pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Science
Item and Scoring Sampler

2023–2024
Grade 4

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—August 2023

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INTRODUCTION

General Introduction

The Pennsylvania Department of Education (PDE) provides districts and schools with tools to assist in delivering focused instructional programs aligned with the Pennsylvania Academic Standards (PAS). These tools include Academic Standards, Assessment Anchors and Eligible Content (AAEC) documents, assessment handbooks, and content-based item and scoring samplers. This Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs by providing samples of test item types and scored student responses. The item sampler is not designed to be used as a pretest, a curriculum, or any other benchmark for operational testing.

This Item and Scoring Sampler is available in Braille format. For more information regarding Braille, call (717) 901-2238.

What Is Included

This sampler contains test questions, or test "items," that have been written to align to the Assessment Anchors that are based on the PAS. The sample test questions model the types of items that may appear on an operational PSSA. Each sample test question has been through a rigorous review process to ensure alignment with the Assessment Anchors prior to being piloted in an embedded field test within a PSSA assessment and then used operationally on a PSSA assessment. Answer keys, scoring guidelines, and any related stimulus material are also included. Additionally, sample student responses are provided with each open-ended (OE) item to demonstrate the range of responses that students provided in response to these items.

Purposes and Uses

The items in this sampler may be used[1] as examples for creating assessment items at the classroom level. Classroom teachers may find it beneficial to have students respond to the open-ended items in this sampler. Educators may then use the sampler as a guide to score the responses either independently or together with colleagues within a school or district. This sampler also includes the *General Description of Scoring Guidelines for Science Open-Ended Items* that students will have access to during a PSSA science administration. The general description of scoring guidelines may be distributed to students for use during local assessments and may also be used by educators when scoring local assessments.

[1] The permission to copy and/or use these materials does not extend to commercial purposes.

Item Format and Scoring Guidelines

The multiple-choice (MC) items have four answer choices. Each correct response to an MC item is worth one point.

Each open-ended (OE) item in science is scored using an item-specific scoring guideline based on a 0–2-point scale.

Testing Time and Mode of Testing Delivery for the PSSA

The PSSA is delivered in a traditional paper-and-pencil format as well as in an online format. The estimated time to respond to a test question is the same for both methods of test delivery. The following table shows the estimated response time for each item type.

Science Item Type	MC	OE
Estimated Response Time (minutes)	1	5

During an official test administration, students are given as much additional time as is necessary to complete the test questions.

Item and Scoring Sampler Format

This sampler includes the test directions and scoring guidelines that appear in the PSSA science assessments. Each MC item is followed by a table that includes the alignment, the answer key, the depth of knowledge (DOK) level, the percentage[2] of students who chose each answer option, and a brief answer-option analysis or rationale. Each OE item is followed by a table that includes the item alignment, DOK level, and mean student score. Additionally, each of the included item-specific scoring guidelines is combined with sample student responses representing each score point to form a practical item-specific scoring guide. The *General Description of Scoring Guidelines for Science Open-Ended Items* used to develop the item-specific scoring guidelines should be used if any additional item-specific scoring guidelines are created for use within local instructional programs. The student responses in this item and scoring sampler are actual student responses; however, the handwriting has been changed to protect the students' identities and to make the item and scoring sampler accessible to as many people as possible.

Example Multiple-Choice Item Information Table

Item Information	
Alignment	Assigned AAEC
Answer Key	Correct Answer
Depth of Knowledge	Assigned DOK
p-value A	Percentage of students who selected option A
p-value B	Percentage of students who selected option B
p-value C	Percentage of students who selected option C
p-value D	Percentage of students who selected option D
Option Annotations	Brief answer-option analysis or rationale

Example Open-Ended Item Information Table

Alignment	Assigned AAEC	**Depth of Knowledge**	Assigned DOK	**Mean Score**	Average Score

[2] All *p*-value percentages listed in the item information tables have been rounded.

SCIENCE TEST DIRECTIONS

Directions:

On the following pages are the Science questions. There are two types of questions.

Multiple-Choice Questions:

Some questions will ask you to select an answer from among four choices. These questions will be found in your test booklet.

For the multiple-choice questions:

- Read each question, and choose the best answer.
- Record your choice in the answer booklet.
- Only one of the answers provided is the correct response.

Open-Ended Questions:

Other questions will require you to write your response. These questions will be found in your answer booklet.

For the open-ended questions:

- Be sure to read the directions carefully.
- If the question asks you to do two tasks, be sure to complete both tasks.
- If the question asks you to compare, be sure to compare. Also, if the question asks you to explain, describe, or identify, be sure to explain, describe, or identify.

General Description of Scoring Guidelines for Science Open-Ended Items

2 Points

- The response demonstrates a *thorough* understanding of the scientific content, concepts, and procedures required by the task(s).
- The response provides a clear, complete, and correct response as required by the task(s). The response may contain a minor blemish or omission in work or explanation that does not detract from demonstrating a *thorough* understanding.

1 Point

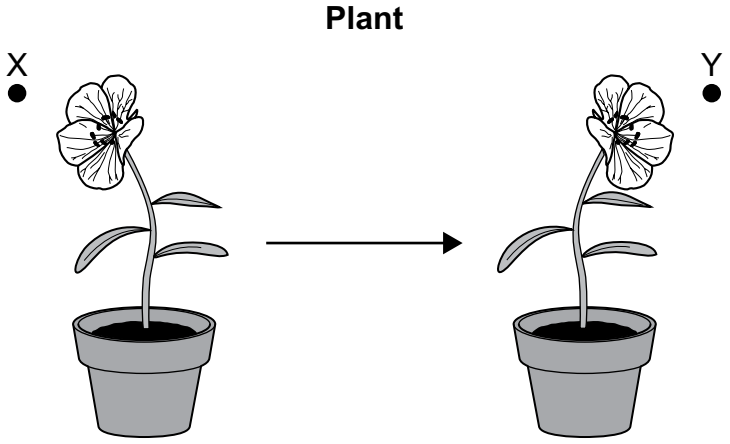
- The response demonstrates a *partial* understanding of the scientific content, concepts, and procedures required by the task(s).
- The response is somewhat correct with *partial* understanding of the required scientific content, concepts, and/or procedures demonstrated and/or explained. The response may contain some work that is incomplete or unclear.

0 Points

- The response provides *insufficient* evidence to demonstrate any understanding of the scientific content, concepts, and procedures as required by the task(s) for that grade level.
- The response may show only information copied or rephrased from the question or *insufficient* correct information to receive a score of 1.

MULTIPLE-CHOICE QUESTIONS

1. Use the diagram below to answer the question.



The diagram shows how a plant changed on its own when the position of an object was moved from point X to point Y over a period of time. What is the object that was moved from point X to point Y?

A. magnet

B. heater

C. fluorescent light

D. source of water

Item Information	
Alignment	S4.A.1.3.3
Answer Key	C
Depth of Knowledge	2
p-value A	7%
p-value B	9%
p-value C	51% (correct answer)
p-value D	33%
Option Annotations	A. Plants are not magnetic, so a magnet will not cause a plant to grow toward a different direction. B. Plants do not necessarily grow toward a heat source. C. Key: Light is essential for plants to grow, and the leaves and flowers of a plant will respond to a change in the position of a light source. D. Water is essential for plants to grow, but leaves and flowers do not respond to a change in position of their water source.

2. Use the table below to answer the question.

Time to Drive One Mile

Car	Time (seconds)
X	150
Y	300
Z	450

A student recorded the time it took three cars to travel one mile. The table shows the cars' times. Which statement **best** describes the information shown in the table?

A. Car X was the fastest car.

B. Car Z was the fastest car.

C. Car Y was slower than car Z.

D. Car X was slower than car Y.

Item Information	
Alignment	S4.A.1.3.2
Answer Key	A
Depth of Knowledge	2
p-value A	54% (correct answer)
p-value B	26%
p-value C	12%
p-value D	8%
Option Annotations	A. Key: Car X traveled the distance in the least amount of time, making it the fastest car. B. Car Z traveled the distance in the greatest amount of time, making it the slowest car. C. Car Y traveled the distance in less time compared to car Z, making car Y faster than car Z. D. Car X traveled the distance in less time compared to car Y, making car X faster than car Y.

3. Which part of the process of growing food on a farm could **most likely** cause an increase in the amount of algae that grows in nearby ponds?

A. plowing the fields in early spring

B. adding fertilizers to the ground

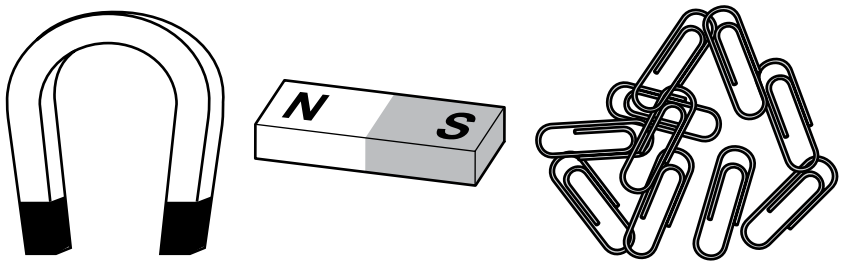
C. releasing insects that kill weeds

D. harvesting vegetables at the end of the season

Item Information	
Alignment	S4.A.1.3.5
Answer Key	B
Depth of Knowledge	2
p-value A	18%
p-value B	47% (correct answer)
p-value C	21%
p-value D	14%
Option Annotations	A. Plowing fields in early spring may affect organisms in the soil but is unlikely to cause a change in algae populations in nearby ponds. B. Key: Fertilizers commonly enter local water systems through runoff. In ponds, fertilizers are a source of nutrients for algae. C. Insects that kill weeds are unlikely to affect the nutrients available to algae in nearby ponds. D. The process of harvesting vegetables is unlikely to affect the nutrients available to algae in nearby ponds.

4. Use the drawing below to answer the question.

Objects



A student is given the objects shown. Which scientific question could be investigated using only the objects shown in the drawing?

A. How are magnets most useful to people in everyday life?

B. What types of objects can be picked up using a magnet?

C. Why is a bar magnet a different shape than a horseshoe magnet?

D. How does the strength of a bar magnet compare to the strength of a horseshoe magnet?

Item Information	
Alignment	S4.A.2.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	13%
p-value B	34%
p-value C	9%
p-value D	44% (correct answer)
Option Annotations	A. This question cannot be investigated by using only the objects shown in the drawing. B. This question can lead to a scientific investigation, but only one type of object (paper clips) is shown in addition to the magnets. C. This is not an example of a scientific question, nor can it be investigated by using the objects shown. D. Key: The number of paper clips attracted to each type of magnet can be scientifically investigated by using the objects shown.

5. Use the table below to answer the question.

Hourly Temperatures for Three Days

Time	Day 1	Day 2	Day 3
9 A.M.	59°F	58°F	65°F
3 P.M.	61°F	73°F	73°F
9 P.M.	53°F	65°F	62°F

A student checked the outdoor temperature three times a day for three days. Which prediction for Day 4 **best** matches the student's data?

A. The temperature will be below 50°F all day.

B. The temperature will be cooler at 3 P.M. than at 9 P.M.

C. The temperature will be warmer at 3 P.M. than at 9 P.M.

D. The temperature will be between 45°F and 55°F at 3 P.M.

Item Information	
Alignment	S4.A.2.1.3
Answer Key	C
Depth of Knowledge	2
p-value A	10%
p-value B	15%
p-value C	61% (correct answer)
p-value D	15%
Option Annotations	A. The daily pattern suggests that Day 4 will be warmer than 50°F all day. B. The daily pattern suggests that it will be cooler at 9 P.M. than at 3 P.M. C. Key: The daily pattern suggests that it will be warmer at 3 P.M. than at 9 P.M. D. The daily pattern suggests that a temperature range of 45°F to 55°F is too low for 3 P.M.

6. A student uses a balance to compare two rocks. What information can this tool provide?

A. the difference in mass between the rocks

B. the difference in length between the rocks

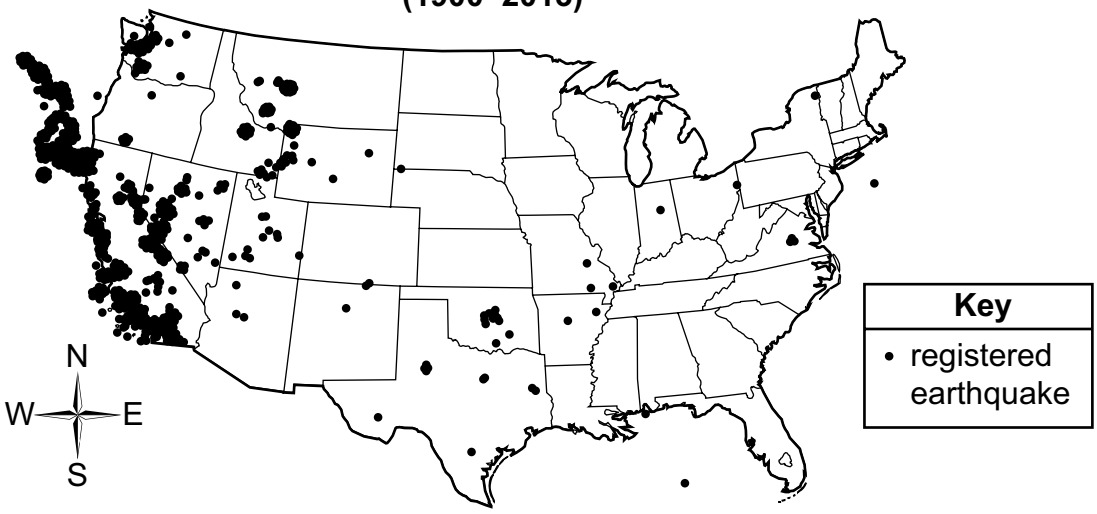
C. the difference in volume between the rocks

D. the difference in temperature between the rocks

Item Information	
Alignment	S4.A.2.2.1
Answer Key	A
Depth of Knowledge	2
p-value A	71% (correct answer)
p-value B	12%
p-value C	11%
p-value D	6%
Option Annotations	A. Key: A balance is a tool that measures the mass of an object. B. The length of the rocks would be measured with a ruler. C. The volume of each rock would be measured with a graduated cylinder. D. The temperature of each rock would be measured with a thermometer.

7. Use the map below to answer the question.

United States Earthquakes
(1900–2013)



Which conclusion is **best** supported by the map?

A. Earthquakes are caused by sudden movements in Earth's crust.

B. Northern areas have more destructive earthquakes than do southern areas.

C. The West Coast has conditions that lead to more earthquakes than other parts of the United States.

D. A greater number of earthquakes were recorded in the United States after 1960 than were recorded before 1960.

Item Information	
Alignment	S4.A.2.1.4
Answer Key	C
Depth of Knowledge	2
p-value A	21%
p-value B	10%
p-value C	59% (correct answer)
p-value D	10%
Option Annotations	A. This conclusion is not supported, because the data in the map does not explain the cause of earthquakes. B. This conclusion is not supported, because there is no data about earthquake strength in the map. C. Key: This conclusion is supported by the locations of registered earthquakes indicated by the data in the map. D. This conclusion is not supported, because there is no data about the relative dates of earthquakes occurring before or after 1960.

8. Both human-made and natural systems can move water. Which sentence **best** describes a natural system that moves water?

A. Water under the ground is refilled by melted snow.

B. Water from the kitchen faucet is poured into a cup.

C. Water from the bathroom sink goes down the drain.

D. Water from a lake is brought to a city through metal pipes.

Item Information	
Alignment	S4.A.3.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	40% (correct answer)
p-value B	8%
p-value C	15%
p-value D	37%
Option Annotations	A. Key: Groundwater and melted snow are components of the water cycle, which is a natural system. B. Kitchen faucets, pipes, and cups are components of a human-made system, not a natural system. C. Bathroom sinks, drains, and sewer systems are components of a human-made system, not a natural system. D. Lakes are part of a natural system, but pipes are made by humans.

9. A student claims that all animals need to eat. What evidence would **best** support the student's claim?

A. Animals need air to breathe.

B. Animals need energy to live.

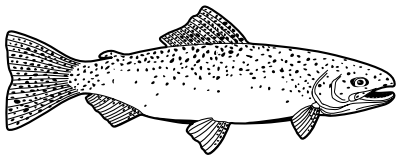
C. The length of an animal increases over time.

D. The weight of an animal increases over time.

Item Information	
Alignment	S4.B.1.1.3
Answer Key	B
Depth of Knowledge	2
p-value A	16%
p-value B	64% (correct answer)
p-value C	7%
p-value D	13%
Option Annotations	A. Animals do need air to breathe, but this does not explain why all animals need to eat. B. Key: Animals need energy to live, and energy comes from food, so all animals need to eat. C. The length of an animal may change over time, but this does not explain why all animals need to eat. D. The weight of an animal may change over time, but this does not explain why all animals need to eat.

10. Use the drawing below to answer the question.

Brook Trout



Brook trout are fish that live and reproduce in cold streams and lakes in the United States. Deforestation removes trees that provide shade over the areas where the brook trout live. This can cause the water temperature to increase. How would this change in water temperature **most likely** affect the brook trout?

A. Brook trout numbers would stay the same because the fish change their genes to stay cool in the warmer water.

B. Brook trout numbers would stay the same because the fish change their behavior to stay cool in the warmer water.

C. Brook trout would increase in number because the temperature would become more comfortable for the fish.

D. Brook trout would decrease in number because the temperature would become more uncomfortable for the fish.

Item Information	
Alignment	S4.B.3.2.1
Answer Key	D
Depth of Knowledge	3
p-value A	14%
p-value B	13%
p-value C	16%
p-value D	57% (correct answer)
Option Annotations	A. The trout numbers would not likely stay the same. Organisms cannot change their genetic material to accommodate their environment. B. The trout numbers would not likely stay the same, even if some fish did change their behavior to stay cool in warmer water. C. The trout numbers would not likely increase, because the water temperature would be less comfortable for the fish, not more comfortable. D. Key: Brook trout require cold-water habitats, so an increase in water temperature would be uncomfortable for the fish. It is likely that some or many of the fish would be unable to survive and reproduce in warm water.

11. In winter, a person living in Pittsburgh, Pennsylvania, buys fresh tomatoes from a grocery store. However, tomatoes do not grow in Pennsylvania during the winter. Which statement **best** explains how fresh tomatoes can be available at a grocery store in Pittsburgh during the winter?

A. The tomatoes are canned at the store and then opened and moved to store shelves when needed.

B. A farmer grew the tomatoes in the summer, but they took a few months to arrive at the store to be sold.

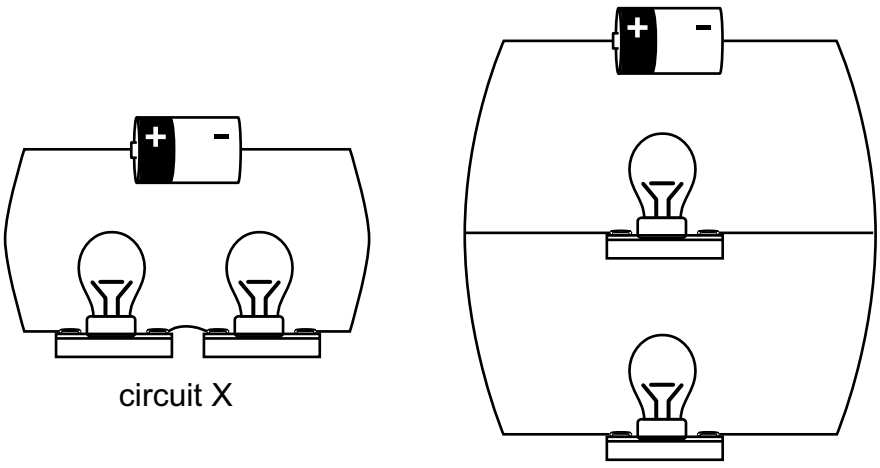
C. The tomatoes are frozen during the summer and then thawed at the store and sold as fresh during the winter.

D. A farmer grew the tomatoes in a warm part of the country and had them shipped to arrive at the store within a few days.

Item Information	
Alignment	S4.B.3.3.2
Answer Key	D
Depth of Knowledge	2
p-value A	14%
p-value B	22%
p-value C	16%
p-value D	48% (correct answer)
Option Annotations	A. The canning process occurs in a canning factory, not in a grocery store, and canned tomatoes do not become “fresh tomatoes” when they are taken out of the can. B. Fresh produce, such as tomatoes, is perishable and does not last a few months before being sold in stores. C. Frozen and thawed tomatoes cannot be made “fresh” again. D. Key: Fresh produce, such as tomatoes, can be grown in warm climates. Modern shipping and transportation allow fresh produce to arrive at grocery stores within days.

12. Use the drawing below to answer the question.

Two Circuits



circuit X

circuit Y

Which statement **best** describes the circuits shown in the drawing?

A. Both circuits are parallel because there are light bulbs in each circuit.

B. Neither circuit is parallel because the light bulbs are not connected to a switch.

C. Circuit X is parallel because both light bulbs are directly connected to each other.

D. Circuit Y is parallel because both light bulbs are connected to the battery differently.

Item Information	
Alignment	S4.C.2.1.3
Answer Key	D
Depth of Knowledge	2
p-value A	16%
p-value B	16%
p-value C	31%
p-value D	37% (correct answer)
Option Annotations	A. The presence or absence of light bulbs does not determine whether a circuit is parallel. B. The presence or absence of a switch does not determine whether a circuit is parallel. C. Both light bulbs are directly connected to each other in circuit X, which makes circuit X a series circuit, not a parallel circuit. D. Key: There are two different paths for electricity to travel in circuit Y, which makes circuit Y a parallel circuit.

13. When guitar strings are shortened, they will play a higher note. When lengthened, they will play a lower note. Which characteristic of sound does this represent?

A. echo

B. pitch

C. volume

D. loudness

Item Information	
Alignment	S4.C.2.1.4
Answer Key	B
Depth of Knowledge	2
p-value A	10%
p-value B	55% (correct answer)
p-value C	28%
p-value D	7%
Option Annotations	A. An echo is the result of a sound wave reflecting off a surface and is not the result of changing frequency. B. Key: Adjusting the length of the string will affect the frequency of the note, which is the pitch. C. The volume of the sound is a measure of the sound's intensity, or loudness, and is not determined by the note, or pitch, that is played. D. Loudness describes the sound's intensity, or volume, and is not determined by the note, or pitch, that is played.

14. Which chart **best** identifies the sources of some products made in Pennsylvania?

A.

From Plants	From Animals
paper	butter
cotton	eggs
lumber	dairy milk

B.

From Plants	From Animals
lumber	cotton
butter	eggs
paper	dairy milk

C.

From Plants	From Animals
butter	paper
eggs	cotton
lumber	dairy milk

D.

From Plants	From Animals
butter	lumber
eggs	cotton
dairy milk	paper

Item Information	
Alignment	S4.D.1.2.1
Answer Key	A
Depth of Knowledge	2
p-value A	68% (correct answer)
p-value B	17%
p-value C	8%
p-value D	7%
Option Annotations	A. Key: Paper, cotton, and lumber are plant products. Butter, eggs, and dairy milk are animal products. B. Butter is an animal product; cotton is a plant product. C. Butter and eggs are animal products; paper and cotton are plant products. D. Butter, eggs, and dairy milk are animal products; lumber, cotton, and paper are plant products.

15. Which statement describes the Sun-Earth-Moon system?

A. It takes one day for the Sun to orbit Earth.

B. It takes one year for Earth to orbit the Sun.

C. It takes one week for the Moon to orbit Earth.

D. It takes one month for Earth to orbit the Moon.

Item Information	
Alignment	S4.D.3.1.1
Answer Key	B
Depth of Knowledge	2
p-value A	18%
p-value B	61% (correct answer)
p-value C	11%
p-value D	10%
Option Annotations	A. The Sun does not orbit Earth. Earth orbits the Sun. B. Key: Earth orbits the Sun, and this cycle takes one year. C. It takes approximately four weeks, or one month, for the Moon to orbit Earth. D. Earth does not orbit the Moon. The Moon orbits Earth.

16. How does a watershed affect the water cycle?

A. by directing where water will flow

B. by changing water from a gas to a liquid

C. by determining when clouds will produce rain

D. by providing the energy that causes water to evaporate

Item Information	
Alignment	S4.D.1.3.4
Answer Key	A
Depth of Knowledge	2
p-value A	46% (correct answer)
p-value B	16%
p-value C	16%
p-value D	22%
Option Annotations	A. Key: A watershed contains all the land and water features that direct the physical movement of water that reaches Earth's surface. B. Watersheds do not cause the temperature changes necessary for condensation or other phase changes to occur. C. Watersheds do not control when condensation occurs. D. Watersheds do not cause the temperature changes necessary for evaporation or other phase changes to occur.

OPEN-ENDED ITEM

17. A population of woodpeckers lives in a forested area. These birds live in trees in the forest and eat beetles that live in the trees. During a very dry summer, the forest area has many wildfires.

Woodpecker

Part A: Describe **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires.

_____

_____

Part B: Scientists observed that some beetles survive in the bark of trees even after a wildfire. Describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires.

_____

_____

SCORING GUIDE

#17 Item Information

Alignment	S4.A.1.3.4	**Depth of Knowledge**	2	**Mean Score**	0.96

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of how to explain what happens to a living organism when its food supply, access to water, shelter, or space is changed (e.g., it might die, migrate, change behavior, eat something else) by • describing **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires **AND** • describing how the beetles' survival might affect the number of woodpeckers in the forest after the fires. The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of how to explain what happens to a living organism when its food supply, access to water, shelter, or space is changed (e.g., it might die, migrate, change behavior, eat something else) by • describing **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires **OR** • describing how the beetles' survival might affect the number of woodpeckers in the forest after the fires. The response may contain some work that is incomplete or unclear.
0	The response provides *insufficient* evidence to demonstrate any understanding of the concept being tested.

Note: No deductions should be taken for misspelled words or grammatical errors.

Responses that will receive credit (responses are not limited to these examples):

Part A (1 point):

- Woodpeckers live in trees. If the trees were lost in a forest fire, the woodpeckers would not have shelter and the number of woodpeckers would decrease.
- Woodpeckers eat beetles that live in trees. If the trees were damaged in a forest fire, the beetles may be harmed too. Without beetles to eat, fewer woodpeckers would be able to survive in the forest.

Part B (1 point):

- If beetles survive the forest fires, the number of woodpeckers may not decrease as much as expected since they have food to eat.

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STUDENT RESPONSE

Response Score: 2 points

PART A

Question 17
Page 1 of 2

Line Guide

Item ID

A population of woodpeckers lives in a forested area. These birds live in trees in the forest and eat beetles that live in the trees. During a very dry summer, the forest area has many wildfires.

Woodpecker

Part A: Describe **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires.

EQ

A reason the number would decrease is because the trees would burn, making the beetles lose their homes or die, wich means less food for the wood pecker

152 / 1000

Review/End Test | Pause | Flag | Options | Next

PART B

Question 17
Page 2 of 2

Line Guide

Item ID

A population of woodpeckers lives in a forested area. These birds live in trees in the forest and eat beetles that live in the trees. During a very dry summer, the forest area has many wildfires.

Woodpecker

Part B: Scientists observed that some beetles survive in the bark of trees even after a wildfire. Describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires.

EQ

Because only some beetles survive the wood-peckers would only decrease by a little

82 / 1000

Review/End Test | Pause | Flag | Options | Back | Next

This response demonstrates a thorough understanding of how to explain what happens to a living organism when its food supply, access to water, shelter, or space is changed. In Part A, the response correctly describes one reason that the number of woodpeckers would decrease if the forest were damaged by wildfires (*the trees would burn, making the beetles lose their homes or die, wich means less food for the wood pecker*). In Part B, the response correctly describes how the beetles' survival might affect the number of woodpeckers in the forest after the fires (*Because only some beetles survive the wood-peckers would only decrease by a little*). The response is clear, complete, and correct.

STUDENT RESPONSE

Response Score: 1 point

17. A population of woodpeckers lives in a forested area. These birds live in trees in the forest and eat beetles that live in the trees. During a very dry summer, the forest area has many wildfires.

Woodpecker

Part A: Describe **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires.

It can burn down trees and they would not have a home

Part B: Scientists observed that some beetles survive in the bark of trees even after a wildfire. Describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires.

It would effect them by taking there home.

This response demonstrates a partial understanding of how to explain what happens to a living organism when its food supply, access to water, shelter, or space is changed. In Part A, the response correctly describes one reason that the number of woodpeckers would decrease if the forest were damaged by wildfires (*It can burn down trees and they would not have a home*). In Part B, the response (*It would effect them by taking there home*) does not describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires and receives no credit.

STUDENT RESPONSE

Response Score: 0 points

17. A population of woodpeckers lives in a forested area. These birds live in trees in the forest and eat beetles that live in the trees. During a very dry summer, the forest area has many wildfires.

Woodpecker

Part A: Describe **one** reason that the number of woodpeckers would decrease if the forest is damaged by wildfires.

The widfires help the trees so they can grow move better.

Part B: Scientists observed that some beetles survive in the bark of trees even after a wildfire. Describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires.

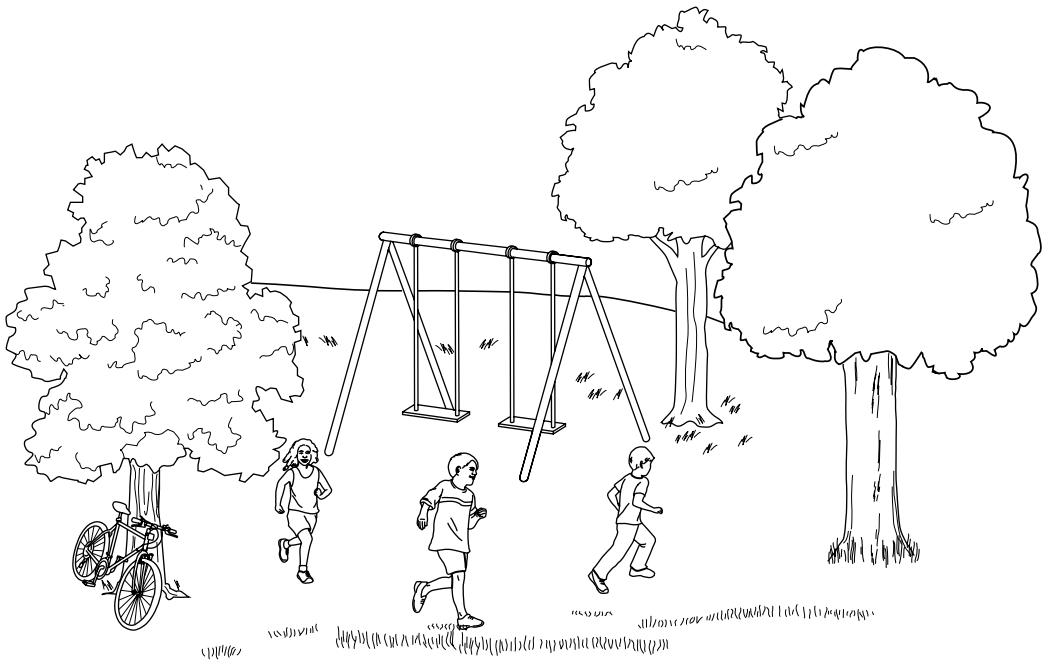
I think they hide inside the tree to stay safe.

This response demonstrates insufficient evidence to demonstrate any understanding of how to explain what happens to a living organism when its food supply, access to water, shelter, or space is changed. In Part A, the response (*widfires help the trees*) does not describe one reason that the number of woodpeckers would decrease if the forest were damaged by wildfires and receives no credit. In Part B, the response (*I think they hide inside the tree to stay safe*) does not describe how the beetles' survival might affect the number of woodpeckers in the forest after the fires and receives no credit.

OPEN-ENDED ITEM

18. Use the drawing below to answer the question.

Playground System



Part A: Give **one** example of a nonliving part of this system.

_____

Part B: Identify a feature that determines whether something is living.

_____

_____

_____

AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

SCORING GUIDE

#18 Item Information

Alignment	S4.B.3.1.1	**Depth of Knowledge**	2	**Mean Score**	1.43

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of how to describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park, playground) by • giving **one** example of a nonliving part of this system **AND** • identifying a feature that determines whether something is living. The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of how to describe the living and nonliving components of a local ecosystem (e.g., lentic and lotic systems, forest, cornfield, grasslands, city park, playground) by • giving **one** example of a nonliving part of this system **OR** • identifying a feature that determines whether something is living. The response may contain some work that is incomplete or unclear.
0	The response provides *insufficient* evidence to demonstrate any understanding of the concept being tested.

Note: No deductions should be taken for misspelled words or grammatical errors.

Responses that will receive credit (responses are not limited to these examples):

Part A (1 point):

- swing(s) or swing set
- bicycle

Part B (1 point):

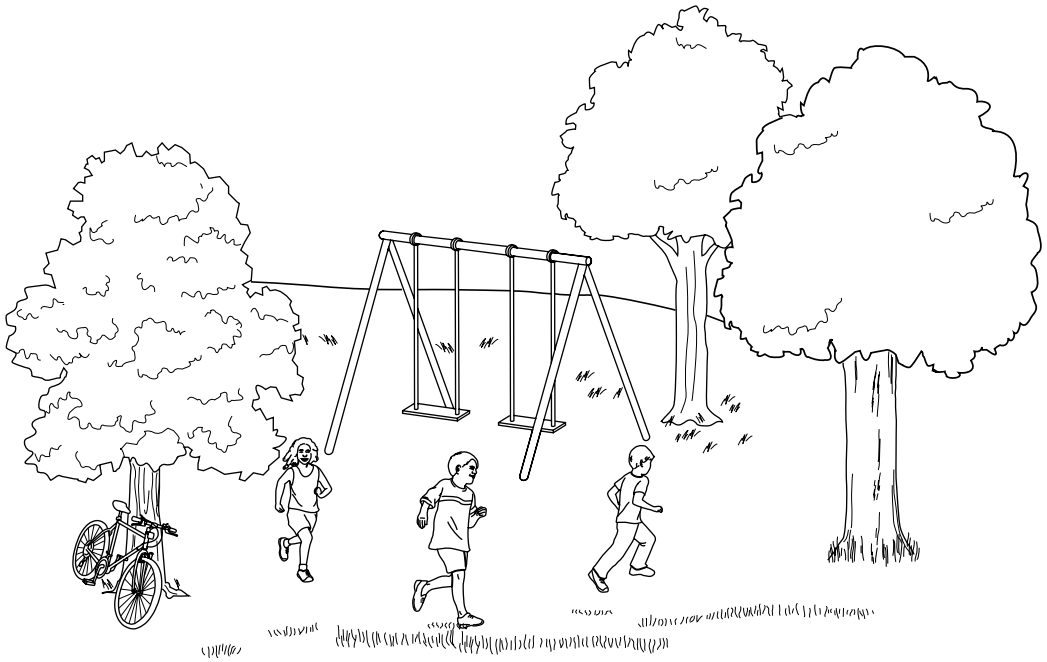
- Growth is a feature that determines whether something is living.
- Living organisms can respond to the environment.
- Any living thing is made up of one or more cells.
- Living organisms develop/change over time.
- Living organisms can reproduce.
- Living organisms can use and transform energy in their cells.
- Adapting to change is a characteristic of living organisms.
- Living organisms can perform processes to maintain balance in their bodies, like sweating or panting.

STUDENT RESPONSE

Response Score: 2 points

18. Use the drawing below to answer the question.

Playground System



Part A: Give **one** example of a nonliving part of this system.

the swingset is nonliving

Part B: Identify a feature that determines whether something is living.

one way we can deturmin something is living is by finding out if they or it is made up of cells

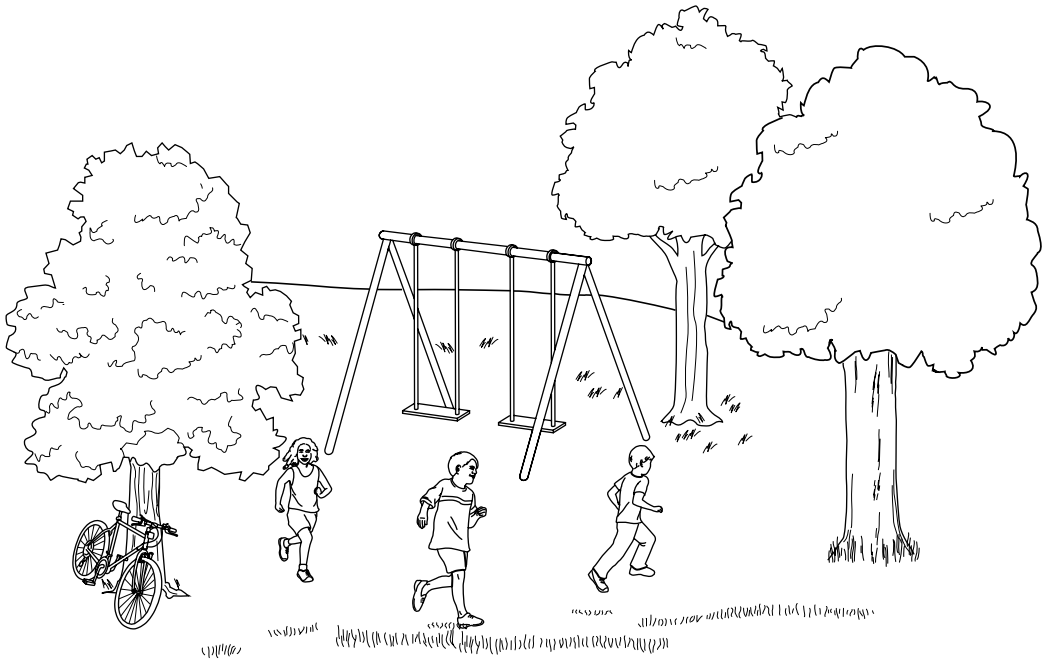
The response demonstrates a thorough understanding of how to describe the living and nonliving components of a local ecosystem. In Part A, the response correctly gives one example of a nonliving part of this system (*swingset*). In Part B, the response correctly identifies a feature that determines whether something is living (*it is made up of cells*). The response is clear, complete, and correct.

STUDENT RESPONSE

Response Score: 1 point

18. Use the drawing below to answer the question.

Playground System



Part A: Give **one** example of a nonliving part of this system.

The bike is nonliving.

Part B: Identify a feature that determines whether something is living.

The bike is nonliving because it was human made and medal is not a living thing.

The response demonstrates a partial understanding of how to describe the living and nonliving components of a local ecosystem. In Part A, the response correctly gives one example of a nonliving part of this system (*bike*). In Part B, the response (*it was human made and medal [metal] is not a living thing*) does not identify a feature that determines whether something is living and receives no credit.

STUDENT RESPONSE

Response Score: 0 points

PARTS A and B

Question 18
Page 1 of 1

Line Guide

Item ID

Use the drawing below to answer the question.

Playground System

Part A: Give **one** example of a nonliving part of this system.

There are kids in the park

26 / 100

Part B: Identify a feature that determines whether something is living.

A tree, a pereson is a living thing

35 / 1000

Review/End Test | Pause | Flag | Options | Next

The response provides insufficient evidence to demonstrate any understanding of how to describe the living and nonliving components of a local ecosystem. In Part A, the response (*There are kids in the park*) does not give an example of a nonliving part of this system and receives no credit. In Part B, the response (*A tree, a pereson is a living thing*) does not identify a feature that determines whether something is living and receives no credit.

SAMPLE ITEM SUMMARY

Multiple-Choice

Sample Number	Alignment	Answer Key	Depth of Knowledge	*p*-value A	*p*-value B	*p*-value C	*p*-value D
1	S4.A.1.3.3	C	2	7	9	51	33
2	S4.A.1.3.2	A	2	54	26	12	8
3	S4.A.1.3.5	B	2	18	47	21	14
4	S4.A.2.1.1	D	2	13	34	9	44
5	S4.A.2.1.3	C	2	10	15	61	15
6	S4.A.2.2.1	A	2	71	12	11	6
7	S4.A.2.1.4	C	2	21	10	59	10
8	S4.A.3.1.1	A	2	40	8	15	37
9	S4.B.1.1.3	B	2	16	64	7	13
10	S4.B.3.2.1	D	3	14	13	16	57
11	S4.B.3.3.2	D	2	14	22	16	48
12	S4.C.2.1.3	D	2	16	16	31	37
13	S4.C.2.1.4	B	2	10	55	28	7
14	S4.D.1.2.1	A	2	68	17	8	7
15	S4.D.3.1.1	B	2	18	61	11	10
16	S4.D.1.3.4	A	2	46	16	16	22

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	S4.A.1.3.4	2	2	0.96
18	S4.B.3.1.1	2	2	1.43

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PSSA Grade 4 Science
Item and Scoring Sampler

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