers must attend to the best practices suggested by universal design, including, but not limited to:

- reduction in wordiness;
- avoidance of ambiguity;
- selection of reader-friendly construction and terminology; and
- consistently applied concept names and graphic conventions.

Universal design principles also inform decisions about test layout and design, including, but not limited to, type size, line length, spacing, and graphics.

## **REVIEW PROCEDURES FOR STATEWIDE SCIENCE ASSESSMENT TEST ITEMS**

Prior to appearing on any Statewide Science Assessment, all science test items must pass several levels of review as part of the Statewide Science Assessment development process. Florida educators and citizens, in conjunction with the FDOE and Statewide Science Assessment contractor, scrutinize all material related to test items prior to accepting it for placement on the tests.

### **Review for Potential Bias and Community Sensitivity**

Science test items are reviewed by groups of Florida educators generally representative of Florida's geographic regions and culturally diverse population. Test items are reviewed for the following kinds of bias: gender, racial, ethnic, linguistic, religious, geographic, and socioeconomic. Item reviews also include consideration of issues related to individuals with disabilities.

Florida citizens associated with a variety of organizations and institutions review all test items for issues of potential concern to members of the community at large. The intent of this review is to ensure that the primary purpose of assessing science achievement is not undermined by inadvertently including in the test any material that parents and other stakeholders may deem inappropriate. Reviewers are asked to consider the variety of cultural, regional, philosophical, political, and religious backgrounds throughout Florida and to determine whether the subject matter will be acceptable to Florida students, their parents, and other members of Florida communities. Test items are written to meet Statewide Science Assessment criteria and to measure the content in the NGSSS for science.

### **Review of Test Items**

The FDOE and Statewide Science Assessment contractor review all test items during the item development process.

Groups of Florida science educators are subsequently convened to review the test items for content characteristics and item specifications. The content review focuses on validity, determining whether each test item is a valid measure of the designated NGSSS benchmark as defined by grade-level specifications for test items. Separate reviews for bias and sensitivity issues are also conducted as noted above.

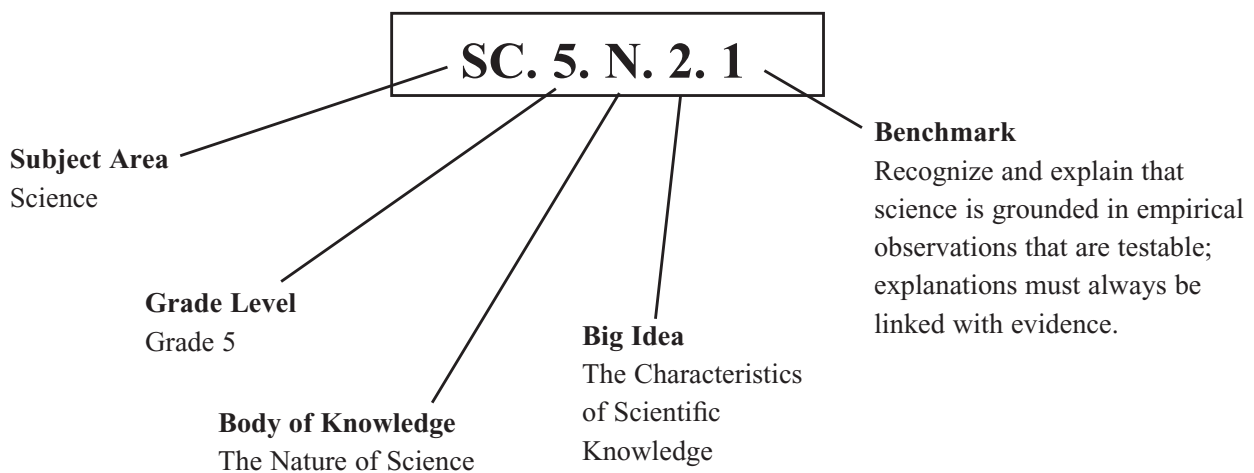
Due to the theory-based nature of the content area, all potential science test items undergo an extra level of scrutiny. A committee of university-level science researchers, university-level faculty, and practicing scientists from the private sector reviews the test items to ensure the accuracy and currency of the science content.

# GUIDE TO THE INDIVIDUAL BENCHMARK SPECIFICATIONS

## Benchmark Classification System

Each benchmark in the NGSSS is labeled with a system of numbers and letters.

- The two letters in the *first position* of the code identify the **Subject Area**.
- The number(s) in the *second position* represent the **Grade Level** to which the benchmark belongs.
- The letter in the *third position* represents the **Body of Knowledge** to which the benchmark belongs.
- The number in the *fourth position* represents the **Big Idea**.
- The number in the *last position* identifies the specific **Benchmark** under the Big Idea.



Grade 5
<b>Body of Knowledge:</b> The Nature of Science
<b>Big Idea 2:</b> The Characteristics of Scientific Knowledge
<b>SC.5.N.2.1</b> Recognize and explain that science is grounded in empirical observations that are testable; explanations must always be linked with evidence.

## Definitions of Benchmark Specifications

The *Specifications* identifies how the benchmarks in Florida’s NGSSS are assessed on the Statewide Science Assessments at grades 5 and 8. For each benchmark assessed in science, the following information is provided in the Individual Benchmark Specifications section.

<b>Reporting Category</b>	refers to the categories of related benchmarks from the NGSSS that are used to summarize and report achievement for the Statewide Science Assessments. There are four reporting categories for the Statewide Science Assessments grades 5 and 8: Nature of Science, Earth and Space Science, Physical Science, and Life Science.
<b>Standard</b>	refers to the standard statement presented in the NGSSS. In the <i>Specifications</i> for grades 5 and 8, the standard also includes the Big Idea.
<b>Benchmark</b>	refers to the benchmark statement presented in the NGSSS. The benchmarks are specific statements of expected student achievement. The benchmarks are different for each grade at levels K–8. In some cases, two or more benchmarks are grouped together because of the relatedness of the concepts in those benchmarks. The related benchmarks are noted in the Also Assesses section.
<b>Also Assesses</b>	refers to the benchmarks that are closely related to the benchmark (see description above).
<b>Benchmark Clarifications</b>	explain how achievement of the benchmark will be demonstrated by students. Clarification statements are written for the benchmark and the Also Assesses benchmark(s). The clarification statements explain what students are expected to do when responding to the question.
<b>Assessment Limits</b>	<p>are intended to define for item writers the range of content knowledge and degree of difficulty that should be assessed in the test items for the benchmark.</p> <p>are used by item writers in conjunction with the Overall Considerations, Item Contexts, and the General Guidelines of the Item Style and Format sections in the <i>Specifications</i>. The assessment limits defined in the Individual Benchmark Specifications section may be an expansion or further restriction of the Overall Considerations, Item Contexts, and the General Guidelines.</p>
<b>Stimulus Attributes</b>	define the types of stimulus materials that should be used in the test items, including the appropriate use of item context, content, or graphic materials.
<b>Response Attributes</b>	define the characteristics of the options from which a student must choose to answer the question.



<b>Prior Knowledge</b>	refers to benchmarks from lower grades that are the foundation for the concept(s) assessed. Test items may require the student to apply science knowledge described in the NGSSS from lower grades; however, test items should be written to assess the appropriate grade-level benchmark.
<b>Sample Items</b>	are provided for each assessed benchmark grouping. The sample test items are presented in a format similar to the one used in the test. The correct answer for each sample test item is identified with a star. The benchmark that the sample item is written to assess is provided. The sample items provided represent a range of cognitive complexities.

## Grades K–2 Science Benchmarks

The NGSSS for science are organized by grade level for grades K–8. Although 18 Big Ideas thread throughout all grade levels and build in rigor and depth as students advance, not all grades have benchmarks for each Big Idea. The benchmarks for grades K–2 serve as a foundation for the grades 3–5 benchmarks. For that reason, the K–2 science benchmarks are included in this document. In the Individual Benchmark Specifications section for grade 5, K–2 benchmarks are cited in the Prior Knowledge section of the Individual Benchmark Specifications.

<b>Big Idea 1 The Practice of Science</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>SC.K.N.1.1</b> Collaborate with a partner to collect information.	<b>SC.1.N.1.1</b> Raise questions about the natural world, investigate them in teams through free exploration, and generate appropriate explanations based on those explorations.	<b>SC.2.N.1.1</b> Raise questions about the natural world, investigate them in teams through free exploration and systematic observations, and generate appropriate explanations based on those explorations.
<b>SC.K.N.1.2</b> Make observations of the natural world and know that they are descriptors collected using the five senses.	<b>SC.1.N.1.2</b> Using the five senses as tools, make careful observations, describe objects in terms of number, shape, texture, size, weight, color, and motion, and compare their observations with others.	<b>SC.2.N.1.2</b> Compare the observations made by different groups using the same tools.
<b>SC.K.N.1.3</b> Keep records as appropriate—such as pictorial records—of investigations conducted.	<b>SC.1.N.1.3</b> Keep records as appropriate—such as pictorial and written records—of investigations conducted.	<b>SC.2.N.1.3</b> Ask “how do you know?” in appropriate situations and attempt reasonable answers when asked the same question by others.
<b>SC.K.N.1.4</b> Observe and create a visual representation of an object which includes its major features.	<b>SC.1.N.1.4</b> Ask “how do you know?” in appropriate situations.	<b>SC.2.N.1.4</b> Explain how particular scientific investigations should yield similar conclusions when repeated.
<b>SC.K.N.1.5</b> Recognize that learning can come from careful observation.		<b>SC.2.N.1.5</b> Distinguish between empirical observation (what you see, hear, feel, smell, or taste) and ideas or inferences (what you think).
		<b>SC.2.N.1.6</b> Explain how scientists alone or in groups are always investigating new ways to solve problems.

## Grades K–2 Science Benchmarks

<b>Big Idea 2 The Characteristics of Science Knowledge</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>Big Idea 3 The Role of Theories, Law, Hypotheses, and Models</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>Big Idea 4 Science and Society</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>Big Idea 5 Earth in Space and Time</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>SC.K.E.5.1</b> Explore the Law of Gravity by investigating how objects are pulled toward the ground unless something holds them up.	<b>SC.1.E.5.1</b> Observe and discuss that there are more stars in the sky than anyone can easily count and that they are not scattered evenly in the sky.	
<b>SC.K.E.5.2</b> Recognize the repeating pattern of day and night.	<b>SC.1.E.5.2</b> Explore the Law of Gravity by demonstrating that Earth’s gravity pulls any object on or near Earth toward it even though nothing is touching the object.	
<b>SC.K.E.5.3</b> Recognize that the Sun can only be seen in the daytime.	<b>SC.1.E.5.3</b> Investigate how magnifiers make things appear bigger and help people see things they could not see without them.	
<b>SC.K.E.5.4</b> Observe that sometimes the Moon can be seen at night and sometimes during the day.	<b>SC.1.E.5.4</b> Identify the beneficial and harmful properties of the Sun.	
<b>SC.K.E.5.5</b> Observe that things can be big and things can be small as seen from Earth.		
<b>SC.K.E.5.6</b> Observe that some objects are far away and some are nearby as seen from Earth.		

## Grades K–2 Science Benchmarks

<b>Big Idea 6 Earth Structures</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
	<p><b>SC.1.E.6.1</b> Recognize that water, rocks, soil, and living organisms are found on Earth’s surface.</p>	<p><b>SC.2.E.6.1</b> Recognize that Earth is made up of rocks. Rocks come in many sizes and shapes.</p>
	<p><b>SC.1.E.6.2</b> Describe the need for water and how to be safe around water.</p>	<p><b>SC.2.E.6.2</b> Describe how small pieces of rock and dead plant and animal parts can be the basis of soil and explain the process by which soil is formed.</p>
	<p><b>SC.1.E.6.3</b> Recognize that some things in the world around us happen fast and some happen slowly.</p>	<p><b>SC.2.E.6.3</b> Classify soil types based on color, texture (size of particles), the ability to retain water, and the ability to support the growth of plants.</p>
<b>Big Idea 7 Earth Systems and Patterns</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
		<p><b>SC.2.E.7.1</b> Compare and describe changing patterns in nature that repeat themselves, such as weather conditions including temperature and precipitation, day to day and season to season.</p>
		<p><b>SC.2.E.7.2</b> Investigate by observing and measuring that the Sun’s energy directly and indirectly warms the water, land, and air.</p>
		<p><b>SC.2.E.7.3</b> Investigate, observe and describe how water left in an open container disappears (evaporates), but water in a closed container does not disappear (evaporate).</p>

## Grades K–2 Science Benchmarks

<b>Big Idea 7 Earth Systems and Patterns</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
		<b>SC.2.E.7.4</b> Investigate that air is all around us and that moving air is wind.
		<b>SC.2.E.7.5</b> State the importance of preparing for severe weather, lightning, and other weather-related events.
<b>Big Idea 8 Properties of Matter</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>SC.K.P.8.1</b> Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light) and texture.	<b>SC.1.P.8.1</b> Sort objects by observable properties, such as size, shape, color, temperature (hot or cold), weight (heavy or light), texture, and whether objects sink or float.	<b>SC.2.P.8.1</b> Observe and measure objects in terms of their properties, including size, shape, color, temperature, weight, texture, sinking or floating in water, and attraction and repulsion of magnets.
		<b>SC.2.P.8.2</b> Identify objects and materials as solid, liquid, or gas.
		<b>SC.2.P.8.3</b> Recognize that solids have a definite shape and that liquids and gases take the shape of their container.
		<b>SC.2.P.8.4</b> Observe and describe water in its solid, liquid, and gaseous states.
		<b>SC.2.P.8.5</b> Measure and compare temperatures taken every day at the same time.
		<b>SC.2.P.8.6</b> Measure and compare the volume of liquids using containers of various shapes and sizes.

## Grades K–2 Science Benchmarks

<b>Big Idea 9 Changes in Matter</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<p><b>SC.K.P.9.1</b> Recognize that the shape of materials such as paper and clay can be changed by cutting, tearing, crumpling, smashing, or rolling.</p>		<p><b>SC.2.P.9.1</b> Investigate that materials can be altered to change some of their properties, but not all materials respond the same way to any one alteration.</p>
<b>Big Idea 10 Forms of Energy</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<p><b>SC.K.P.10.1</b> Observe that things that make sound vibrate.</p>		<p><b>SC.2.P.10.1</b> Discuss that people use electricity or other forms of energy to cook their food, cool or warm their homes, and power their cars.</p>
<b>Big Idea 11 Energy Transfer and Transformations</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>Big Idea 12 Motion of Objects</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<p><b>SC.K.P.12.1</b> Investigate that things move in different ways, such as fast, slow, etc.</p>	<p><b>SC.1.P.12.1</b> Demonstrate and describe the various ways that objects can move, such as in a straight line, zigzag, back-and-forth, round-and-round, fast, and slow.</p>	
<b>Big Idea 13 Forces and Changes in Motion</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<p><b>SC.K.P.13.1</b> Observe that a push or a pull can change the way an object is moving.</p>	<p><b>SC.1.P.13.1</b> Demonstrate that the way to change the motion of an object is by applying a push or a pull.</p>	<p><b>SC.2.P.13.1</b> Investigate the effect of applying various pushes and pulls on different objects.</p>
		<p><b>SC.2.P.13.2</b> Demonstrate that magnets can be used to make some things move without touching them.</p>

## Grades K–2 Science Benchmarks

<b>Big Idea 13 Forces and Changes in Motion</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
		<b>SC.2.P.13.3</b> Recognize that objects are pulled toward the ground unless something holds them up.
		<b>SC.2.P.13.4</b> Demonstrate that the greater the force (push or pull) applied to an object, the greater the change in motion of the object.
<b>Big Idea 14 Organization and Development of Living Organisms</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>SC.K.L.14.1</b> Recognize the five senses and related body parts.	<b>SC.1.L.14.1</b> Make observations of living things and their environment using the five senses.	<b>SC.2.L.14.1</b> Distinguish human body parts (brain, heart, lungs, stomach, muscles, and skeleton) and their basic functions.
<b>SC.K.L.14.2</b> Recognize that some books and other media portray animals and plants with characteristics and behaviors they do not have in real life.	<b>SC.1.L.14.2</b> Identify the major parts of plants, including stem, roots, leaves, and flowers.	
<b>SC.K.L.14.3</b> Observe plants and animals, describe how they are alike and how they are different in the way they look and in the things they do.	<b>SC.1.L.14.3</b> Differentiate between living and nonliving things.	
<b>Big Idea 15 Diversity and Evolution of Living Organisms</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
<b>Big Idea 16 Heredity and Reproduction</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
	<b>SC.1.L.16.1</b> Make observations that plants and animals closely resemble their parents, but variations exist among individuals within a population.	<b>SC.2.L.16.1</b> Observe and describe major stages in the life cycles of plants and animals, including beans and butterflies.

## Grades K–2 Science Benchmarks

<b>Big Idea 17 Interdependence</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>
	<p><b>SC.1.L.17.1</b> Through observation, recognize that all plants and animals, including humans, need the basic necessities of air, water, food, and space.</p>	<p><b>SC.2.L.17.1</b> Compare and contrast the basic needs that all living things, including humans, have for survival.</p>
		<p><b>SC.2.L.17.2</b> Recognize and explain that living things are found all over Earth, but each is only able to live in habitats that meet its basic needs.</p>
<b>Big Idea 18 Matter and Energy Transformations</b>		
<b>Kindergarten</b>	<b>Grade 1</b>	<b>Grade 2</b>



## **INDIVIDUAL BENCHMARK SPECIFICATIONS FOR STATEWIDE SCIENCE ASSESSMENT GRADE 5**

This section of the *Specifications* describes how the science benchmarks are assessed on the Statewide Science Assessment. Each grade level includes benchmarks from the four Bodies of Knowledge (Nature of Science, Life Science, Earth Science, and Physical Science). Eighteen Big Ideas thread throughout all the grade levels and build in rigor and depth as students advance.

The sample test items included in the *Specifications* represent, whenever possible, a range of difficulty and cognitive complexity. Although most of the test items are of average difficulty and moderate complexity, some of the test items presented will be challenging for some students and are specifically included to prompt item writers to submit test items that will measure the abilities of higher-achieving students.

## BENCHMARK SC.5.N.1.1

**Reporting Category** Nature of Science

**Standard** **Big Idea 1** The Practice of Science

**Benchmark** **SC.5.N.1.1** Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations; experiments requiring the identification of variables; collecting and organizing data; interpreting data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions. (Also assesses SC.3.N.1.1, SC.4.N.1.1, SC.4.N.1.6, SC.5.N.1.2, and SC.5.N.1.4.)

**Also Assesses** **SC.3.N.1.1** Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

**SC.4.N.1.1** Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.

**SC.4.N.1.6** Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.

**SC.5.N.1.2** Explain the difference between an experiment and other types of scientific investigation.

**SC.5.N.1.4** Identify a control group and explain its importance in an experiment.

**Benchmark Clarifications** The student will evaluate a written procedure or experimental setup.

The student will identify appropriate forms of record keeping.

The student will interpret and analyze data to generate appropriate explanations based on that data.

The student will identify examples of or distinguish among observations, predictions, and/or inferences.

The student will explain the difference between an experiment, which has controlled variables and/or a control group, versus other types of scientific investigations, which do not have controls.

The student will identify a control group and/or explain its importance in an experiment.

<b>Assessment Limits</b>	<p>Items may address different types of reference materials but will not assess specific knowledge of reference materials.</p> <p>Items will not require the identification or evaluation of a hypothesis.</p> <p>Items may use the term <i>hypothesis</i> but will not assess the meaning of the term.</p> <p>Items will not require the design of a procedure.</p> <p>Items will not require mathematical computations.</p> <p>Items will not require the differentiation between outcome variables (dependent variables) and test variables (independent variables).</p> <p>Items will not assess the reason for differences in data across groups that are investigating the same problem.</p> <p>Items referring to conclusions will not require the formation of a conclusion.</p>
<b>Stimulus Attributes</b>	<p>Scenarios describing a scientific experiment are limited to one control group.</p> <p>Scenarios referring to observations will not use the term <i>systematic observation</i>.</p>
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.N.1.1, SC.K.N.1.2, SC.K.N.1.3, SC.K.N.1.4, SC.K.N.1.5, SC.1.N.1.1, SC.1.N.1.2, SC.1.N.1.3, SC.1.N.1.4, SC.1.E.5.3, SC.2.N.1.1, SC.2.N.1.3, SC.3.N.1.3, SC.3.N.1.6, SC.4.N.1.4, and SC.4.E.6.5.

**Sample Item 1**      **SC.5.N.1.1**

Delilah followed these steps of an investigation:

- Collect five objects made of different types of metal.
- Place them on a large laboratory table.
- Touch each metal object with a magnet and lift slowly.
- Record observations.

Which of the following statements is Delilah **most likely** testing?

- ★ **A.** Some types of metal are attracted to magnets.
- B.** Each magnet can lift the metal object to the same height.
- C.** Larger magnets can pick up heavier metal objects than smaller magnets can.
- D.** Heavier metal objects are more attracted to magnets than lighter metal objects are.

## BENCHMARK SC.5.N.2.1

<b>Reporting Category</b>	Nature of Science
<b>Standard</b>	<b>Big Idea 2</b> The Characteristics of Scientific Knowledge
<b>Benchmark</b>	<b>SC.5.N.2.1 Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence. (Also assesses SC.3.N.1.7, SC.4.N.1.3, SC.4.N.1.7, SC.5.N.1.5, and SC.5.N.1.6.)</b>
<b>Also Assesses</b>	<p><b>SC.3.N.1.7</b> Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.</p> <p><b>SC.4.N.1.3</b> Explain that science does not always follow a rigidly defined method (“the scientific method”) but that science does involve the use of observations and empirical evidence.</p> <p><b>SC.4.N.1.7</b> Recognize and explain that scientists base their explanations on evidence.</p> <p><b>SC.5.N.1.5</b> Recognize and explain that authentic scientific investigation frequently does not parallel the steps of “the scientific method.”</p> <p><b>SC.5.N.1.6</b> Recognize and explain the difference between personal opinion/interpretation and verified observation.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify and/or explain that science is grounded in verifiable observations (empirical) that are testable.</p> <p>The student will distinguish between personal interpretation and verified observation.</p> <p>The student will distinguish between examples of evidence or observations (empirical) and personal opinions.</p>
<b>Assessment Limit</b>	Items will not assess steps or order of scientific method.
<b>Stimulus Attributes</b>	<p>The term <i>observations</i> should be used rather than the phrase <i>empirical observations</i> or <i>verified observations</i>.</p> <p>The term <i>evidence</i> should be used rather than the phrase <i>empirical evidence</i>.</p>
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.N.1.5, SC.2.N.1.6, SC.4.N.1.8, and SC.4.N.2.1.

**Sample Item 2**      **SC.5.N.1.6**

Rashan is performing an investigation using several earthworms. He places a rectangular box under a bright lamp and covers one-half of the box so that it is shaded. Then, he puts the earthworms into the box on the side that is still brightly lit. Later, Rashan notices that all of the earthworms have crawled over to the shaded side of the box. Based on his investigation, which of the following is an observation rather than an opinion?

- A. Earthworms are afraid of light.
- B. Earthworms like staying together.
- ★ C. Earthworms move away from light.
- D. Earthworms like living in the ground.

## BENCHMARK SC.5.N.2.2

<b>Reporting Category</b>	Nature of Science
<b>Standard</b>	<b>Big Idea 2</b> The Characteristics of Scientific Knowledge
<b>Benchmark</b>	<b>SC.5.N.2.2 Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others. (Also assesses SC.3.N.1.2, SC.3.N.1.5, SC.4.N.1.2, SC.4.N.1.5, and SC.5.N.1.3.)</b>
<b>Also Assesses</b>	<p><b>SC.3.N.1.2</b> Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.</p> <p><b>SC.3.N.1.5</b> Recognize that scientists question, discuss, and check each others' evidence and explanations.</p> <p><b>SC.4.N.1.2</b> Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.</p> <p><b>SC.4.N.1.5</b> Compare the methods and results of investigations done by other classmates.</p> <p><b>SC.5.N.1.3</b> Recognize and explain the need for repeated experimental trials.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify and/or explain the need for replication of scientific investigations.</p> <p>The student will recognize and explain that scientists' evidence and explanations include data, observations, results, and/or conclusions from scientific investigations.</p> <p>The student will explain the reason for differences in data across groups as a result of using different tools.</p> <p>The student will explain the reason for differences in data across groups as a result of using different procedures.</p> <p>The student will identify and/or explain the need for repeated trials in a scientific investigation.</p>
<b>Assessment Limit</b>	Items may use the terms <i>accurate</i> and/or <i>valid</i> in context but should not assess these terms or the difference between these terms.
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.N.1.2, SC.2.N.1.4, and SC.3.N.1.4.

**Sample Item 3**    **SC.5.N.2.2**

Gabriel is designing an experiment to see whether sugar or artificial sweetener will attract the greater number of ants. Which statement **best** describes why Gabriel should write down his experimental procedure and record his data?

- ★ **A.** The exact experiment can be repeated by others and the results compared.
- B.** The experiment can be changed by others to get different results.
- C.** The data will help people decide what type of sweetener to use.
- D.** The data will show people which ants are more common.

## BENCHMARK SC.5.E.5.1

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 5</b> Earth in Space and Time
<b>Benchmark</b>	<b>SC.5.E.5.1 Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way. (Also assesses SC.3.E.5.1, SC.3.E.5.2, and SC.3.E.5.3.)</b>
<b>Also Assesses</b>	<p><b>SC.3.E.5.1</b> Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.</p> <p><b>SC.3.E.5.2</b> Identify the Sun as a star that emits energy; some of it in the form of light.</p> <p><b>SC.3.E.5.3</b> Recognize that the Sun appears large and bright because it is the closest star to Earth.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify the basic components of a galaxy.</p> <p>The student will explain how stars can be different.</p> <p>The student will identify the Sun as a star that emits energy.</p> <p>The student will identify that the Sun’s appearance is due to its proximity to Earth.</p>
<b>Assessment Limits</b>	<p>Items will only assess a conceptual understanding of a galaxy.</p> <p>Items will not assess the name of our Galaxy in isolation.</p> <p>Items may address but will not assess objects orbiting stars, including the Sun.</p> <p>Items that assess stars are limited to brightness, size, or appearance in relation to distance, and that stars emit energy.</p> <p>Items that address energy emitted by a star are limited to visible light.</p> <p>Items will not assess the effects of the Sun’s energy on Earth.</p> <p>Items will not assess numeric values for distance or number of stars.</p> <p>Items may assess that stars are made of gases but not the specific chemical composition of stars.</p>
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified



**Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.E.5.5, SC.K.E.5.6, SC.1.E.5.1, and SC.1.E.5.4.

**Sample Item 4**      **SC.3.E.5.1**

A star named Sirius appears as the brightest star in the nighttime sky, even though a star named Pollux actually gives off more light. Which of the following **best** explains why Sirius appears brighter than Pollux in our nighttime sky?

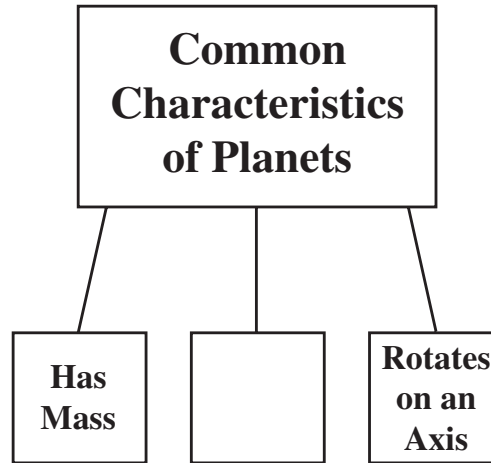
- A. Sirius is made of different gases than Pollux is.
- B. Sirius is a different color than Pollux is.
- ★C. Sirius is closer to Earth than Pollux is.
- D. Sirius is larger than Pollux is.

### BENCHMARK SC.5.E.5.3

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 5</b> Earth in Space and Time
<b>Benchmark</b>	<b>SC.5.E.5.3 Distinguish among the following objects of the Solar System—Sun, planets, moons, asteroids, comets—and identify Earth’s position in it. (Also assesses SC.5.E.5.2.)</b>
<b>Also Assesses</b>	<b>SC.5.E.5.2</b> Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.
<b>Benchmark Clarifications</b>	<p>The student will distinguish among objects in our Solar System based on their relative positions and/or their characteristics.</p> <p>The student will identify common characteristics of all planets in our Solar System.</p> <p>The student will compare and/or contrast the common characteristics of inner and outer planet groups.</p>
<b>Assessment Limits</b>	<p>Items will address a conceptual understanding of our Solar System and the characteristics of objects in our Solar System.</p> <p>Items will not assess characteristics of the Sun.</p> <p>Items may address but will not assess the asteroid belt.</p> <p>Items assessing inner and outer planet groups are limited to: surface composition (whether they are mostly solid or gas), presence of an atmosphere, relative size, relative position to the Sun, presence of moons or rings, relative temperature, and relative length of a year.</p> <p>Items will not require specific knowledge of quantitative astronomical data.</p> <p>Items will not assess interactions of objects in our Solar System.</p> <p>Items will not assess the force of gravity.</p>
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	This benchmark grouping is foundational. These concepts have not been introduced in the NGSSS prior to this grade band.

**Sample Item 5**      **SC.5.E.5.2**

Jacob started creating a diagram to show some of the common characteristics of the planets in our Solar System.



Which characteristic should Jacob enter in the empty box of the diagram?

- A. Made Mostly of Gas
- B. Has a Rocky Surface
- ★ C. Revolves around a Star
- D. Is a Satellite of Another Planet

## BENCHMARK SC.4.E.5.4

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 5</b> Earth in Space and Time
<b>Benchmark</b>	<b>SC.4.E.5.4</b> <b>Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected. (Also assesses SC.4.E.5.1, SC.4.E.5.2, and SC.4.E.5.3.)</b>
<b>Also Assesses</b>	<p><b>SC.4.E.5.1</b> Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.</p> <p><b>SC.4.E.5.2</b> Describe the changes in the observable shape of the Moon over the course of about a month.</p> <p><b>SC.4.E.5.3</b> Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.</p>
<b>Benchmark Clarifications</b>	<p>The student will describe how the rotation of Earth and apparent movement of the Sun, Moon, and/or stars are related.</p> <p>The student will identify that the pattern of stars appears to shift across the sky nightly or that different stars can be seen in different seasons.</p> <p>The student will describe the visual changes of the Moon and/or identify that the appearance of the Moon changes over the course of the lunar cycle.</p> <p>The student will explain that, in a calendar year, Earth revolves around the Sun.</p> <p>The student will explain that, in a 24-hour day, Earth rotates on its axis.</p>
<b>Assessment Limits</b>	<p>Items will assess a conceptual understanding of the apparent movements of the Sun, Moon, and stars and resulting patterns.</p> <p>Items will not assess the causes of moon phases.</p> <p>Items will not assess or use vocabulary associated with moon phases, such as <i>waning</i>, <i>waxing</i>, and <i>gibbous</i>.</p> <p>Items will not require the identification of specific constellations.</p> <p>Items will not require specific knowledge of quantitative astronomical data.</p> <p>Items will not assess the causes of seasons, directness of sunlight, or Earth's tilt.</p> <p>Items will not assess solar or lunar eclipses.</p>

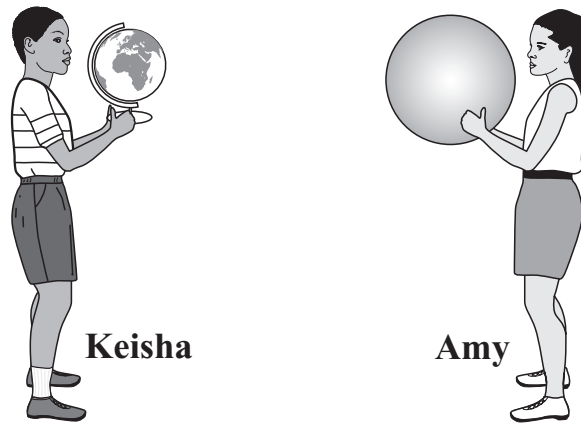
**Stimulus Attribute** Scenarios referring to patterns of stars in the sky will not use the term *constellation*.

**Response Attributes** None specified

**Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.E.5.2, SC.K.E.5.3, and SC.K.E.5.4.

**Sample Item 6** SC.4.E.5.3

Keisha wants to show Amy what happens during one Earth day. Keisha holds a small globe representing Earth, and Amy holds a large ball representing the Sun.



What should Keisha do to show Amy what happens during one Earth day?

- A. Keisha should move the globe in one complete circle around Amy.
- B. Keisha should move the globe toward Amy and then away from her.
- C. Keisha should slowly lift the globe above her head and then lower it.
- ★D. Keisha should slowly spin the globe one complete time about its axis.

## BENCHMARK SC.4.E.6.2

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 6</b> Earth Structures
<b>Benchmark</b>	<b>SC.4.E.6.2 Identify the physical properties of common earth- forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks. (Also assesses SC.4.E.6.1.)</b>
<b>Also Assesses</b>	<b>SC.4.E.6.1</b> Identify the three categories of rocks: igneous, (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).
<b>Benchmark Clarifications</b>	<p>The student will identify and/or describe the physical properties of common minerals.</p> <p>The student will describe and/or explain the role of minerals in the formation of rocks.</p> <p>The student will identify the three categories of rocks and how they were formed.</p>
<b>Assessment Limits</b>	<p>Items will not assess the identification of a specific mineral based on its properties.</p> <p>Items addressing common minerals are limited to quartz, feldspar, mica, calcite, talc, pyrite, and graphite.</p> <p>Items will not require the identification of specific mineral composition of any type of rock.</p> <p>Items will not require knowledge of Moh’s hardness scale. Items will not assess the rock cycle.</p>
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.1.E.6.1, SC.2.E.6.1, SC.2.E.6.2, SC.2.E.6.3, SC.K.P.8.1, SC.1.P.8.1, and SC.2.P.8.1.

**Sample Item 7**    **SC.4.E.6.2**

Dennis cannot scratch a mineral sample with his fingernail, but he observes that he can scratch the mineral sample with a piece of metal. What physical property of the mineral sample is Dennis investigating?

- A. cleavage
- ★ B. hardness
- C. luster
- D. streak

## BENCHMARK SC.4.E.6.3

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 6</b> Earth Structures
<b>Benchmark</b>	<b>SC.4.E.6.3 Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable. (Also assesses SC.4.E.6.6.)</b>
<b>Also Assesses</b>	<b>SC.4.E.6.6</b> Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).
<b>Benchmark Clarifications</b>	The student will identify and/or distinguish between renewable and nonrenewable resources found on Earth.  The student will identify resources naturally found in Florida.
<b>Assessment Limit</b>	Items assessing resources found in Florida are limited to water, phosphate, oil, limestone, silica, wind, and solar energy.
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.1.E.6.2.
<b>Sample Item 8</b>	<b>SC.4.E.6.3</b>

There are many different natural resources found in Florida. Which of the following can be described as a renewable resource?

- A. limestone
- B. oil
- C. phosphate
- ★ D. water



## BENCHMARK SC.4.E.6.4

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 6</b> Earth Structures
<b>Benchmark</b>	<b>SC.4.E.6.4 Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).</b>
<b>Benchmark Clarifications</b>	The student will identify and/or describe the processes of physical weathering and/or erosion.  The student will compare and contrast the agents and/or the processes of physical weathering and erosion.
<b>Assessment Limit</b>	Items may address but will not assess specific landforms resulting from physical weathering and erosion.
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.1.E.6.1, SC.1.E.6.3, and SC.2.E.6.1.
<b>Sample Item 9</b>	<b>SC.4.E.6.4</b>

Earth has a great variety of surface features that are caused by weathering and erosion. Which of the following describes a change due only to weathering?

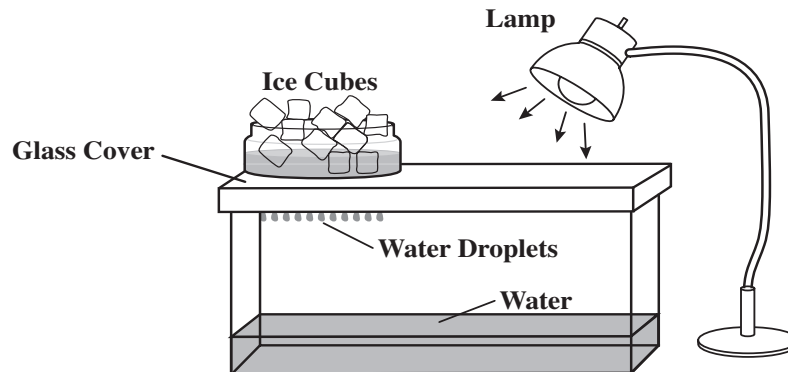
- A. ocean waves washing sand off the beach
- B. rivers carrying soil and rocks through valleys
- C. wind blowing sand and pebbles off a sand dune
- ★ D. tree roots breaking rocks into smaller pieces of rock

**BENCHMARK SC.5.E.7.1**

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 7</b> Earth Systems and Patterns
<b>Benchmark</b>	<b>SC.5.E.7.1</b> Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another. (Also assesses SC.5.E.7.2.)
<b>Also Assesses</b>	<b>SC.5.E.7.2</b> Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth’s water reservoirs via evaporation and precipitation processes.
<b>Benchmark Clarifications</b>	<p>The student will identify and/or explain the parts of the water cycle.</p> <p>The student will identify the states of water associated with each part of the water cycle and/or explain the phase changes that occur as water moves from one part of the water cycle to another.</p> <p>The student will identify and/or describe the role of the ocean in the water cycle.</p>
<b>Assessment Limits</b>	<p>Items will not address or assess transpiration, infiltration, or percolation as processes of the water cycle.</p> <p>Items assessing the phases of water are limited to a water cycle context.</p>
<b>Stimulus Attribute</b>	Scenarios referring to the water cycle will not use the term <i>reservoir</i> .
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.E.7.1, SC.2.E.7.2, SC.2.E.7.3, and SC.2.P.8.4.

**Sample Item 10**      **SC.5.E.7.1**

A model of the water cycle was made using an aquarium with a glass cover, a container of ice cubes, water, and a lamp.



Which part of the water cycle causes the water droplets to form on the glass cover?

- ★ A. condensation
- B. evaporation
- C. precipitation
- D. runoff

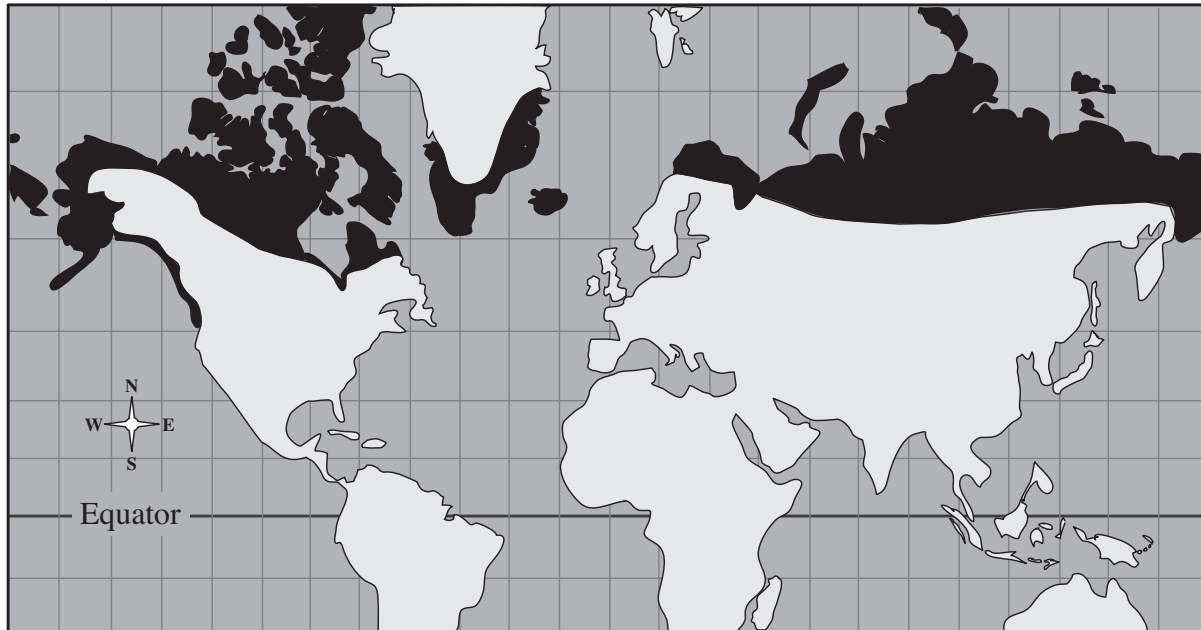
## BENCHMARK SC.5.E.7.3

<b>Reporting Category</b>	Earth and Space Science
<b>Standard</b>	<b>Big Idea 7</b> Earth Systems and Patterns
<b>Benchmark</b>	<b>SC.5.E.7.3 Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time. (Also assesses SC.5.E.7.4, SC.5.E.7.5, and SC.5.E.7.6.)</b>
<b>Also Assesses</b>	<p><b>SC.5.E.7.4</b> Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.</p> <p><b>SC.5.E.7.5</b> Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.</p> <p><b>SC.5.E.7.6</b> Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify and/or describe how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation describe weather in a particular place and time.</p> <p>The student will identify or distinguish the forms of precipitation (rain, snow, sleet, and hail) and their related weather conditions.</p> <p>The student will distinguish weather conditions among different environments.</p> <p>The student will describe the temperature and precipitation of different climate zones as they relate to latitude, elevation, and/or proximity to bodies of water.</p>
<b>Assessment Limits</b>	<p>Items assessing weather and climate are limited to conceptual understanding.</p> <p>Items will not assess the difference between climate and weather.</p> <p>Items will not address or assess the interpretation of specific characteristics used to forecast weather.</p> <p>Items addressing the types of clouds are limited to cumulus, cirrus, stratus, and cumulonimbus as they relate to weather but will not require differentiation among these types of clouds.</p> <p>Items assessing climate zones are limited to polar, tropical, and temperate.</p>

<b>Assessment Limits</b>	<p>Items assessing weather-related differences among different environments may also include grassland, rainforest, tundra, and wetland.</p> <p>Items will not require knowledge of specific geographic locations.</p> <p>Items will not assess fronts.</p> <p>Items may refer to common tools used to measure air temperature, barometric pressure, humidity, wind speed and direction, and precipitation but will not assess specific knowledge of the tools.</p>
<b>Stimulus Attributes</b>	<p>Scenarios may include a weather map with a key explaining weather symbols.</p> <p>Dual thermometers showing degrees Fahrenheit and degrees Celsius must be used if the scenario requires an illustration of a thermometer.</p> <p>Wind speeds will be shown in miles per hour (mph).</p> <p>The phrases <i>air pressure</i> and <i>barometric pressure</i> may be used.</p>
<b>Response Attributes</b>	<p>None specified</p>
<b>Prior Knowledge</b>	<p>Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.E.7.1, SC.2.E.7.2, SC.2.E.7.4, SC.2.E.7.5, SC.2.P.8.4, and SC.2.P.8.5.</p>

**Sample Item 11**      **SC.5.E.7.6**

Earth has many types of climate zones. The map below shows the tundra climate zones of the Northern Hemisphere.

**TUNDRA ZONES OF EARTH'S NORTHERN HEMISPHERE**

LEGEND	
	Tundra climate

Which of the following **best** describes this type of climate zone?

- A. It is very hot because it is on the coastline
- B. It is very wet because it is below sea level.
- C. It receives very little snowfall because it is close to the ocean.
- ★ D. It has very cold temperatures because it is far from the equator.

**BENCHMARK SC.5.P.8.1**

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 8</b> Properties of Matter
<b>Benchmark</b>	<b>SC.5.P.8.1 Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature. (Also assesses SC.3.P.8.1, SC.3.P.8.2, SC.3.P.8.3, and SC.4.P.8.1.)</b>
<b>Also Assesses</b>	<p><b>SC.3.P.8.1</b> Measure and compare temperatures of various samples of solids and liquids.</p> <p><b>SC.3.P.8.2</b> Measure and compare the mass and volume of solids and liquids.</p> <p><b>SC.3.P.8.3</b> Compare materials and objects according to properties such as size, shape, color, texture, and hardness.</p> <p><b>SC.4.P.8.1</b> Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.</p>
<b>Benchmark Clarifications</b>	<p>The student will compare and/or contrast the physical properties of solids, liquids, and/or gases.</p> <p>The student will describe or classify a material as a solid, liquid, or gas.</p>
<b>Assessment Limits</b>	<p>Items will not address or assess particle behavior in each state of matter or between states of matter.</p> <p>Items will not address or assess the water cycle.</p> <p>Items may refer to common tools used to measure basic properties of solids, liquids, and gases but will not assess specific knowledge of the tools.</p> <p>Items will not assess the difference between weight and mass.</p> <p>Items will not assess unit of measure.</p> <p>Items will not require unit conversions to compare data.</p> <p>Items will not address or assess density as a property.</p>
<b>Stimulus Attribute</b>	Dual thermometers showing degrees Fahrenheit and degrees Celsius must be used if the scenario requires an illustration of a thermometer.
<b>Response Attributes</b>	None specified

**Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.8.1, SC.1.P.8.1, SC.2.P.8.1, SC.2.P.8.2, SC.2.P.8.3, SC.2.P.8.4, SC.2.P.8.6, and SC.1.E.5.3.

**Sample Item 12**      **SC.5.P.8.1**

Kyle and Jan are comparing two samples of matter. They make a chart showing the properties of each sample.

**PROPERTIES OF SAMPLES**

Property	Sample 1	Sample 2
Color	Red	Silver
Mass (grams)	30	5
Shape	Pyramid	Cube
Volume (milliliters)	40	3

Which property provides the **best** evidence that both samples are solids rather than liquids?

- A. color
- B. mass
- ★ C. shape
- D. volume



## BENCHMARK SC.5.P.8.3

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 8</b> Properties of Matter
<b>Benchmark</b>	<b>SC.5.P.8.3 Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction. (Also assesses SC.5.P.8.2.)</b>
<b>Also Assesses</b>	<b>SC.5.P.8.2</b> Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.
<b>Benchmark Clarifications</b>	<p>The student will describe and/or explain how mixtures of solids can be separated.</p> <p>The student will identify common materials that dissolve in water.</p> <p>The student will identify or describe conditions that will speed up or slow down the dissolving process.</p>
<b>Assessment Limits</b>	<p>Items assessing conditions used to speed up or slow down the dissolving process are limited to temperature, stirring, and/or surface area.</p> <p>Items will not use the term <i>solution</i>, <i>solvent</i>, <i>solute</i>, <i>saturation</i>, or <i>catalyst</i>.</p> <p>Items will not assess the difference between a mixture and a solution.</p>
<b>Stimulus Attribute</b>	Dual thermometers showing degrees Fahrenheit and degrees Celsius must be used if the scenario requires an illustration of a thermometer.
<b>Response Attribute</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.8.1 and SC.1.P.8.1.

**Sample Item 13**      **SC.5.P.8.2**

Dani adds 10 grams (g) of salt to a jar of water and 10 g of sand to another jar of water. She places a lid on each jar and shakes the jars for 10 seconds. Then, Dani allows the jars to sit on a table for five minutes.

What should Dani expect to observe after five minutes?

- A. Both the salt and the sand dissolved in the water.
- B. Both the salt and the sand settled to the bottom of the jar.
- C. The salt settled to the bottom of the jar, and the sand dissolved in the water.
- ★ D. The salt dissolved in the water, and the sand settled to the bottom of the jar.

## BENCHMARK SC.5.P.9.1

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 9</b> Changes in Matter
<b>Benchmark</b>	<b>SC.5.P.9.1 Investigate and describe that many physical and chemical changes are affected by temperature. (Also assesses SC.3.P.9.1 and SC.4.P.9.1.)</b>
<b>Also Assesses</b>	<p><b>SC.3.P.9.1</b> Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.</p> <p><b>SC.4.P.9.1</b> Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.</p>
<b>Benchmark Clarifications</b>	<p>The student will describe how physical and/or chemical changes are affected by temperature.</p> <p>The student will describe the physical changes water undergoes as it is heated and/or cooled.</p> <p>The student will describe how some familiar changes in materials result in other materials with different characteristics.</p>
<b>Assessment Limit</b>	Items will not assess particle motion in changes of states of matter.
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.9.1 and SC.2.P.9.1.

### Sample Item 14      **SC.3.P.9.1**

One morning, Ryan noticed there were tiny drops of water on the grass as he walked to school. That afternoon, he did not see any drops of water on the grass when he returned home. Which of the following **best** explains what happened to the drops of water?

- A. The heat from the air caused the water drops to boil.
- B. The air cooled the water and caused the drops to freeze.
- ★ C. The Sun heated the water and caused the drops to evaporate.
- D. The energy from the Sun caused the water drops to condense.

## BENCHMARK SC.5.P.10.1

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 10</b> Forms of Energy
<b>Benchmark</b>	<b>SC.5.P.10.1 Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical. (Also assesses SC.3.P.10.1, SC.3.P.10.3, SC.3.P.10.4, SC.3.P.11.1, SC.3.P.11.2, SC.4.P.10.1, and SC.4.P.10.3.)</b>
<b>Also Assesses</b>	<p><b>SC.3.P.10.1</b> Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.</p> <p><b>SC.3.P.10.3</b> Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.</p> <p><b>SC.3.P.10.4</b> Demonstrate that light can be reflected, refracted, and absorbed.</p> <p><b>SC.3.P.11.1</b> Investigate, observe, and explain that things that give off light often also give off heat.</p> <p><b>SC.3.P.11.2</b> Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one’s hands together.</p> <p><b>SC.4.P.10.1</b> Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.</p> <p><b>SC.4.P.10.3</b> Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify and/or describe some basic forms of energy.</p> <p>The student will describe that light travels in a straight line until it strikes an object or travels from one material to another.</p> <p>The student will explain that heat is produced when two objects are rubbed against each other.</p> <p>The student will explain that sound is produced by vibrations and/or that pitch depends on how fast or slow the object vibrates.</p>
<b>Assessment Limits</b>	<p>Items assessing basic forms of energy are limited to light, heat (thermal), sound, electrical, chemical, and mechanical energy.</p> <p>Items will not assess the transformation of energy from one form to another.</p> <p>Items assessing light reflection, refraction, or absorption should use the term <i>reflect</i>, <i>bend</i>, or <i>absorb</i> to describe light’s behavior.</p>

**Stimulus Attributes** The term *material* or *substance* should be used rather than the term *medium* or *media*.

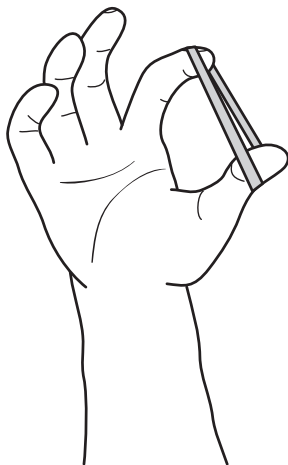
Scenarios referring to mechanical energy should not use the term *kinetic energy* or *potential energy*.

**Response Attributes** None specified

**Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.10.1 and SC.2.P.10.1.

**Sample Item 15**      **SC.4.P.10.3**

Jason stretches a rubber band between his fingers, as shown below. When he plucks the rubber band, it makes a sound.



Which of the following **best** explains why the rubber band makes a sound when Jason plucks it?

- A. It heats the air.
- ★ B. It vibrates the air.
- C. It absorbs energy from the air.
- D. It releases molecules into the air.

**BENCHMARK SC.5.P.10.2**

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 10</b> Forms of Energy
<b>Benchmark</b>	<b>SC.5.P.10.2 Investigate and explain that energy has the ability to cause motion or create change. (Also assesses SC.3.P.10.2, SC.4.P.10.2, and SC.4.P.10.4.)</b>
<b>Also Assesses</b>	<p><b>SC.3.P.10.2</b> Recognize that energy has the ability to cause motion or create change.</p> <p><b>SC.4.P.10.2</b> Investigate and describe that energy has the ability to cause motion or create change.</p> <p><b>SC.4.P.10.4</b> Describe how moving water and air are sources of energy and can be used to move things.</p>
<b>Benchmark Clarifications</b>	<p>The student will explain that energy has the ability to cause motion or create change.</p> <p>The student will identify and/or describe examples where energy has caused motion or created changes.</p> <p>The student will describe and/or explain how water and/or air are sources of energy.</p>
<b>Assessment Limit</b>	Items will not assess sound and/or chemical energy.
<b>Stimulus Attributes</b>	<p>Comparative words such as <i>greater than</i>, <i>less than</i>, <i>faster</i>, or <i>slower</i> should be used when describing motion.</p> <p>Scenarios will not use weathering and/or erosion as a context.</p>
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.10.1, SC.K.P.12.1, SC.1.P.12.1 and SC.K.P.13.1, SC.1.P.13.1, and SC.2.P.13.1.
<b>Sample Item 16</b>	<b>SC.4.P.10.2</b>

Gustave uses a bowling ball to demonstrate how energy can cause changes. Which of the following actions would NOT demonstrate a change caused by Gustave applying energy to the ball?

- ★ **A.** He holds the bowling ball in both hands.
- B.** He spins the bowling ball with one hand.
- C.** He rolls the bowling ball across the floor.
- D.** He lifts the bowling ball to place it on a shelf.

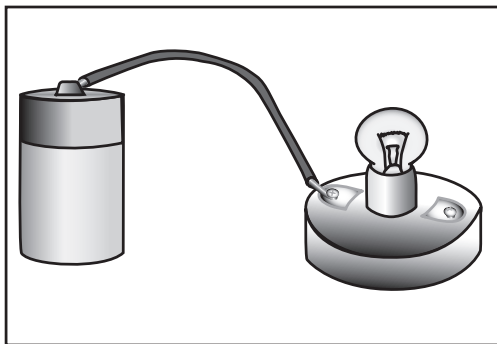
## BENCHMARK SC.5.P.10.4

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 10</b> Forms of Energy
<b>Benchmark</b>	<b>SC.5.P.10.4 Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion. (Also assesses SC.3.E.6.1, SC.4.P.11.1, SC.4.P.11.2, SC.5.P.10.3, SC.5.P.11.1, and SC.5.P.11.2.)</b>
<b>Also Assesses</b>	<p><b>SC.3.E.6.1</b> Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.</p> <p><b>SC.4.P.11.1</b> Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.</p> <p><b>SC.4.P.11.2</b> Identify common materials that conduct heat well or poorly.</p> <p><b>SC.5.P.10.3</b> Investigate and explain that an electrically charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.</p> <p><b>SC.5.P.11.1</b> Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).</p> <p><b>SC.5.P.11.2</b> Identify and classify materials that conduct electricity and materials that do not.</p>
<b>Benchmark Clarifications</b>	<p>The student will explain that electrical energy can be transformed into heat, light, and/or sound energy, as well as the energy of motion.</p> <p>The student will explain that energy from the Sun can be used to heat objects, and that when sunlight is not present, heat may be lost.</p> <p>The student will identify the flow of heat between hot and cold objects and/or that heat may cause objects to change temperature.</p> <p>The student will identify and differentiate between conductors and insulators of heat.</p> <p>The student will explain that an electrically charged object can attract an uncharged object and/or either attract or repel another charged object without any contact between the objects.</p> <p>The student will determine that the flow of electricity requires a closed circuit.</p> <p>The student will identify and differentiate between conductors and insulators of electricity.</p>

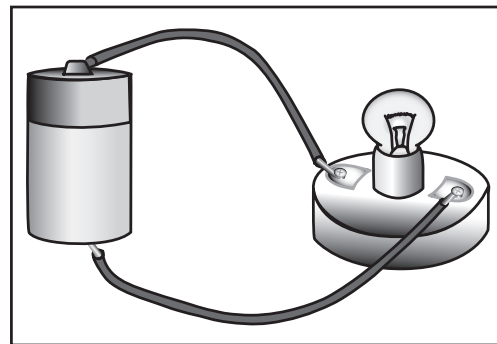
- Assessment Limits** Items will not assess the difference between parallel and series circuits.
- Items assessing electricity will not refer to electrons or the movement of electrons in producing electrical charge.
- Items that refer to positive and negative charges in attraction and repulsion properties must be in the context of static electricity.
- Items will not use more than two energy conversions.
- Stimulus Attributes** Scenarios are limited to abiotic systems.
- Scenarios referring to energy from the Sun will not use the term *radiant*.
- Response Attributes** None specified
- Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.P.10.1.

**Sample Item 17** SC.5.P.11.1

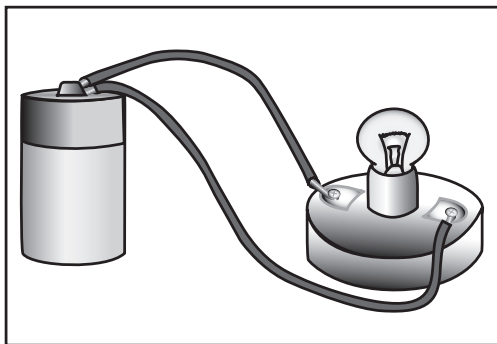
Electric circuits must be properly connected or electricity will not flow. Which of the following shows a properly connected circuit that would allow electricity to flow and light the bulb?



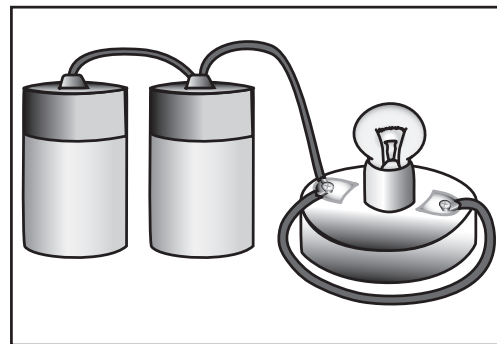
A.



★ C.



B.



D.

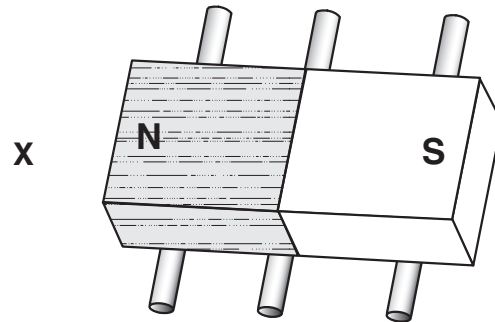


## BENCHMARK SC.5.P.13.1

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 13</b> Forces and Changes in Motion
<b>Benchmark</b>	<b>SC.5.P.13.1 Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects. (Also assesses SC.3.E.5.4 and SC.4.P.8.4.)</b>
<b>Also Assesses</b>	<p><b>SC.3.E.5.4</b> Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.</p> <p><b>SC.4.P.8.4</b> Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify familiar forces that affect how objects move.</p> <p>The student will identify scenarios whereby gravity is overcome.</p> <p>The student will identify and/or describe examples of magnetic attraction and repulsion.</p>
<b>Assessment Limits</b>	<p>Items assessing forces that cause objects to move are limited to pushes, pulls, gravity, and magnetic force.</p> <p>Items referring to magnetic force are limited to a conceptual understanding of magnetic poles.</p> <p>Items may only require the interpretation of two forces at a time.</p> <p>Items that assess magnetic attraction will not use the context of separating mixtures and solutions.</p>
<b>Stimulus Attributes</b>	None specified
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.E.5.1, SC.1.E.5.2, SC.K.P.13.1, SC.1.P.13.1, SC.2.P.13.1, SC.2.P.13.2, SC.2.P.13.3, and SC.2.P.13.4.

**Sample Item 18**      **SC.4.P.8.4**

Bar magnets have a north pole (N) and a south pole (S). Latrisha places a bar magnet on three small straws so it can roll. She attempts to make the magnet move by placing different objects in location X. Her setup is shown below.



Which of the following objects should Latrisha use to cause the bar magnet to move away from location X ?

- A. an iron nail
- B. an aluminum can
- ★C. the north end of another bar magnet
- D. the south end of another bar magnet

## BENCHMARK SC.5.P.13.2

<b>Reporting Category</b>	Physical Science
<b>Standard</b>	<b>Big Idea 13</b> Forces and Changes in Motion
<b>Benchmark</b>	<b>SC.5.P.13.2 Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object. (Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, and SC.5.P.13.4.)</b>
<b>Also Assesses</b>	<p><b>SC.4.P.12.1</b> Recognize that an object in motion always changes its position and may change its direction.</p> <p><b>SC.4.P.12.2</b> Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.</p> <p><b>SC.5.P.13.3</b> Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.</p> <p><b>SC.5.P.13.4</b> Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.</p>
<b>Benchmark Clarifications</b>	<p>The student will describe the relationship among mass, force, and motion.</p> <p>The student will explain how opposing forces, including friction, affect movement.</p> <p>The student will identify and/or describe that an object in motion always changes its position and may change its direction.</p> <p>The student will describe that the speed of an object is determined by the distance an object travels and the time it takes the object to travel that distance.</p> <p>The student will describe that objects can move at different speeds.</p>
<b>Assessment Limits</b>	<p>Items assessing relationship between mass, force, and motion are limited to a conceptual understanding. Items will not involve mathematical calculations or formulas.</p> <p>Items will address a conceptual understanding of speed and will not require mathematical computations.</p> <p>Items may require the identification of the direction of motion but not the magnitude of motion.</p> <p>Items may refer to balanced forces and/or unbalanced forces but not net force.</p> <p>Items referring to friction will only assess the force of friction as a resistance to movement.</p> <p>Items assessing forces applied to an object or to objects of different masses are limited to pushes, pulls, and friction.</p>

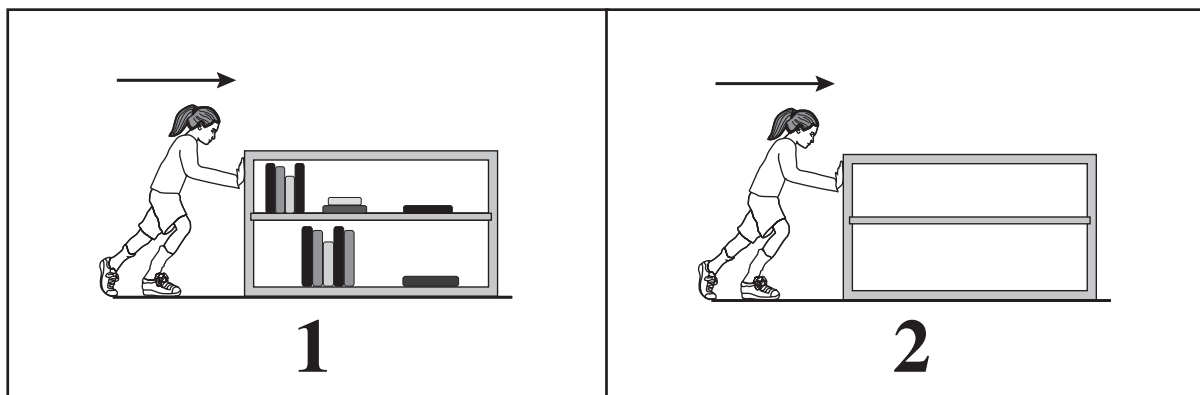
**Stimulus Attribute** Scenarios should use newtons (N) as the unit of measure for forces.

**Response Attributes** None specified

**Prior Knowledge** Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.P.13.1, SC.1.P.13.1, SC.2.P.13.1, and SC.2.P.13.4.

**Sample Item 19** SC.5.P.13.3

Stephanie started pushing a bookcase across the room, as shown in picture 1. Then, she removed the books and continued pushing with the same force and direction, as shown in picture 2.



How does removing the books affect the motion of the bookcase?

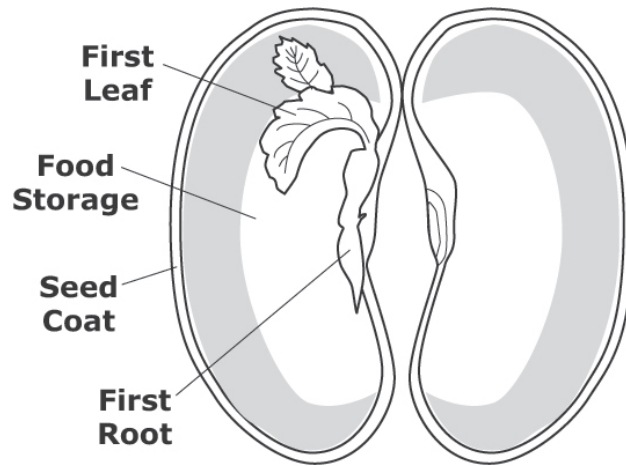
- ★ A. The mass is decreased, making the bookcase move faster.
- B. The gravity is increased, making the bookcase move slower.
- C. The friction is increased, making the bookcase move slower.
- D. The mechanical energy is decreased, making the bookcase move faster.

## BENCHMARK SC.3.L.14.1

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 14</b> Organization and Development of Living Organisms
<b>Benchmark</b>	<b>SC.3.L.14.1 Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction. (Also assesses SC.3.L.14.2 and SC.4.L.16.1.)</b>
<b>Also Assesses</b>	<p><b>SC.3.L.14.2</b> Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.</p> <p><b>SC.4.L.16.1</b> Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.</p>
<b>Benchmark Clarifications</b>	<p>The student will identify and/or describe the parts of plants and/or the part's role.</p> <p>The student will describe how plants respond to stimuli.</p> <p>The student will describe processes of sexual reproduction in flowering plants.</p>
<b>Assessment Limits</b>	<p>Items assessing the structures and functions of major parts of plants are limited to stem, leaf/needle, root, flower, seed, and fruit.</p> <p>Items assessing sexual reproduction in flowering plants are limited to only these parts of the flower: stamen, pistil, ovary, petal, sperm, and egg.</p> <p>Items will not assess cellular processes.</p> <p>Items referring to a plant's response to stimuli are limited to a conceptual understanding of a plant's response to heat, light, or gravity.</p> <p>Items will not use the term <i>phototropism</i>, <i>geotropism</i>, <i>hydrotropism</i>, or <i>thigmotropism</i>.</p>
<b>Stimulus Attribute</b>	Scenarios referring to how plants respond to conditions will not use the term <i>stimulus</i> or <i>stimuli</i> .
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.L.14.3, SC.1.L.14.1, SC.1.L.14.2, and SC.1.L.14.3.

**Sample Item 20**      **SC.3.L.14.1**

The inside of a bean seed is shown in the diagram below.



Which statement describes what must occur for a bean seed to develop into a plant?

- ★A. The seed must germinate.
- B. The seed must be pollinated.
- C. The seed must double in size.
- D. The seed must be carried to a different location.

## BENCHMARK SC.5.L.14.1

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 14</b> Organization and Development of Living Organisms
<b>Benchmark</b>	<b>SC.5.L.14.1 Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.</b>
<b>Benchmark Clarification</b>	The student will identify organs in the human body and/or describe their functions.
<b>Assessment Limits</b>	<p>Items will not assess human body systems.</p> <p>Items will not require specific knowledge of the parts of organs.</p> <p>Items referring to the intestines may assess the small intestines and/or the large intestines.</p> <p>Items will not require the memorization of the names of muscles or bones.</p> <p>Items referring to muscles will only assess the general function of muscles.</p>
<b>Stimulus Attribute</b>	Diagrams of the reproductive organs will not be used.
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.L.14.1, SC.K.L.14.3, and SC.2.L.14.1.
<b>Sample Item 21</b>	<b>SC.5.L.14.1</b>

Organs in the human body carry out different functions. Which human organ breaks down food so that it can be used by the human body?

- A. bladder
- B. heart
- C. kidneys
- ★ D. stomach

## BENCHMARK SC.5.L.14.2

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 14</b> Organization and Development of Living Organisms
<b>Benchmark</b>	<b>SC.5.L.14.2 Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support—some with internal skeletons, others with exoskeletons—while some plants have stems for support. (Also assesses SC.3.L.15.1 and SC.3.L.15.2.)</b>
<b>Also Assesses</b>	<p><b>SC.3.L.15.1</b> Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.</p> <p><b>SC.3.L.15.2</b> Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.</p>
<b>Benchmark Clarifications</b>	<p>The student will compare and/or contrast the functions of organs and/or other physical structures within animals.</p> <p>The student will compare and/or contrast the functions of organs and/or other physical structures within plants.</p> <p>The student will compare and/or contrast the functions of organs and/or other physical structures between plants and animals.</p> <p>The student will classify animals into major groups according to their physical characteristics and behaviors.</p> <p>The student will classify flowering and/or nonflowering plants into major groups according to their physical characteristics.</p>
<b>Assessment Limits</b>	<p>Items addressing and/or assessing the functions of organs or the comparison of physical structures are limited to the brain, heart, lungs, gills, stomach, liver, intestines, pancreas, muscles, bones, exoskeleton, testes, ovaries, kidneys, bladder, skin or body covering, eyes, ears, nose, and tongue.</p> <p>Items referring to the functions of plant structures are limited to cone, flower, fruit, leaf, root, stem, seed, and spore.</p> <p>Items addressing the comparison of the structure and/or function of plants and animals are limited to skin compared to plant covering, skeleton compared to stem, and reproductive organs compared to flower.</p> <p>Items will not require specific knowledge of the parts of organs.</p> <p>Items will not require the classification of animals beyond the initial invertebrates grouping when comparing and/or contrasting vertebrates to invertebrates.</p>



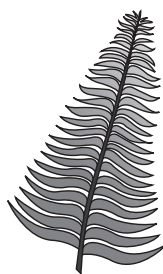
<b>Assessment Limits</b>	Items referring to classification of vertebrates will only assess general physical characteristics and/or behaviors of mammals, birds, reptiles, amphibians, and fish.
<b>Stimulus Attributes</b>	Scenarios will use common names of organisms and will not include scientific names.  Scenarios requiring the classification of organisms as vertebrates or invertebrates must include a description or picture of the organisms.
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.K.L.14.3, SC.1.L.14.3, and SC.2.L.14.1.

**Sample Item 22**      **SC.3.L.15.2**

The illustrations below show two plants that grow in Florida, a penta and a sword fern.

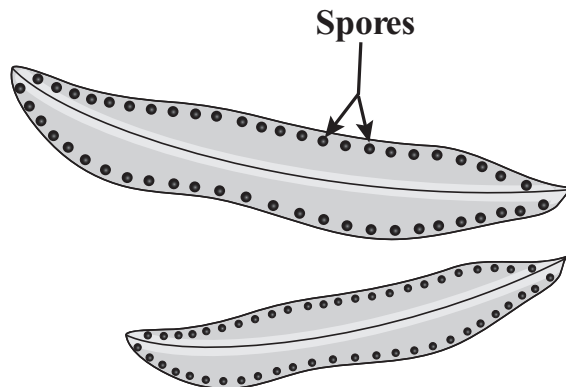


**Penta**



**Sword Fern**

The illustration below shows the spores that appear on the underside of the sword fern's leaves.



Which of the following is present in the penta but NOT in the sword fern?

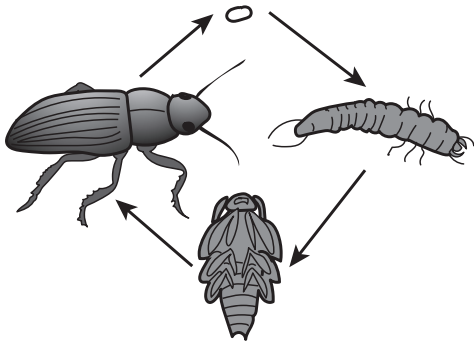
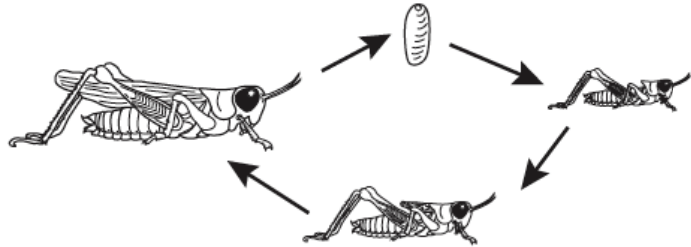
- A. root growth
- ★ B. flower production
- C. ability to reproduce
- D. ability to make food

**BENCHMARK SC.4.L.16.4**

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 16</b> Heredity and Reproduction
<b>Benchmark</b>	<b>SC.4.L.16.4 Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.</b>
<b>Benchmark Clarification</b>	The student will identify, compare, and/or contrast the major life cycles of Florida plants and/or animals.
<b>Assessment Limits</b>	<p>Items will only assess the life cycles of plants and animals commonly found in Florida.</p> <p>Items assessing the life cycles of insects are limited to egg, larva, pupa, and adult (complete metamorphosis) or egg, nymph, and adult (incomplete metamorphosis).</p> <p>Items assessing the life cycles of flowering and nonflowering plants may include seed, seedling, and other stages of plant development.</p> <p>Items assessing the life cycles of animals are limited to egg, embryo, juvenile, and adult stages.</p> <p>Items will not assess the major stages of the human life cycle.</p>
<b>Stimulus Attribute</b>	Plants and animals in scenarios and art must be common to Florida.
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.2.L.16.1.

**Sample Item 23**      **SC.4.L.16.4**

The life cycle of both beetles and grasshoppers starts at the same stage. The pictures below show the life cycle of both organisms.

**BEETLE LIFE CYCLE****GRASSHOPPER LIFE CYCLE**

Which of the following is the beginning stage of the life cycle for both the beetle and the grasshopper?

- ★ A. egg
- B. larva
- C. nymph
- D. pupa

## BENCHMARK SC.5.L.17.1

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 17</b> Interdependence
<b>Benchmark</b>	<b>SC.5.L.17.1 Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors, and physical characteristics. (Also assesses SC.3.L.17.1, SC.4.L.16.2, SC.4.L.16.3, SC.4.L.17.1, SC.4.L.17.4, and SC.5.L.15.1.)</b>
<b>Also Assesses</b>	<p><b>SC.3.L.17.1</b> Describe how animals and plants respond to changing seasons.</p> <p><b>SC.4.L.16.2</b> Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.</p> <p><b>SC.4.L.16.3</b> Recognize that animal behaviors may be shaped by heredity and learning.</p> <p><b>SC.4.L.17.1</b> Compare the seasonal changes in Florida plants and animals to those in other regions of the country.</p> <p><b>SC.4.L.17.4</b> Recognize ways plants and animals, including humans, can impact the environment.</p> <p><b>SC.5.L.15.1</b> Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.</p>
<b>Benchmark Clarifications</b>	<p>The student will explain, compare, and/or contrast how adaptations displayed by animals or plants enable them to survive in different environments.</p> <p>The student will describe or explain how animals and/or plants respond to changing seasons.</p> <p>The student will describe plant or animal characteristics that are inherited and/or affected by the environment.</p> <p>The student will distinguish plant or animal characteristics that are inherited from those that are affected by the environment.</p> <p>The student will identify characteristics of animals that are inherited or distinguish inherited characteristics from those that are shaped by learning.</p> <p>The student will compare the seasonal changes in Florida plants and/or animals to those in other regions of the country.</p> <p>The student will identify ways in which plants and/or animals, including humans, can impact the environment.</p>

<b>Benchmark Clarifications</b>	The student will describe how, when the environment changes, differences between organisms allow some plants and animals to survive and reproduce while others die or move to new locations.
<b>Assessment Limits</b>	Items referring to the adaptation of organisms to different environments may address but will not assess the different stages of the organism’s life cycle.  Items may require knowledge of how animals living in a particular environment are adapted to survive the seasonal changes in that environment.  Items will not assess renewable or nonrenewable resources.
<b>Stimulus Attribute</b>	The term <i>characteristic</i> should be used rather than the term <i>trait</i> .
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.1.L.16.1, SC.2.L.17.1, and SC.2.L.17.2.

**Sample Item 24 SC.5.L.17.1**

Loggerhead sea turtles are large turtles that live in the ocean and nest on the Florida coast. The female loggerhead sea turtle lays more than 100 eggs in the beach sand. How is laying so many eggs an important adaptation that helps these turtles to survive?

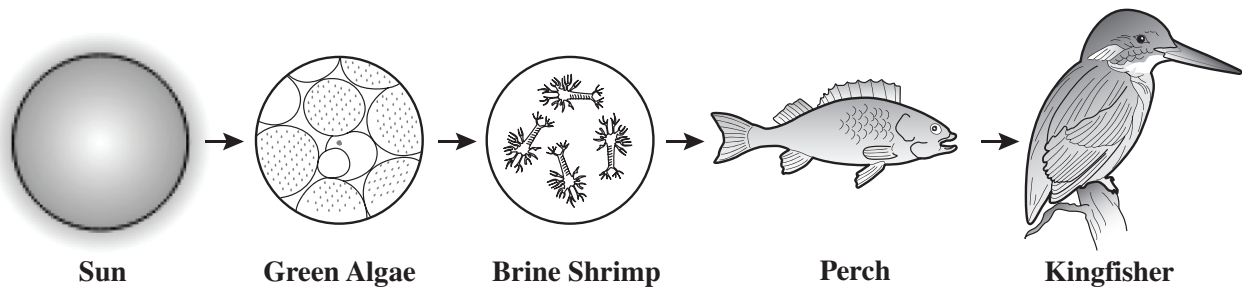
- A. Large nests of eggs help keep the eggs warm enough to allow more turtles to hatch.
- B. If many turtles hatch, they can help defend each other against predators in large numbers.
- ★C. The more eggs that are laid, the greater the chance that more turtles will live to become adults.
- D. A large number of eggs in one place makes it possible for the mother to lie on the eggs until they hatch.

## BENCHMARK SC.4.L.17.3

<b>Reporting Category</b>	Life Science
<b>Standard</b>	<b>Big Idea 17</b> Interdependence
<b>Benchmark</b>	<b>SC.4.L.17.3 Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers. (Also assesses SC.3.L.17.2 and SC.4.L.17.2.)</b>
<b>Also Assesses</b>	<p><b>SC.3.L.17.2</b> Recognize that plants use energy from the Sun, air, and water to make their own food.</p> <p><b>SC.4.L.17.2</b> Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.</p>
<b>Benchmark Clarifications</b>	<p>The student will describe or explain how energy is transferred from the Sun through a food chain.</p> <p>The student will explain that plants make their own food using carbon dioxide, water, and energy from the Sun.</p> <p>The student will explain that animals obtain energy from the plants and/or animals they eat.</p>
<b>Assessment Limits</b>	<p>Items assessing the flow of energy from the Sun through a food chain are limited to the direction of energy flow. Items will not address or assess the amounts of energy flowing through the food chain or the efficiency of the energy transfers.</p> <p>Items will not address or assess cellular respiration or any other cellular process.</p> <p>Items will not address or assess decomposers.</p> <p>Items will not address or assess food webs, trophic levels, or energy pyramids.</p> <p>Items will not assess more than five components (links) in a food chain.</p>
<b>Stimulus Attributes</b>	<p>Scenarios addressing food chains may, but are not required to, include the Sun.</p> <p>Scenarios referring to consumers may use the terms <i>carnivore</i>, <i>herbivore</i>, and <i>omnivore</i>.</p>
<b>Response Attributes</b>	None specified
<b>Prior Knowledge</b>	Items may require the student to apply science knowledge described in the NGSSS from lower grades. This benchmark requires prerequisite knowledge from SC.1.L.17.1.

**Sample Item 25**      **SC.4.L.17.3**

A lagoon food chain is shown below.



Which of the following describes the transfer of energy from a producer to a consumer?

- A. from Perch to Kingfisher
- B. from Brine Shrimp to Perch
- C. from the Sun to Green Algae
- ★ D. from Green Algae to Brine Shrimp

## APPENDIX A: DIRECTIONS FOR ITEM REVIEW AND STATEWIDE SCIENCE ASSESSMENT ITEM RATING FORM

Directions: A series of questions is presented below. These questions are designed to assist you with your evaluation of the quality of the Statewide Science Assessment test items you will be reviewing. The form on the next page is an example of the one you will use to record your rating of each test item. Review each test item independently before discussing the items with other committee members. If you identify any problem with the item during independent review, you should put a crossmark (✗) in the appropriate column. Crossmarks (✗) will indicate a problem area, and blank spaces or checks (✓) will indicate that no problem is identified.

### Questions for Individual Test Items—Record your answers on your rating sheet.

1. Does the test item assess the knowledge required by the benchmark?
2. Does the content of the test item adhere to the assessment limits described in the *Statewide Science Assessment Test Item Specifications*?
3. Are the context and language of the test item appropriate for the grade level?
4. What is the cognitive complexity of the test item? Is the item best categorized as low complexity (L), moderate complexity (M), or high complexity (H)?
5. Is the item clearly worded and dependent on the context (does the item flow cognitively)? If the item has art, does it enhance the item? Is the art scientifically accurate and appropriate? Is the answer free of clang? (Is the answer clued in the context?)
6. Is the assigned content focus appropriate for this item? If not, is there a better or more appropriate content focus?
7. Is there only one correct answer? Record the letter of the correct answer on the rating sheet.
8. Are the options appropriate, plausible, and parallel (both grammatically and conceptually) to the correct response and appropriate for the question asked?
9. Is the item scientifically accurate?
10. Rate the overall quality of the item using these rating definition codes:

<b>Overall Quality</b>	
<b>A</b> (Accept)	<b>RR</b> (Revise and Resubmit)
<b>AM</b> (Accept with Metadata Change)	<b>R</b> (Reject)
<b>AR</b> (Accept as Revised)	

11. Do you have any additional comments? If so, record your comments on your rating sheet in the additional comments area.





## DIRECTIONS FOR ITEM REVIEW OF CONTEXT-DEPENDENT SETS

Directions: A series of questions is presented below. These questions are designed to assist you with your evaluation of the quality of the Statewide Science Assessment test items you will be reviewing. The form on page A–5 is an example of the one you will use to record your rating of each context-dependent-set test item. Review each test item independently before discussing the items with other committee members. If you identify any problem with the item during independent review, you should put a crossmark (✘) in the appropriate column. Crossmarks (✘) will indicate a problem area, and blank spaces or checks (✓) will indicate that no problem is identified.

### Questions for Context-Dependent Item Sets—Record your answers on the rating sheet.

Review the main context of the item set.

1. Is the context grade-level appropriate in content and language?
2. Is the main context free of clang, or does it clue test items?
3. Is the context scientifically accurate?
4. Rate the overall quality of the context using these rating definition codes:

<u>Overall Quality</u>	
A (Accept)	RR (Revise and Resubmit)
AM (Accept with Metadata Change)	R (Reject)
AR (Accept as Revised)	

Read each item in the set.

5. Does the test item assess the knowledge required by the benchmark?
6. Does the content of the test item adhere to the assessment limits described in the *Statewide Science Assessment Test Item Specifications*?
7. Is the item clearly worded and dependent on or directly related to the main context?
8. Are the context and language of the test item appropriate for this grade level?
9. What is the cognitive complexity of the test item? Is the item best categorized as low complexity (L), moderate complexity (M), or high complexity (H)?
10. Is the answer free of clang? (Does it answer or clue other items in the set or does the main context clue an item?)
11. Is the assigned content focus appropriate for this item? If not, is there a better or more appropriate content focus?
12. Is there only one correct answer? Record the letter of the correct answer on the rating sheet.
13. Are the options appropriate, plausible, and parallel (both grammatically and conceptually) to the correct response and appropriate for the question asked?

14. Is the item scientifically accurate?
15. Rate the overall quality of the item using these rating definition codes:

<b><u>Overall Quality</u></b>	
<b>A</b> (Accept)	<b>RR</b> (Revise and Resubmit)
<b>AM</b> (Accept with Metadata Change)	<b>R</b> (Reject)
<b>AR</b> (Accept as Revised)	

16. Do you have any additional comments? If so, record your comments on your rating sheet in the additional comments area.

## STATEWIDE SCIENCE ASSESSMENT ITEM RATING FORM



Signature _____ Date _____	Students in my (classroom, school, district) [circle one] are given the opportunity to learn the (grade 5, grade 8) [circle one] material that these items test, except as noted in my comments.
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Context-Dependent Set: Main Context						
Sequence	Passage	Is Grade Appropriate	Is Clearly Written and Free of Clang	Is Scientifically Accurate	Overall Rating A, AM, AR, RR, R	Additional Comments

Context-Dependent Set: Items													
Sequence	Florida ID	Measures Benchmark	Adheres to Assessment Limits	Is Dependent or Related	Is Grade Appropriate	Has Appropriate Cognitive Complexity (L, M, H)	Is Clearly Written and Free of Clang	Has Appropriate Content Focus	Only One Correct Answer	Has Appropriate MC Options	Is Scientifically Accurate	Overall Rating A, AM, AR, RR, R	Additional Comments

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 1 The Practice of Science		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.N.1.1</b> Raise questions about the natural world, investigate them individually and in teams through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.</p> <p style="text-align: right;">Assessed as SC.5.N.1.1.</p>	<p><b>SC.4.N.1.1</b> Raise questions about the natural world, use appropriate reference materials that support understanding to obtain information (identifying the source), conduct both individual and team investigations through free exploration and systematic investigations, and generate appropriate explanations based on those explorations.</p> <p style="text-align: right;">Assessed as SC.5.N.1.1.</p>	<p><b>SC.5.N.1.1</b> Define a problem, use appropriate reference materials to support scientific understanding, plan and carry out scientific investigations of various types such as: systematic observations; experiments requiring the identification of variables, collecting and organizing data; interpreting data in charts, tables, and graphics; analyze information; make predictions; and defend conclusions.</p> <p style="text-align: right;">Also assesses SC.3.N.1.1, SC.4.N.1.1, SC.4.N.1.6, SC.5.N.1.2, and SC.5.N.1.4.</p> <p style="text-align: center;"><b>AA</b></p>
<p><b>SC.3.N.1.2</b> Compare the observations made by different groups using the same tools and seek reasons to explain the differences across groups.</p> <p style="text-align: right;">Assessed as SC.5.N.2.2.</p>	<p><b>SC.4.N.1.2</b> Compare the observations made by different groups using multiple tools and seek reasons to explain the differences across groups.</p> <p style="text-align: right;">Assessed as SC.5.N.2.2.</p>	<p><b>SC.5.N.1.2</b> Explain the difference between an experiment and other types of scientific investigation.</p> <p style="text-align: right;">Assessed as SC.5.N.1.1</p>
<p><b>SC.3.N.1.3</b> Keep records as appropriate, such as pictorial, written, or simple charts and graphs, of investigations conducted.</p> <p style="text-align: right;">Not Assessed.</p>	<p><b>SC.4.N.1.3</b> Explain that science does not always follow a rigidly defined method (“the scientific method”) but that science does involve the use of observations and empirical evidence.</p> <p style="text-align: right;">Assessed as SC.5.N.2.1.</p>	<p><b>SC.5.N.1.3</b> Recognize and explain the need for repeated experimental trials.</p> <p style="text-align: right;">Assessed as SC.5.N.2.2.</p>

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 1 The Practice of Science		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.N.1.4</b> Recognize the importance of communication among scientists.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.4.N.1.4</b> Attempt reasonable answers to scientific questions and cite evidence in support.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.5.N.1.4</b> Identify a control group and explain its importance in an experiment.</p> <p style="text-align: right;">Assessed as SC.5.N.1.1.</p>
<p><b>SC.3.N.1.5</b> Recognize that scientists question, discuss, and check each others' evidence and explanations.</p> <p style="text-align: right;">Assessed as SC.5.N.2.2.</p>	<p><b>SC.4.N.1.5</b> Compare the methods and results of investigations done by other classmates.</p> <p style="text-align: right;">Assessed as SC.5.N.2.2.</p>	<p><b>SC.5.N.1.5</b> Recognize and explain that authentic scientific investigation frequently does not parallel the steps of "the scientific method."</p> <p style="text-align: right;">Assessed as SC.5.N.2.1.</p>
<p><b>SC.3.N.1.6</b> Infer based on observation.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.4.N.1.6</b> Keep records that describe observations made, carefully distinguishing actual observations from ideas and inferences about the observations.</p> <p style="text-align: right;">Assessed as SC.5.N.1.1.</p>	<p><b>SC.5.N.1.6</b> Recognize and explain the difference between personal opinion/ interpretation and verified observation.</p> <p style="text-align: right;">Assessed as SC.5.N.2.1.</p>
<p><b>SC.3.N.1.7</b> Explain that empirical evidence is information, such as observations or measurements, that is used to help validate explanations of natural phenomena.</p> <p style="text-align: right;">Assessed as SC.5.N.2.1.</p>	<p><b>SC.4.N.1.7</b> Recognize and explain that scientists base their explanations on evidence.</p> <p style="text-align: right;">Assessed as SC.5.N.2.1</p>	
	<p><b>SC.4.N.1.8</b> Recognize that science involves creativity in designing experiments.</p> <p style="text-align: right;">Not assessed.</p>	

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 2 The Characteristics of Scientific Knowledge		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.N.2.1</b> Explain that science focuses solely on the natural world.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.5.N.2.1</b> Recognize and explain that science is grounded in empirical observations that are testable; explanation must always be linked with evidence.</p> <p style="text-align: right;">Also assesses SC.3.N.1.7, SC.4.N.1.3, SC.4.N.1.7, SC.5.N.1.5, and SC.5.N.1.6.</p> <p><b>AA</b></p>
		<p><b>SC.5.N.2.2</b> Recognize and explain that when scientific investigations are carried out, the evidence produced by those investigations should be replicable by others.</p> <p style="text-align: right;">Also assesses SC.3.N.1.2, SC.3.N.1.5, SC.4.N.1.2, SC.4.N.1.5, and SC.5.N.1.3.</p> <p><b>AA</b></p>
Big Idea 3 The Role of Theories, Laws, Hypotheses, and Models		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.N.3.1</b> Recognize that words in science can have different or more specific meanings than their use in everyday language; for example, energy, cell, heat/ cold, and evidence.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.4.N.3.1</b> Explain that models can be three dimensional, two dimensional, an explanation in your mind, or a computer model.</p> <p style="text-align: right;">Not assessed.</p>	
<p><b>SC.3.N.3.2</b> Recognize that scientists use models to help understand and explain how things work.</p> <p style="text-align: right;">Not assessed.</p>		

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 3 The Role of Theories, Laws, Hypotheses, and Models		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.N.3.3</b> Recognize that all models are approximations of natural phenomena; as such, they do not perfectly account for all observations.</p> <p style="text-align: right;">Not assessed.</p>		
Big Idea 4		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
Big Idea 5 Earth in Space and Time		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.E.5.1</b> Explain that stars can be different; some are smaller, some are larger, and some appear brighter than others; all except the Sun are so far away that they look like points of light.</p> <p style="text-align: right;">Assessed as SC.5.E.5.1.</p>	<p><b>SC.4.E.5.1</b> Observe that the patterns of stars in the sky stay the same although they appear to shift across the sky nightly, and different stars can be seen in different seasons.</p> <p style="text-align: right;">Assessed as SC.4.E.5.4.</p>	<p><b>SC.5.E.5.1</b> Recognize that a galaxy consists of gas, dust, and many stars, including any objects orbiting the stars. Identify our home galaxy as the Milky Way.</p> <p style="text-align: right;">Also assesses SC.3.E.5.1, SC.3.E.5.2, and SC.3.E.5.3.</p> <p style="text-align: center;"><b>AA</b></p>
<p><b>SC.3.E.5.2</b> Identify the Sun as a star that emits energy; some of it in the form of light.</p> <p style="text-align: right;">Assessed as SC.5.E.5.1.</p>	<p><b>SC.4.E.5.2</b> Describe the changes in the observable shape of the Moon over the course of about a month.</p> <p style="text-align: right;">Assessed as SC.4.E.5.4.</p>	<p><b>SC.5.E.5.2</b> Recognize the major common characteristics of all planets and compare/contrast the properties of inner and outer planets.</p> <p style="text-align: right;">Assessed as SC.5.E.5.3.</p>

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.



## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 5 Earth in Space and Time		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.E.5.3</b> Recognize that the Sun appears large and bright because it is the closest star to Earth.</p> <p style="text-align: right;">Assessed as SC.5.E.5.1.</p>	<p><b>SC.4.E.5.3</b> Recognize that Earth revolves around the Sun in a year and rotates on its axis in a 24-hour day.</p> <p style="text-align: right;">Assessed as SC.4.E.5.4.</p>	<p><b>SC.5.E.5.3</b> Distinguish among the following objects of the Solar System—Sun, planets, moons, asteroids, comets—and identify Earth’s position in it.</p> <p style="text-align: right;">Also assesses SC.5.E.5.2.</p> <p><b>AA</b></p>
<p><b>SC.3.E.5.4</b> Explore the Law of Gravity by demonstrating that gravity is a force that can be overcome.</p> <p style="text-align: right;">Assessed as SC.5.P.13.1.</p>	<p><b>SC.4.E.5.4</b> Relate that the rotation of Earth (day and night) and apparent movements of the Sun, Moon, and stars are connected.</p> <p style="text-align: right;">Also assesses SC.4.E.5.1, SC.4.E.5.2, and SC.4.E.5.3.</p> <p><b>AA</b></p>	
<p><b>SC.3.E.5.5</b> Investigate that the number of stars that can be seen through telescopes is dramatically greater than those seen by the unaided eye.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.4.E.5.5</b> Investigate and report the effects of space research and exploration on the economy and culture of Florida.</p> <p style="text-align: right;">Not assessed.</p>	

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 6 Earth Structures		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.E.6.1</b> Demonstrate that radiant energy from the Sun can heat objects and when the Sun is not present, heat may be lost.</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>	<p><b>SC.4.E.6.1</b> Identify the three categories of rocks: igneous (formed from molten rock); sedimentary (pieces of other rocks and fossilized organisms); and metamorphic (formed from heat and pressure).</p> <p style="text-align: right;">Assessed as SC.4.E.6.2.</p>	
	<p><b>SC.4.E.6.2</b> Identify the physical properties of common earth-forming minerals, including hardness, color, luster, cleavage, and streak color, and recognize the role of minerals in the formation of rocks.</p> <p style="text-align: right;">Also assesses SC.4.E.6.1.</p> <p><b>AA</b></p>	
	<p><b>SC.4.E.6.3</b> Recognize that humans need resources found on Earth and that these are either renewable or nonrenewable.</p> <p style="text-align: right;">Also assesses SC.4.E.6.6.</p> <p><b>AA</b></p>	
	<p><b>SC.4.E.6.4</b> Describe the basic differences between physical weathering (breaking down of rock by wind, water, ice, temperature change, and plants) and erosion (movement of rock by gravity, wind, water, and ice).</p> <p><b>AA</b></p>	

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 6 Earth Structures		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.E.6.5</b> Investigate how technology and tools help to extend the ability of humans to observe very small things and very large things.</p> <p style="text-align: right;">Not assessed.</p>	
	<p><b>SC.4.E.6.6</b> Identify resources available in Florida (water, phosphate, oil, limestone, silicon, wind, and solar energy).</p> <p style="text-align: right;">Assessed as SC.4.E.6.3.</p>	
Big Idea 7 Earth Systems and Patterns		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
		<p><b>SC.5.E.7.1</b> Create a model to explain the parts of the water cycle. Water can be a gas, a liquid, or a solid and can go back and forth from one state to another.</p> <p style="text-align: right;">Also assesses SC.5.E.7.2.</p> <p style="text-align: right;">AA</p>
		<p><b>SC.5.E.7.2</b> Recognize that the ocean is an integral part of the water cycle and is connected to all of Earth's water reservoirs via evaporation and precipitation processes.</p> <p style="text-align: right;">Assessed as SC.5.E.7.1.</p>

AA = annually assessed benchmark

Standards marked as *Not Assessed* are more appropriately assessed through classroom instruction.

## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 7 Earth Systems and Patterns		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
		<p><b>SC.5.E.7.3</b> Recognize how air temperature, barometric pressure, humidity, wind speed and direction, and precipitation determine the weather in a particular place and time.</p> <p style="text-align: right;">Also assesses SC.5.E.7.4, SC.5.E.7.5, and SC.5.E.7.6.</p> <p><b>AA</b></p>
		<p><b>SC.5.E.7.4</b> Distinguish among the various forms of precipitation (rain, snow, sleet, and hail), making connections to the weather in a particular place and time.</p> <p style="text-align: right;">Assessed as SC.5.E.7.3.</p>
		<p><b>SC.5.E.7.5</b> Recognize that some of the weather-related differences, such as temperature and humidity, are found among different environments, such as swamps, deserts, and mountains.</p> <p style="text-align: right;">Assessed as SC.5.E.7.3.</p>
		<p><b>SC.5.E.7.6</b> Describe characteristics (temperature and precipitation) of different climate zones as they relate to latitude, elevation, and proximity to bodies of water.</p> <p style="text-align: right;">Assessed as SC.5.E.7.3.</p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 7 Earth Systems and Patterns		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
		<p><b>SC.5.E.7.7</b> Design a family preparedness plan for natural disasters and identify the reasons for having such a plan.</p> <p style="text-align: right;">Not assessed.</p>
Big Idea 8 Properties of Matter		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.8.1</b> Measure and compare temperatures of various samples of solids and liquids.</p> <p style="text-align: right;">Assessed as SC.5.P.8.1.</p>	<p><b>SC.4.P.8.1</b> Measure and compare objects and materials based on their physical properties including: mass, shape, volume, color, hardness, texture, odor, taste, attraction to magnets.</p> <p style="text-align: right;">Assessed as SC.5.P.8.1.</p>	<p><b>SC.5.P.8.1</b> Compare and contrast the basic properties of solids, liquids, and gases, such as mass, volume, color, texture, and temperature.</p> <p style="text-align: right;">Also assesses SC.3.P.8.1, SC.3.P.8.2, SC.3.P.8.3, and SC.4.P.8.1.</p> <p><b>AA</b></p>
<p><b>SC.3.P.8.2</b> Measure and compare the mass and volume of solids and liquids.</p> <p style="text-align: right;">Assessed as SC.5.P.8.1.</p>	<p><b>SC.4.P.8.2</b> Identify properties and common uses of water in each of its states.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.5.P.8.2</b> Investigate and identify materials that will dissolve in water and those that will not and identify the conditions that will speed up or slow down the dissolving process.</p> <p style="text-align: right;">Assessed as SC.5.P.8.3.</p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 8 Properties of Matter		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.8.3</b> Compare materials and objects according to properties such as size, shape, color, texture, and hardness.</p> <p style="text-align: right;">Assessed as SC.5.P.8.1.</p>	<p><b>SC.4.P.8.3</b> Explore the Law of Conservation of Mass by demonstrating that the mass of a whole object is always the same as the sum of the masses of its parts.</p> <p style="text-align: right;">Not assessed.</p>	<p><b>SC.5.P.8.3</b> Demonstrate and explain that mixtures of solids can be separated based on observable properties of their parts such as particle size, shape, color, and magnetic attraction.</p> <p style="text-align: right;">Also assesses SC.5.P.8.2.</p> <p style="text-align: center;"><b>AA</b></p>
	<p><b>SC.4.P.8.4</b> Investigate and describe that magnets can attract magnetic materials and attract and repel other magnets.</p> <p style="text-align: right;">Assessed as SC.5.P.13.1.</p>	<p><b>SC.5.P.8.4</b> Explore the scientific theory of atoms (also called atomic theory) by recognizing that all matter is composed of parts that are too small to be seen without magnification.</p> <p style="text-align: right;">Not assessed.</p>
Big Idea 9 Changes in Matter		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.9.1</b> Describe the changes water undergoes when it changes state through heating and cooling by using familiar scientific terms such as melting, freezing, boiling, evaporation, and condensation.</p> <p style="text-align: right;">Assessed as SC.5.P.9.1.</p>	<p><b>SC.4.P.9.1</b> Identify some familiar changes in materials that result in other materials with different characteristics, such as decaying animal or plant matter, burning, rusting, and cooking.</p> <p style="text-align: right;">Assessed as SC.5.P.9.1.</p>	<p><b>SC.5.P.9.1</b> Investigate and describe that many physical and chemical changes are affected by temperature.</p> <p style="text-align: right;">Also assesses SC.3.P.9.1 and SC.4.P.9.1.</p> <p style="text-align: center;"><b>AA</b></p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 10 Forms of Energy		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.10.1</b> Identify some basic forms of energy such as light, heat, sound, electrical, and mechanical.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.4.P.10.1</b> Observe and describe some basic forms of energy, including light, heat, sound, electrical, and the energy of motion.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.5.P.10.1</b> Investigate and describe some basic forms of energy, including light, heat, sound, electrical, chemical, and mechanical.</p> <p style="text-align: right;">Also assesses SC.3.P.10.1, SC.3.P.10.3, SC.3.P.10.4, SC.3.P.11.1, SC.3.P.11.2, SC.4.P.10.1, and SC.4.P.10.3.</p> <p style="text-align: center;">AA</p>
<p><b>SC.3.P.10.2</b> Recognize that energy has the ability to cause motion or create change.</p> <p style="text-align: right;">Assessed as SC.5.P.10.2.</p>	<p><b>SC.4.P.10.2</b> Investigate and describe that energy has the ability to cause motion or create change.</p> <p style="text-align: right;">Assessed as SC.5.P.10.2.</p>	<p><b>SC.5.P.10.2</b> Investigate and explain that energy has the ability to cause motion or create change.</p> <p style="text-align: right;">Also assesses SC.3.P.10.2, SC.4.P.10.2, and SC.4.P.10.4.</p> <p style="text-align: center;">AA</p>
<p><b>SC.3.P.10.3</b> Demonstrate that light travels in a straight line until it strikes an object or travels from one medium to another.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.4.P.10.3</b> Investigate and explain that sound is produced by vibrating objects and that pitch depends on how fast or slow the object vibrates.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.5.P.10.3</b> Investigate and explain that an electrically charged object can attract an uncharged object and can either attract or repel another charged object without any contact between the objects.</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 10 Forms of Energy		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.10.4</b> Demonstrate that light can be reflected, refracted, and absorbed.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.4.P.10.4</b> Describe how moving water and air are sources of energy and can be used to move things.</p> <p style="text-align: right;">Assessed as SC.5.P.10.2</p>	<p><b>SC.5.P.10.4</b> Investigate and explain that electrical energy can be transformed into heat, light, and sound energy, as well as the energy of motion.</p> <p style="text-align: right;">Also assesses SC.3.E.6.1, SC.4.P.11.1, SC.4.P.11.2, SC.5.P.10.3, SC.5.P.11.1, and SC.5.P.11.2.</p> <p style="text-align: center;">AA</p>
Big Idea 11 Energy Transfer and Transformations		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.P.11.1</b> Investigate, observe, and explain that things that give off light often also give off heat.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.4.P.11.1</b> Recognize that heat flows from a hot object to a cold object and that heat flow may cause materials to change temperature.</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>	<p><b>SC.5.P.11.1</b> Investigate and illustrate the fact that the flow of electricity requires a closed circuit (a complete loop).</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>
<p><b>SC.3.P.11.2</b> Investigate, observe, and explain that heat is produced when one object rubs against another, such as rubbing one's hands together.</p> <p style="text-align: right;">Assessed as SC.5.P.10.1.</p>	<p><b>SC.4.P.11.2</b> Identify common materials that conduct heat well or poorly.</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>	<p><b>SC.5.P.11.2</b> Identify and classify materials that conduct electricity and materials that do not.</p> <p style="text-align: right;">Assessed as SC.5.P.10.4.</p>
Big Idea 12 Motion of Objects		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.P.12.1</b> Recognize that an object in motion always changes its position and may change its direction.</p> <p style="text-align: right;">Assessed as SC.5.P.13.2.</p>	

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 12 Motion of Objects		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.P.12.2</b> Investigate and describe that the speed of an object is determined by the distance it travels in a unit of time and that objects can move at different speeds.</p> <p style="text-align: right;">Assessed as SC.5.P.13.2.</p>	
Big Idea 13 Forces and Changes in Motion		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
		<p><b>SC.5.P.13.1</b> Identify familiar forces that cause objects to move, such as pushes or pulls, including gravity acting on falling objects.</p> <p style="text-align: right;">Also assesses SC.3.E.5.4 and SC.4.P.8.4.</p> <p style="text-align: right;">AA</p>
		<p><b>SC.5.P.13.2</b> Investigate and describe that the greater the force applied to it, the greater the change in motion of a given object.</p> <p style="text-align: right;">Also assesses SC.4.P.12.1, SC.4.P.12.2, SC.5.P.13.3, and SC.5.P.13.4.</p> <p style="text-align: right;">AA</p>
		<p><b>SC.5.P.13.3</b> Investigate and describe that the more mass an object has, the less effect a given force will have on the object's motion.</p> <p style="text-align: right;">Assessed as SC.5.P.13.2.</p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 13 Forces and Changes in Motion		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
		<p><b>SC.5.P.13.4</b> Investigate and explain that when a force is applied to an object but it does not move, it is because another opposing force is being applied by something in the environment so that the forces are balanced.</p> <p style="text-align: right;">Assessed as SC.5.P.13.2.</p>
Big Idea 14 Organization and Development of Living Organisms		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.L.14.1</b> Describe structures in plants and their roles in food production, support, water and nutrient transport, and reproduction.</p> <p style="text-align: center;">Also assesses SC.3.L.14.2 and SC.4.L.16.1.</p> <p><b>AA</b></p>		<p><b>SC.5.L.14.1</b> Identify the organs in the human body and describe their functions, including the skin, brain, heart, lungs, stomach, liver, intestines, pancreas, muscles and skeleton, reproductive organs, kidneys, bladder, and sensory organs.</p> <p><b>AA</b></p>
<p><b>SC.3.L.14.2</b> Investigate and describe how plants respond to stimuli (heat, light, gravity), such as the way plant stems grow toward light and their roots grow downward in response to gravity.</p> <p style="text-align: right;">Assessed as SC.3.L.14.1</p>		<p><b>SC.5.L.14.2</b> Compare and contrast the function of organs and other physical structures of plants and animals, including humans, for example: some animals have skeletons for support—some with internal skeletons, others with exoskeletons—while some plants have stems for support.</p> <p style="text-align: right;">Also assesses SC.3.L.15.1 and SC.3.L.15.2.</p> <p><b>AA</b></p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 15 Diversity and Evolution of Living Organisms		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.L.15.1</b> Classify animals into major groups (mammals, birds, reptiles, amphibians, fish, arthropods, vertebrates and invertebrates, those having live births and those which lay eggs) according to their physical characteristics and behaviors.</p> <p style="text-align: right;">Assessed as SC.5.L.14.2.</p>		<p><b>SC.5.L.15.1</b> Describe how, when the environment changes, differences between individuals allow some plants and animals to survive and reproduce while others die or move to new locations.</p> <p style="text-align: right;">Assessed as SC.5.L.17.1.</p>
<p><b>SC.3.L.15.2</b> Classify flowering and nonflowering plants into major groups such as those that produce seeds, or those like ferns and mosses that produce spores, according to their physical characteristics.</p> <p style="text-align: right;">Assessed as SC.5.L.14.2.</p>		
Big Idea 16 Heredity and Reproduction		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.L.16.1</b> Identify processes of sexual reproduction in flowering plants, including pollination, fertilization (seed production), seed dispersal, and germination.</p> <p style="text-align: right;">Assessed as SC.3.L.14.1.</p>	
	<p><b>SC.4.L.16.2</b> Explain that although characteristics of plants and animals are inherited, some characteristics can be affected by the environment.</p> <p style="text-align: right;">Assessed as SC.5.L.17.1.</p>	

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 16 Heredity and Reproduction		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
	<p><b>SC.4.L.16.3</b> Recognize that animal behaviors may be shaped by heredity and learning.</p> <p style="text-align: center;">Assessed as SC.5.L.17.1.</p>	
	<p><b>SC.4.L.16.4</b> Compare and contrast the major stages in the life cycles of Florida plants and animals, such as those that undergo incomplete and complete metamorphosis, and flowering and nonflowering seed-bearing plants.</p> <p><b>AA</b></p>	
Big Idea 17 Interdependence		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.L.17.1</b> Describe how animals and plants respond to changing seasons.</p> <p style="text-align: center;">Assessed as SC.5.L.17.1.</p>	<p><b>SC.4.L.17.1</b> Compare the seasonal changes in Florida plants and animals to those in other regions of the country.</p> <p style="text-align: center;">Assessed as SC.5.L.17.1.</p>	<p><b>SC.5.L.17.1</b> Compare and contrast adaptations displayed by animals and plants that enable them to survive in different environments such as life cycle variations, animal behaviors, and physical characteristics.</p> <p style="text-align: center;">Also assesses SC.3.L.17.1, SC.4.L.16.2, SC.4.L.16.3, SC.4.L.17.1, SC.4.L.17.4, and SC.5.L.15.1.</p> <p><b>AA</b></p>

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## APPENDIX B: SCIENCE CONTENT ASSESSED BY STATEWIDE SCIENCE ASSESSMENT GRADE 5

Big Idea 17 Interdependence		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark
<p><b>SC.3.L.17.2</b> Recognize that plants use energy from the Sun, air, and water to make their own food.</p> <p style="text-align: right;">Assessed as SC.4.L.17.3.</p>	<p><b>SC.4.L.17.2</b> Explain that animals, including humans, cannot make their own food and that when animals eat plants or other animals, the energy stored in the food source is passed to them.</p> <p style="text-align: right;">Assessed as SC.4.L.17.3.</p>	
	<p><b>SC.4.L.17.3</b> Trace the flow of energy from the Sun as it is transferred along the food chain through the producers to the consumers.</p> <p style="text-align: center;">Also assesses SC.3.L.17.2 and SC.4.L.17.2.</p> <p><b>AA</b></p>	
	<p><b>SC.4.L.17.4</b> Recognize ways plants and animals, including humans, can impact the environment.</p> <p style="text-align: right;">Assessed as SC.5.L.17.1.</p>	
Big Idea 18		
Grade 3 Benchmark	Grade 4 Benchmark	Grade 5 Benchmark

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## APPENDIX C: STATEWIDE SCIENCE ASSESSMENT ITEM WRITER GLOSSARY GRADE 5

The following glossary is a reference list provided for the item writers and is **not** intended to comprise a comprehensive vocabulary list for students. The definitions are not intended to provide a thorough scientific definition of the terms. Some definitions are limited by the extent of knowledge intended for the grade level. The terms and definitions in this glossary are specific to the Florida NGSSS in science for grades 3 through 5 and the content assessed on the Statewide Science Assessment.

**Absorb**—To take up and store energy without reflecting or transmitting that energy.

**Adaptation**—A characteristic of an organism that increases its chances of survival in its environment.

**Analyze**—To examine methodically by separating into parts and studying their interrelatedness.

**Asteroid**—An irregularly shaped rocky or metallic object that orbits the Sun and is much smaller than a planet.

**Attraction**—A term used to describe the electric or magnetic force exerted by oppositely charged objects or to describe the gravitational force that pulls objects toward each other.

**Balanced forces**—Forces that are equal in size but opposite in direction. See also force and unbalanced forces.

**Behavior**—A plant or animal action, reaction, or activity that occurs in response to stimuli (e.g., gravity, light, temperature).

**Carnivore**—An animal that obtains nutrients from eating other animals.

**Characteristic**—A feature, quality, property, or trait of an object or organism.

**Chemical change**—Process by which substances are changed into different substances with different properties.

**Classify**—To arrange in a specific order or group by categories based on similarities.

**Cleavage**—A property used to describe how a mineral breaks apart along smooth surfaces.

**Climate**—The average pattern of weather that occurs in a certain location over many years.

**Comet**—An object made of rock, ice, dust, and gas that revolves around the Sun.

## APPENDIX C: STATEWIDE SCIENCE ASSESSMENT ITEM WRITER GLOSSARY GRADE 5

**Community**—Populations of different species of organisms living together in the same geographic area.

**Complete metamorphosis**—Type of insect development characterized by the presence of a larval stage with different feeding habits.

**Conclusion**—A statement that tells what an investigation showed, based on observations and data.

**Condensation**—The process by which water is changed from a gas (water vapor) to a liquid; a stage of the water cycle.

**Conduct**—To transmit heat, sound, or electricity through a medium.

**Consumer**—An organism in a food chain that obtains nutrients from producers or other consumers; consumers may be herbivores or carnivores.

**Control group**—A group in a scientific experiment that serves as a reference for comparison to the experimental group; a group that is untreated by the factor being tested.

**Controlled variable**—A factor or condition in a scientific experiment that is purposefully kept the same.

**Data**—Measurements or observations collected and recorded in an experiment or investigation.

**Ecosystem**—All the living and nonliving things that interact with each other in an environment.

**Endangered species**—A species whose population is so small that it is in danger of extinction.

**Environment**—An area that includes all living organisms and the surrounding physical features such as air, water, soil, weather, and landforms.

**Erosion**—The process by which rock, soil, and other weathered earth materials are moved from one place to another.

**Evaporation**—The process by which water is changed from a liquid to a gas (water vapor); a stage of the water cycle.

**Experiment**—A scientific test or procedure that is carried out under controlled conditions to answer a scientific question.

**Extinct species**—A species that no longer exists.

**Fertilization**—The process by which the female reproductive cell (egg) is united with the male reproductive cell (sperm).

**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 5**

**Food chain**—A diagram representing the transfer of energy from the Sun through producers and a series of consumers.

**Force**—A push or a pull that one object exerts on another object with or without direct contact (e.g., friction, gravity). See also balanced forces and unbalanced forces.

**Friction**—A force that opposes motion through direct contact.

**Germination**—The process by which plants begin to grow from a seed or a spore.

**Hardness**—A property of a mineral that describes how easily it can be scratched.

**Hemisphere**—Half of Earth (i.e., Northern, Southern, Eastern, Western).

**Herbivore**—An animal that obtains nutrients only from plants.

**Humidity**—A measure of the amount of water vapor in the air.

**Igneous rock**—A type of rock that forms from cooled magma or lava.

**Incomplete metamorphosis**—Type of insect development characterized by the similar appearance of pre-adults and adults.

**Inference**—An explanation based on evidence that is not directly observed.

**Inherited trait**—A trait or characteristic that is passed from parent to offspring.

**Insulator**—A material used to reduce or prevent the transfer of electricity, heat, or sound.

**Invertebrate**—An animal that lacks a backbone.

**Investigation**—An organized scientific study of the natural world that may include making systematic observations, asking questions, gathering information, analyzing data, summarizing results, drawing conclusions, and/or communicating results.

**Larva**—An early stage in the life cycle of an organism that will undergo complete metamorphosis.

**Life cycle**—The stages of an organism's growth and development.

**Luster**—A property of a mineral that describes how it appears when it reflects light.

**Mass**—The amount of matter a substance or object has.



**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 5**

**Matter**—Anything that takes up space and has mass.

**Mechanical energy**—A type of energy an object has due to its motion or position.

**Metamorphic rock**—A type of rock that is formed over time from existing rock due to extreme pressure and/or heat.

**Mineral**—A naturally occurring inorganic solid with a distinct chemical composition and crystalline structure.

**Moon**—A natural object that orbits a planet.

**Nutrient**—A substance that an organism needs to survive and grow.

**Nymph**—A pre-adult insect undergoing incomplete metamorphosis.

**Observation**—Information about the natural world gathered through the senses and/or scientific instruments.

**Omnivore**—An organism that obtains nutrients from both plants and animals.

**Organism**—A living thing.

**Ovary**—The female reproductive organ that produces and contains egg cells.

**Physical change**—A change of a substance from one form to another without a change in its chemical properties.

**Pistil**—The female reproductive structure of a flowering plant.

**Pitch**—The relative frequency (high or low) of a sound as perceived by a listener.

**Planet**—A large body in space that orbits a star and does not produce its own light.

**Polar zone**—A climate zone characterized by very little precipitation and extremely cold temperatures.

**Pollen**—The fine dustlike powder that contains the male reproductive cells of seed-bearing plants.

**Pollinate**—To transfer the pollen from the male reproductive structure to the female reproductive structure to fertilize flowering plants.

**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 5**

**Population**—All members of the same species living together at the same time in the same area.

**Precipitation**—A form of water (e.g., hail, rain, sleet, snow) that condenses in the atmosphere and falls to Earth’s surface.

**Predator**—An organism that kills and eats other organisms (prey).

**Predict**—To state what one thinks will happen under certain conditions based on data or observation.

**Prey**—An organism that is killed and/or eaten by another organism (predator).

**Producer**—An organism that produces its own food.

**Pupa**—A stage in the life cycle of an insect that occurs between larva and adult.

**Reflect**—To bounce light, sound, or heat off of a surface.

**Repel**—To force away or apart.

**Reproduction**—The process of making more organisms of the same kind.

**Revolution**—The motion of one object around another object.

**Rotation**—The turning of an object on its axis.

**Sedimentary rock**—A type of rock formed from layers of sediment.

**Soil**—The loose top layer of Earth’s surface made of weathered rock and organic matter.

**Solar system**—A system of planets and other bodies that orbits a star.

**Species**—A group of the same kind of organisms that can mate and produce offspring that can reproduce.

**Speed**—The distance traveled by an object in a given amount of time.

**Spore**—A seedlike structure that produces a new plant (e.g., ferns or mosses).

**Stamen**—The male reproductive structure of a flowering plant.

**Star**—A large object in space that is made of gas and produces its own light.

## APPENDIX C: STATEWIDE SCIENCE ASSESSMENT ITEM WRITER GLOSSARY GRADE 5

**State of matter**—The form matter can take (e.g., solid, liquid, gas).

**Streak**—The color of the powder of a mineral when it is rubbed on a streak plate.

**Technology**—The use of scientific knowledge and processes to solve practical problems.

**Temperate zone**—A climate zone located between the tropics and the polar circles generally characterized by moderate temperatures rather than extremely hot or cold temperatures.

**Testable (scientifically testable)**—A term used to describe a question that can be answered through an experiment or observation.

**Texture**—A physical property of a solid used to describe its surface.

**Trials**—Multiple sets of measurements or observations in a scientific investigation.

**Tropical zone**—A climate zone near the equator characterized by warm temperatures.

**Unbalanced forces**—Forces that are unequal in size and may or may not be opposite in direction. See also balanced forces and force.

**Valid**—A term used to describe the certainty of data or results of an investigation or experiment.

**Variable**—An event, condition, or factor that can be changed or controlled in order to study or test a hypothesis in a scientific experiment.

**Vertebrate**—An animal that has a backbone.

**Volume**—The amount of space an object or substance occupies.

**Water cycle**—The continuous movement of water through the environment by evaporation, condensation, precipitation, and runoff.

**Water vapor**—The gas state of water.

**Weather**—The condition of the atmosphere at a given time and place.

**Weathering**—The process by which rocks and other surfaces are broken down.

**Weight**—A measure of the force of gravity on an object.

## APPENDIX C: STATEWIDE SCIENCE ASSESSMENT ITEM WRITER GLOSSARY GRADE 8

The following glossary is a reference list provided for the item writers and is **not** intended to comprise a comprehensive vocabulary list for students. The definitions are not intended to provide a thorough scientific definition of the terms. Some definitions are limited by the extent of knowledge intended for the grade level. The terms and definitions in this glossary are specific to the Florida NGSSS in science for grades 6 through 8 and the content assessed on Statewide Science Assessment. These terms should not be used in grade 5 test items.

**Acceleration**—The rate at which velocity is changing. The change may involve an increase or decrease in speed and/or a change in direction. The change may be positive or negative.

**Allele**—Any of two or more alternate forms of a gene that an organism may have for a particular trait.

**Amplitude**—The maximum absolute variation of any periodic function (e.g., a wave).

**Astronomical unit**—A unit used to measure distances in the Solar System equal to the average distance between the Sun and Earth, approximately 150 million kilometers, and abbreviated AU.

**Autotroph**—An organism that can produce food from inorganic materials (e.g., carbon dioxide, sunlight, water).

**Binary fission**—An asexual reproductive process in which a single cell divides into two cells.

**Binomial nomenclature**—A system used to name organisms using two words: the genus name and the species name.

**Boiling point**—The temperature at which a liquid changes to a gas. The boiling point of water at sea level is 100°C (212°F).

**Budding**—An asexual reproductive process in which an outgrowth of a parent organism detaches and forms a new individual of the same species.

**Chemical properties**—Characteristics of substances that describe their composition, reactivity, and how the substance changes into different substances.

**Dominant**—The form of a trait that is expressed or shown when the combination of alleles for this trait is heterozygous.

**Dwarf planet**—A celestial body similar to a planet but orbiting in a zone that has many other objects in it (e.g., Ceres, Pluto).

**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 8**

**Empirical evidence**—Evidence based on observations or experiments rather than theory.

**Eukaryote**—An organism whose cells contain a nucleus surrounded by a membrane.

**Evolution (scientific theory of evolution)**—A cumulative change in the characteristics of organisms or populations over time from generation to generation.

**F<sub>1</sub> generation**—The first generation of offspring from the mating of parental organisms (P generation).

**Fault**—A crack in Earth’s crust along which movement has occurred.

**Fold**—A bend in a layer or several layers of rock.

**Heterogeneous**—A type of mixture in which different parts can be easily distinguished.

**Heterotroph**—An organism that cannot produce its own food.

**Heterozygous**—A cell or organism that has two different alleles for a particular trait.

**Homeostasis**—The tendency of a cell, organism, or population to maintain internal stability.

**Homogeneous**—A type of mixture in which the different parts are blended evenly so that the mixture is the same throughout.

**Homozygous**—A type of cell or organism that has identical rather than different alleles for a particular trait.

**Hypothesis**—A statement that can be tested scientifically through experiments and/or other scientific investigations.

**Infiltration**—A process in which water soaks into the soil.

**Kingdom**—The highest Linnaean classification into which organisms are grouped; above phylum.

**Law (scientific law)**—A scientific principle based on many observations of naturally occurring events that demonstrate it to be without exception under certain stated conditions. See also theory.

**Light-year**—The distance a ray of light travels in a vacuum in one year.

**Melting point**—The temperature at which a solid changes to a liquid. The melting point of ice at sea level is 0°C (32°F).

**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 8**

**Model (scientific model)**—A replica or description designed to show the workings or structure of an object or system.

**Molecule**—The smallest unit of matter of a substance that retains all the physical and chemical properties of that substance; consists of a single atom or a group of atoms bonded together.

**Nebula**—A large cloudlike mass of gas and dust in space that may lead to the formation of a star.

**Net force**—The sum of all the forces acting on an object. When forces are balanced, the net force is zero and the object's motion will remain the same. When forces are unbalanced, the net force is nonzero and the object's motion will change.

**Niche**—The unique position occupied by a particular species in terms of the area it inhabits and the function it performs within the community.

**Nucleus**—The center region of an atom where protons and neutrons are located; also, the cell structure that contains a cell's genetic material.

**Opaque**—A term used to describe a material that absorbs and/or reflects light and does not allow light to pass through.

**Outcome variable (dependent variable)**—A factor, usually being measured or observed, that responds to, or depends on, another factor (test variable).

**P generation**—The parental generation in a genetic cross.

**Percolation**—The movement of water through rock or soil.

**pH**—A measure of the acidity or alkalinity of a solution based on a scale from zero to fourteen.

**Pressure**—The force exerted per unit area.

**Prokaryote**—An organism whose cells are characterized by the lack of a defined nucleus.

**Recessive**—The form of a trait that will be masked unless the organism is homozygous for this trait.

**Regeneration**—The growth of new tissues or organs to replace those lost or damaged by injury.

**Repetition**—Making multiple sets of measurements or observations in a scientific investigation.

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**APPENDIX C: STATEWIDE SCIENCE ASSESSMENT  
ITEM WRITER GLOSSARY GRADE 8**

**Replication**—The reproduction of a scientific investigation by another person to ensure accuracy.

**Saturation**—A condition of a solution whereby it has reached a maximum amount of solute under the given conditions.

**Solute**—A substance that is being dissolved by another substance.

**Solvent**—A substance that dissolves another substance.

**Systematic observations**—Observations obtained by following a preplanned method of observation.

**Temperature**—A measure of how hot or cold a substance is; a measure of the average kinetic energy of the particles of a substance.

**Test variable (independent variable)**—The variable manipulated by the experimenter in order to study changes in the outcome variable.

**Theory (scientific theory)**—An explanation for some naturally occurring event developed from extensive observations, experimentation, and reasoning. See also law.

**Translucent**—A term used to describe a material that cannot be clearly seen through but that allows some light to pass through it.

**Transparent**—A term used to describe a material that can be clearly seen through because it allows light waves to pass through in straight lines.

## APPENDIX D: REPORTING CATEGORIES FOR THE STATEWIDE SCIENCE ASSESSMENTS AND BIOLOGY 1 END-OF-COURSE ASSESSMENT

### Reporting Categories

The following tables represent the content reporting categories for the Statewide Science Assessments and Biology 1 End-of-Course Assessment, along with the approximate percentage of raw-score points that will be derived from each content category.

Statewide Science Assessments				
Grade	Nature of Science	Earth and Space Science	Physical Science	Life Science
5	17%	29%	29%	25%
8	19%	27%	27%	27%

Biology 1 End-of-Course Assessment	
Molecular and Cellular Biology	35%
Classification, Heredity, and Evolution	25%
Organisms, Populations, and Ecosystems	40%



## APPENDIX E: STATEWIDE SCIENCE ASSESSMENTS AND BIOLOGY 1 END-OF-COURSE ASSESSMENT TEST DESIGN SUMMARY

### Item Types and Numbers

This table provides an approximate range for the number of items on each test. These ranges include both the operational and field-test items. All items are multiple choice (MC).

Assessment	Item Range
5	60–66
8	60–66
Biology 1	60–66

### Duration of Tests

The table below displays the number of minutes allowed for regular test takers for the Statewide Science Assessments and Biology 1 End-of-Course Assessment.

Assessment	Duration (in minutes)
5	160
8	160
Biology 1	160

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**APPENDIX F: PERIODIC TABLE OF THE ELEMENTS  
STATEWIDE SCIENCE ASSESSMENT GRADE 8 AND  
BIOLOGY 1 END-OF-COURSE ASSESSMENT**

The Periodic Table of the Elements for use with the Statewide Science Assessment Grade 8 and the Biology 1 EOC Assessment is available online at the Florida Statewide Assessments Program Portal at <https://fsassessments.org/>.

**APPENDIX G: REVISIONS**

Page(s)	Revision	Date
Cover	Replaced logo	August 2021
1	Revised Introduction section	August 2021
2	Added to the Overall Considerations section	August 2021
3	Revised an Item Contexts (Scenarios) entry	August 2021
5	Revised Item Style and Format General Guidelines entries	August 2021
7	Revised a Context-Dependent Item Sets entry	August 2021
8	Replaced Sample CD set	August 2021
9	Revised Sample Items	August 2021
10	Revised Guidelines for Item Writers	August 2021
11	Revised Item Difficulty entries	August 2021
20	Revised a term	August 2021
30	Revised a Benchmark Clarification	August 2021
30	Added a Benchmark Clarification	August 2021
31	Added an Assessment Limit	August 2021
31	Revised an Assessment Limit	August 2021
31	Revised a Sample Item	August 2021
34	Added a Benchmark Clarification	August 2021
34	Revised a Benchmark Clarification	August 2021
35	Revised a Sample Item	August 2021
36	Revised an Assessment Limit	August 2021
37	Revised Sample Item options	August 2021
38	Revised a Benchmark Clarification	August 2021
38	Added an Assessment Limit	August 2021
38	Revised an Assessment Limit	August 2021
39	Revised a Sample Item	August 2021
40	Revised Benchmark Clarifications	August 2021
49	Revised an Assessment Limit	August 2021
49	Revised a Stimulus Attribute	August 2021
50	Revised a Sample Item	August 2021
54	Revised a Sample Item	August 2021
58	Revised an Assessment Limit	August 2021
59	Revised Assessment Limits	August 2021
60	Revised an Assessment Limit	August 2021
61	Revised an Assessment Limit	August 2021
61	Added an Assessment Limit	August 2021

<b>Page(s)</b>	<b>Revision</b>	<b>Date</b>
61	Removed an Assessment Limit	August 2021
62	Revised a Sample Item	August 2021
63	Added a Benchmark Clarification	August 2021
63	Added an Assessment Limit	August 2021
63	Revised an Assessment Limit	August 2021
65	Revised an Assessment Limit	August 2021
66	Replaced a Sample Item	August 2021
67	Revised an Assessment Limit	August 2021
68	Revised a Benchmark Clarification	August 2021
68	Revised Assessment Limits	August 2021
69	Revised a Sample Item	August 2021
70	Revised Assessment Limits	August 2021
71	Revised a Sample Item	August 2021
72	Added a Benchmark Clarification	August 2021
72	Revised Benchmark Clarifications	August 2021
75	Revised a Sample Item	August 2021
A-2	Revised column headers	August 2021
A-5	Revised column headers	August 2021
C-1	Corrected a glossary definition grammatical error	August 2021
C-2	Added a glossary term/definition	August 2021
F-1	Replaced table with link	August 2021



The Florida Department of Education and its test contractors currently employ strategies to protect the environment in the production and destruction of Statewide Science Assessment and Biology 1 EOC Assessment materials.

The Department encourages schools and districts to recycle nonsecure Statewide Science Assessment and Biology 1 EOC Assessment interpretive publications after use.