pennsylvania
DEPARTMENT OF EDUCATION

The Pennsylvania System of School Assessment

Science
Item and Scoring Sampler

2018–2019
Grade 4

Pennsylvania Department of Education Bureau of Curriculum, Assessment and Instruction—September 2018

TABLE OF CONTENTS

INFORMATION ABOUT SCIENCE

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). In addition to the PAS, these tools include Assessment Anchor documents, assessment handbooks, and content-based item and scoring samplers. Each Item and Scoring Sampler is a useful tool for Pennsylvania educators in preparing local instructional programs and can also be useful in preparing students for the statewide assessment.

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 will 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 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 as models for creating assessment items at the classroom level, and they may also be copied and used as part of a local instructional program.[1] Classroom teachers may find it beneficial to have students respond to the open-ended items in this sampler. Educators can then use the item's scoring guideline and sample responses as a basic guide to score the responses, either independently or together with colleagues within a school or district. The sampler also includes the *General Description of Scoring Guidelines for Science Open-Ended Items* used to develop the item-specific guidelines. The general description of scoring guidelines can be used if any additional item-specific scoring guidelines are created for use within local instructional programs.[1]

ITEM FORMAT AND SCORING GUIDELINES

The multiple-choice (MC) questions have four answer choices. Each correct response to an MC question 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 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. During an official testing administration, students are given additional time as necessary to complete the test questions. The following table shows the estimated response time per item for each item type.

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

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

ITEM AND SCORING SAMPLER FORMAT

This sampler includes the test directions and scoring guidelines that appear in the PSSA science assessments. Each sample multiple-choice question 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 open-ended item is followed by a table that includes the item alignment, DOK, 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.

Example Multiple-Choice Question 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**	

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

SCIENCE TEST 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.

Special Categories within zero reported separately:

Blank.....Blank, entirely erased, entirely crossed out, or consists entirely of whitespace

Refusal.....Refusal to respond to the task

Off Task.....Makes no reference to the item but is not an intentional refusal

Foreign Language.....Written entirely in a language other than English

Illegible.....Illegible or incoherent

THIS PAGE IS INTENTIONALLY BLANK.

MULTIPLE-CHOICE QUESTIONS

1. Over the past hundred years, people have built new and better roads in Pennsylvania. What is one possible **negative** effect of this technology?

A. Transportation has become less expensive.

B. Traveling greater distances is more difficult.

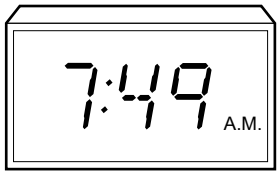
C. Wildlife habitats are separated into smaller areas.

D. Mail delivery services take longer to reach people.

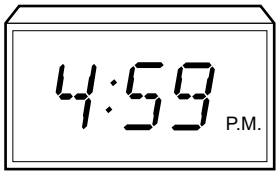
Item Information	
Alignment	S4.A.1.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	11%
p-value B	16%
p-value C	63% (correct answer)
p-value D	10%
Option Annotations	A. Decreased expense would be a positive effect, not a negative effect. B. New and better roads make traveling greater distances easier, not more difficult. C. Key: Roads can separate wildlife habitats into smaller areas and negatively impact species that live in the areas. D. New and better roads allow mail to be delivered more quickly, not more slowly.

2. Use the drawings below to answer the question.

Sunrise and Sunset Times for Erie, PA (January 1)



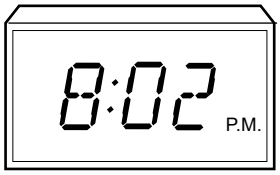
sunrise



sunset

Sunrise and Sunset Times for Erie, PA (May 1)

sunrise



sunset

Which change occurred between January 1 and May 1?

A. The amount of daylight increased.

B. The average air temperature decreased.

C. Earth rotated more quickly around its axis.

D. Earth made one revolution around the Sun.

Item Information	
Alignment	S4.A.1.3.1
Answer Key	A
Depth of Knowledge	2
p-value A	65% (correct answer)
p-value B	7%
p-value C	16%
p-value D	12%
Option Annotations	A. Key: The time between sunrise and sunset increased between January 1 and May 1. B. The drawings show times, not temperatures. C. The speed of Earth's rotation does not change during the year. D. Earth makes one revolution around the Sun in one year, not in four months.

3. A student wants to measure the depth of each snowfall in January. Which tools are **most** helpful for gathering and recording the data?

A. shovel and calculator

B. beaker and stopwatch

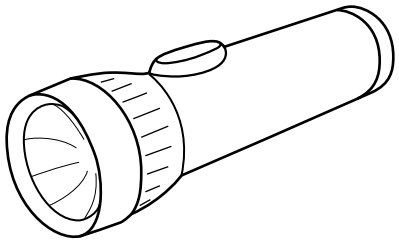
C. balance and computer

D. meterstick and calendar

Item Information	
Alignment	S4.A.1.3.1
Answer Key	D
Depth of Knowledge	2
p-value A	15%
p-value B	11%
p-value C	10%
p-value D	64% (correct answer)
Option Annotations	A. Neither a shovel nor a calculator is a tool for measuring. B. A beaker can be used to measure volume, but not length. A stopwatch can be used to measure time in seconds and minutes, but not days and months. C. A balance can be used to measure mass. A computer is not a tool for measuring. D. Key: The meterstick will allow the student to record the depth of snow in centimeters, and the calendar will allow the student to record the day of the month.

4. Use the drawing below to answer the question.

Flashlight



A student wants to compare how long a flashlight will continue to shine using different brands of batteries. How can the student make sure that the test is fair?

A. Test the same brand of batteries in two flashlights.

B. Test each brand of batteries in the same flashlight.

C. Test different sizes of batteries in the same flashlight.

D. Test whether some flashlights can work with only one battery.

Item Information	
Alignment	S4.A.2.1.2
Answer Key	B
Depth of Knowledge	3
p-value A	24%
p-value B	54% (correct answer)
p-value C	11%
p-value D	11%
Option Annotations	A. The student wants to compare different brands of batteries, not the same brand. B. Key: Using different brands of batteries in the same flashlight will limit the number of variables. C. Only one size of battery will work in the flashlight. D. The student wants to compare different brands of batteries, not different flashlights.

5. Use the table below to answer the question.

Student Observations

Year	Arrival Date of Merganser Ducks
1	February 22
2	March 3
3	March 10
4	February 28

A student observes the first day merganser ducks arrive at a lake each year during their migration. When will the merganser ducks **most likely** arrive at the lake in year 5?

A. February 15 to 22

B. around February 15

C. mid-April to late April

D. late February to mid-March

Item Information	
Alignment	S4.A.2.1.3
Answer Key	D
Depth of Knowledge	2
p-value A	14%
p-value B	11%
p-value C	21%
p-value D	54% (correct answer)
Option Annotations	A. The earliest that merganser ducks have been observed is February 22, so it is unlikely that they will arrive before this date. B. The earliest that merganser ducks have been observed is February 22, so it is unlikely that they will arrive before this date. C. The merganser ducks were observed arriving between February 22 and March 10, so it is unlikely they will arrive as late as April. D. Key: The merganser ducks have been observed arriving at the lake between February 22 and March 10 in previous years, so they will most likely continue this pattern in future years.

6. Which system is partly natural and partly human-made?

A. a pen that writes in blue ink

B. a tree that produces edible fruit

C. a mountain that erodes over time

D. a coral reef that grows on old train cars

Item Information	
Alignment	S4.A.3.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	28%
p-value B	23%
p-value C	8%
p-value D	41% (correct answer)
Option Annotations	A. Both the pen and ink are human-made. B. Both the tree and fruit are natural. C. Both the mountain and the process of erosion are natural. D. Key: The coral reef is natural and the train cars are human-made.

7. A student described human-made systems and natural systems. Which characteristic was **most likely** used to describe both systems?

A. grows larger

B. needs oxygen

C. has multiple parts

D. is powered by electricity

Item Information	
Alignment	S4.A.3.1.1
Answer Key	C
Depth of Knowledge	2
p-value A	14%
p-value B	31%
p-value C	41% (correct answer)
p-value D	14%
Option Annotations	A. Human-made systems do not grow larger. B. Human-made systems do not need oxygen. C. Key: Both human-made systems and natural systems have multiple parts. D. Natural systems are not powered by electricity.

8. Use the drawing below to answer the question.

Terrarium

How does the soil help the plants in the terrarium?

A. The soil absorbs sunlight for the plants.

B. The soil produces energy for the plants.

C. The soil provides the plants with a place to grow.

D. The soil protects the plants from other organisms.

Item Information	
Alignment	S4.A.3.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	18%
p-value B	25%
p-value C	47% (correct answer)
p-value D	10%
Option Annotations	A. Plants absorb sunlight to grow. They do not get sunlight from the soil. B. Plants make their own energy from sunlight, water, and carbon dioxide. They do not get energy from the soil. C. Key: Plants grow in soil. D. The soil does not protect the plants from other organisms.

9. How do the human nose and lungs work together?

A. The nose filters air that is processed in the lungs.

B. The nose brings in food that is digested in the lungs.

C. The nose lets out energy that is produced by the lungs.

D. The nose senses odors that are understood by the lungs.

Item Information	
Alignment	S4.B.1.1.4
Answer Key	A
Depth of Knowledge	2
p-value A	64% (correct answer)
p-value B	6%
p-value C	16%
p-value D	14%
Option Annotations	A. Key: Air is inhaled through the nose, filtered, and then processed in the lungs. B. The nose and lungs are part of the respiratory system, not the digestive system. C. The nose filters air that is processed in the lungs. The nose does not let out energy that is produced by the lungs. D. The nose has sensors that receive information about smells, but this information is processed by the brain, not the lungs.

10. Use the lists below to answer the question.

Lists of Traits

List A	List B
• brown eyes • 5 feet tall • curly hair	• scar on right knee • likes to sing • long hair

How are these lists of traits different?

A. Only the traits in List A can change.

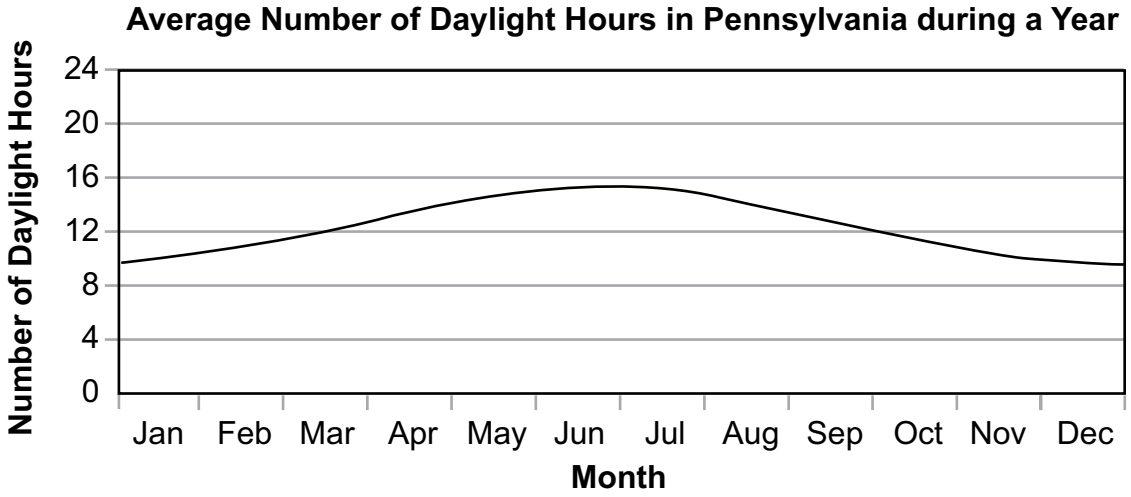
B. Only the traits in List B are formed naturally.

C. Only the traits in List A are inherited from parents.

D. Only the traits in List B can affect a person's survival.

Item Information	
Alignment	S4.B.2.2.1
Answer Key	C
Depth of Knowledge	2
p-value A	14%
p-value B	18%
p-value C	57% (correct answer)
p-value D	11%
Option Annotations	A. The traits in both lists can change over time. B. The traits in both lists can be formed naturally. C. Key: The traits in List A are controlled by genes passed on from the parents. D. The traits in List B would be unlikely to affect a person's survival.

11. Use the graph below to answer the question.



Plants and animals respond to changes in their natural environment. Which natural response can **most likely** be predicted due to the changing amounts of daylight shown in the graph?

A. Birds will migrate north between July and December.

B. Birds will migrate south between January and March.

C. Plants will absorb the most energy between May and July.

D. Plants will absorb the most energy between March and May.

Item Information	
Alignment	S4.B.3.2.3
Answer Key	C
Depth of Knowledge	3
p-value A	20%
p-value B	20%
p-value C	49% (correct answer)
p-value D	11%
Option Annotations	A. Birds migrate south, not north, between July and December. B. Birds migrate north, not south, between January and March. C. Key: The numbers of hours of daylight are greatest between May and July, allowing plants to absorb the most energy during this time. D. The numbers of hours of daylight are greatest between May and July, not between March and May.

12. A log burns in a fireplace. Nearby, a light bulb is glowing. How are the fire and the light bulb alike?

A. Both create new energy.

B. Both absorb light energy.

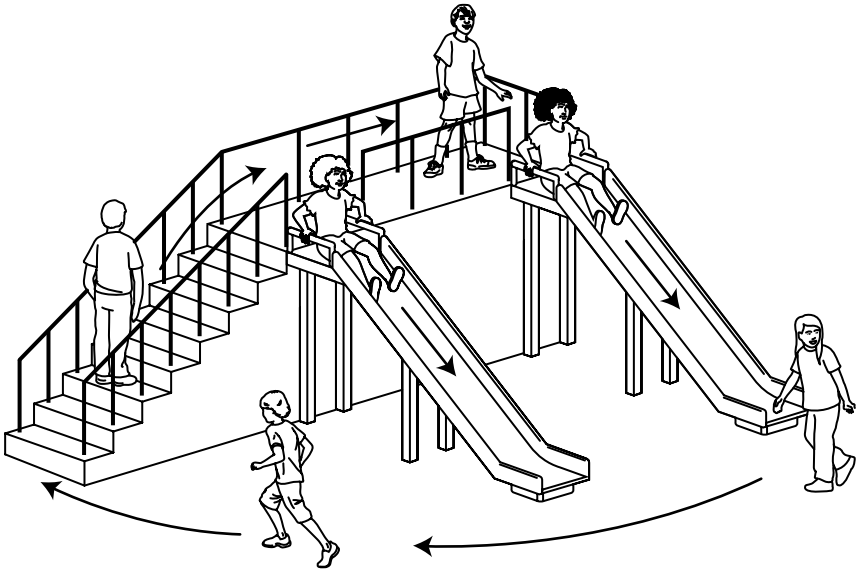
C. Both release light energy.

D. Both use electrical energy.

Item Information	
Alignment	S4.C.2.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	10%
p-value B	13%
p-value C	70% (correct answer)
p-value D	7%
Option Annotations	A. Energy is not created by either the fire or the light bulb. B. Both sources release light energy. They do not absorb it. C. Key: The fire and the light bulb both release energy in the form of light. D. The fire does not use electrical energy.

13. Use the drawing below to answer the question.

Schoolyard Playground



A schoolyard playground reminded a student of an electrical circuit. Which type of circuit would the student **most likely** describe using the playground?

A. a series circuit because there is only one way up to the top

B. a series circuit because the students can only go down the slides

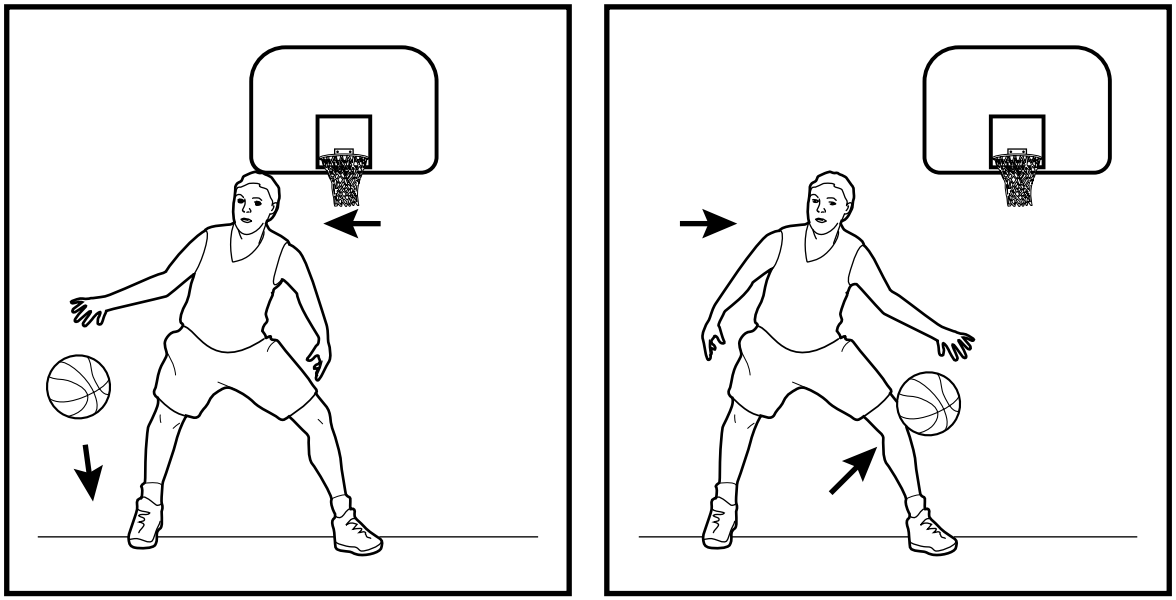
C. a parallel circuit because the students change directions as they are playing

D. a parallel circuit because students have two ways to slide down to the ground

Item Information	
Alignment	S4.C.2.1.3
Answer Key	D
Depth of Knowledge	3
p-value A	23%
p-value B	12%
p-value C	13%
p-value D	52% (correct answer)
Option Annotations	A. The circuit is parallel, not series, because there is more than one path to the ground. B. The circuit is parallel, not series, because there is more than one path to the ground. C. The arrows do not indicate that the students can change direction while playing. D. Key: Parallel circuits have more than one path for the current to flow; the two slides show this split.

14. Use the drawing below to answer the question.

Student Playing Basketball



time 1 time 2

Which statement **best** describes the movement of the student and the ball in the drawing?

A. The student is only moving from side to side, while the basketball is only moving up and down.

B. The student is mostly moving up and down, while the basketball is mostly moving from side to side.

C. The student is only moving up and down, while the basketball is moving up and down and from side to side.

D. The student is mostly moving from side to side, while the basketball is moving from side to side and up and down.

Item Information	
Alignment	S4.C.3.1.2
Answer Key	D
Depth of Knowledge	2
p-value A	22%
p-value B	10%
p-value C	11%
p-value D	57% (correct answer)
Option Annotations	A. The basketball is also moving from side to side, not just up and down. B. The student is moving from side to side, not up and down. Also, the basketball is moving up and down and from side to side. C. The student is moving from side to side, not up and down. D. Key: The student is moving from side to side, and the basketball is moving both up and down and from side to side.

15. A student lives near a lake. Which observation is the student **most likely** to make about the lake?

A. The water is fresh rather than salty.

B. The lake empties into a larger body of water.

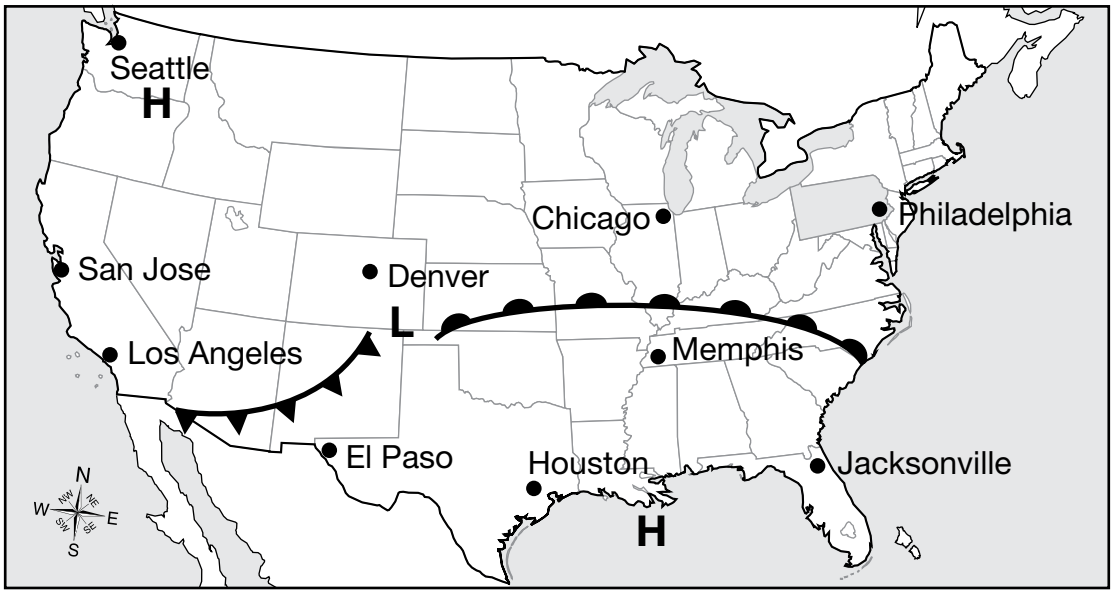
C. The water flows quickly from high to low areas.

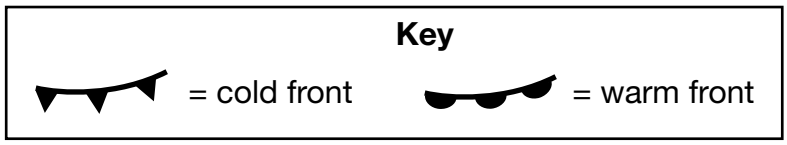
D. The lake completely dries up during some seasons.

Item Information	
Alignment	S4.D.1.3.1
Answer Key	A
Depth of Knowledge	2
p-value A	49% (correct answer)
p-value B	20%
p-value C	20%
p-value D	11%
Option Annotations	A. Key: Most lakes contain fresh water. B. Rivers, not lakes, empty into larger bodies of water. C. Lakes contain still water. They do not flow. D. Lakes are usually too large to completely dry up.

THIS PAGE IS INTENTIONALLY BLANK.

16. Use the weather map below to answer the question.





Which type of front is likely to arrive soon in Philadelphia?

A. cold front from the north

B. cold front from the south

C. warm front from the north

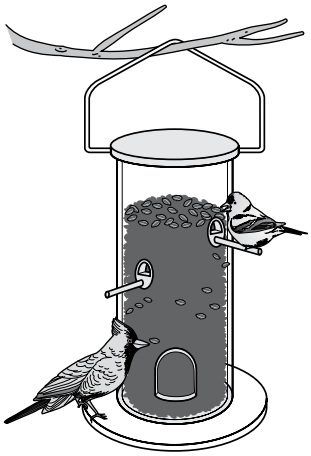
D. warm front from the south

Item Information	
Alignment	S4.D.2.1.2
Answer Key	D
Depth of Knowledge	2
p-value A	11%
p-value B	10%
p-value C	35%
p-value D	44% (correct answer)
Option Annotations	A. There is no cold front to the north of Philadelphia. B. There is no cold front to the south of Philadelphia. C. There is no warm front to the north of Philadelphia. D. Key: There is a warm front to the south of Philadelphia, and it will most likely move northeast and affect Philadelphia.

OPEN-ENDED ITEM

17. Use the drawing below to answer the question.

Birds at a Bird Feeder



A student wants to learn more about birds. The student fills and hangs a bird feeder from a tree outside a window.

Part A: Identify an appropriate tool for measuring how much bird seed is eaten from the feeder each day.

_____

Part B: Describe how using binoculars can help the student learn more about the birds that visit the feeder.

_____

_____

_____

SCORING GUIDE

#17 Item Information

Alignment	S4.A.2.2.1	**Depth of Knowledge**	2	**Mean Score**	1.50

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of how to identify appropriate tools or instruments for specific tasks and describes the information they can provide (e.g., measuring: length – ruler, mass – balance scale, volume – beaker, temperature – thermometer, making observations: hand lens, binoculars, telescope) by • identifying an appropriate tool for measuring how much bird seed is eaten from the feeder each day **and** • describing how using binoculars can help the student learn more about the birds that visit the feeder. The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of how to identify appropriate tools or instruments for specific tasks and describes the information they can provide (e.g., measuring: length – ruler, mass – balance scale, volume – beaker, temperature – thermometer, making observations: hand lens, binoculars, telescope) by • identifying an appropriate tool for measuring how much bird seed is eaten from the feeder each day **or** • describing how using binoculars can help the student learn more about the birds that visit the feeder. 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:

Part A (1 point):

- A balance scale
- A measuring cup
- A beaker
- A ruler

Part B (1 point):

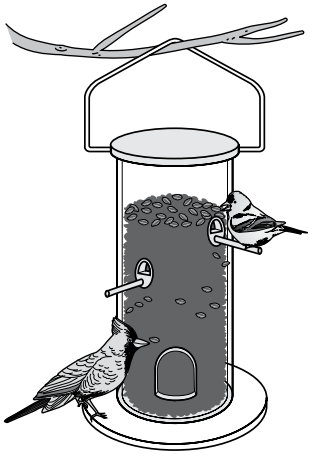
- Binoculars make objects that are far away appear closer and larger. The student will be able to see markings and colors on the birds better using the binoculars than without using them.
- Binoculars help a student see small details on the birds that may help the student identify the birds that visit the feeder.
- Using the binoculars may help the student observe locations away from the feeder, like where the birds go to build a nest after they leave the feeder.

STUDENT RESPONSE

Response Score: 2 points

17. Use the drawing below to answer the question.

Birds at a Bird Feeder



A student wants to learn more about birds. The student fills and hangs a bird feeder from a tree outside a window.

Part A: Identify an appropriate tool for measuring how much bird seed is eaten from the feeder each day.

Use a ruler and make markings.

Part B: Describe how using binoculars can help the student learn more about the birds that visit the feeder.

Binoculars help by making bird look closer. Then that student will see more detail in the feathers witch can help identify the bird.

This response demonstrates a *thorough* understanding of how to identify appropriate tools or instruments for specific tasks and describes the information they can provide. In part A, the response (*"ruler"*) identifies an appropriate tool for measuring how much bird seed is eaten from the feeder each day. In part B, the response (*". . . making bird look closer. Then that student will see more detail in the feathers witch can help identify the bird"*) accurately describes how binoculars can help the student learn more about the birds that visit the feeder. The response is clear, complete, and correct.

STUDENT RESPONSE

Response Score: 1 point

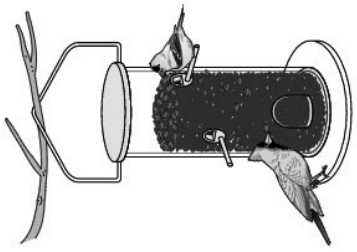
PART A

Question 17
Page 1 of 2

Item ID

Use the drawing below to answer the question.

Birds at a Bird Feeder



A student wants to learn more about birds. The student fills and hangs a bird feeder from a tree outside a window.

Part A: Identify an appropriate tool for measuring how much bird seed is eaten from the feeder each day.

EQ

you look at it.

15 / 1000

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

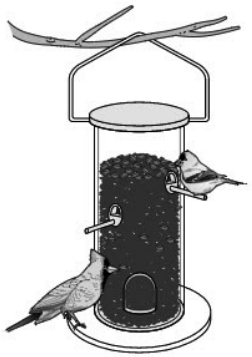
Question 17
Page 2 of 2

Line Guide

Item ID

Use the drawing below to answer the question.

Birds at a Bird Feeder



A student wants to learn more about birds. The student fills and hangs a bird feeder from a tree outside a window.

Part B: Describe how using binoculars can help the student learn more about the birds that visit the feeder.

EQ

to see feathers

15 / 1000

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

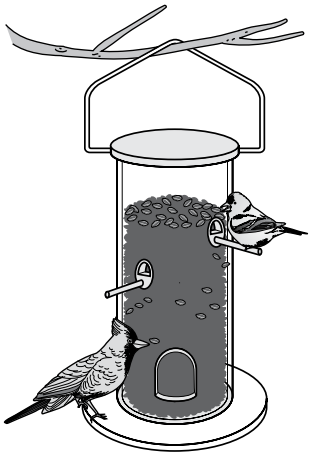
This response demonstrates a *partial* understanding of how to identify appropriate tools or instruments for specific tasks and describes the information they can provide. In part A, the response (*"you look at it"*) does not identify a tool that can be used for measuring how much bird seed is eaten from the feeder each day and does not receive any credit. In part B, the response (*"to see there feathers"*) accurately describes how binoculars can help the student learn more about the birds that visit the feeder. The response contains some work that is incomplete or unclear.

STUDENT RESPONSE

Response Score: 0 points

17. Use the drawing below to answer the question.

Birds at a Bird Feeder



A student wants to learn more about birds. The student fills and hangs a bird feeder from a tree outside a window.

Part A: Identify an appropriate tool for measuring how much bird seed is eaten from the feeder each day.

It eats about 3,000 seeds a day

Part B: Describe how using binoculars can help the student learn more about the birds that visit the feeder.

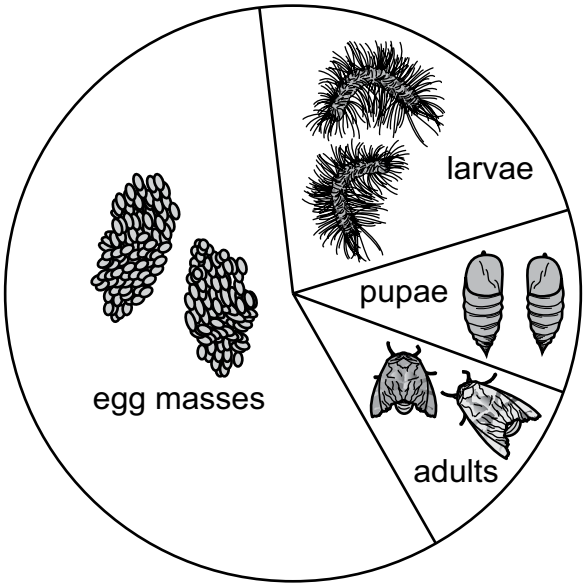
about 8 birds see it a day

This response provides *insufficient* evidence to demonstrate any understanding of how to identify appropriate tools or instruments for specific tasks or describe the information they can provide. In part A, the response (*"It eats about 3,000 seeds a day"*) does not identify a tool that can be used for measuring how much bird seed is eaten from the feeder each day and does not receive any credit. In part B, the response (*"about 8 birds see it a day"*) does not describe how the binoculars can help the student learn more about the birds that visit the feeder and does not receive any credit.

OPEN-ENDED ITEM

18. Use the diagram below to answer the question.

Life Cycle of the Gypsy Moth
(one year)



The diagram shows the life cycle of the gypsy moth.

Part A: Complete the life cycle of the gypsy moth by filling in the missing stages in the correct order below.

adults → _____ → _____ → _____

Part B: Describe one way that the larva stage is different from the egg mass stage.

_____

_____

_____

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

STOP

SCORING GUIDE

#18 Item Information

Alignment	S4.B.1.1.5	**Depth of Knowledge**	2	**Mean Score**	1.11

Item-Specific Scoring Guideline

Score	Description
2	The response demonstrates a *thorough* understanding of how to describe the life cycles of different organisms (e.g., moth, grasshopper, frog, seed-producing plant) by • filling in the missing stages of the gypsy moth life cycle in the correct order **and** • describing one way that the larva stage is different from the egg mass stage. The response is clear, complete, and correct.
1	The response demonstrates a *partial* understanding of how to describe the life cycles of different organisms (e.g., moth, grasshopper, frog, seed-producing plant) by • filling in the missing stages of the gypsy moth life cycle in the correct order **or** • describing one way that the larva stage is different from the egg mass stage. The response may contain some work that is incomplete or unclear.
0	The response provides *insufficient* evidence to demonstrate any understanding of how to describe the life cycles of different organisms.

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

Responses that will receive credit:

Part A (1 point):

- adults → egg masses → larva → pupae

Part B (1 point):

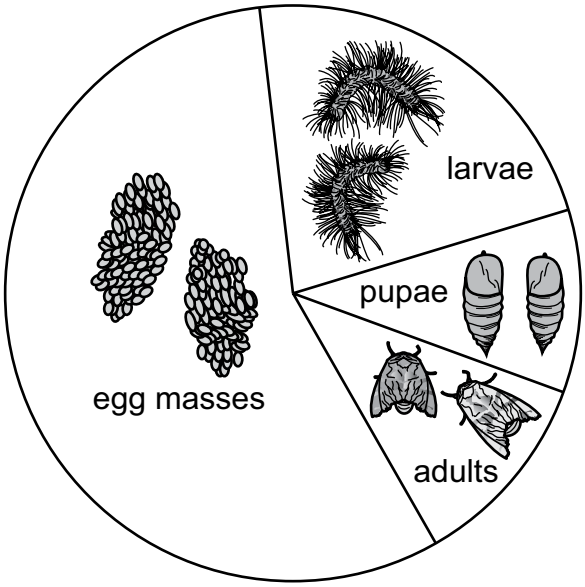
- The moth larvae can move and the egg masses are unable to move.
- The larva stage shows larva as individuals, but the eggs clump together in groups.
- The larva stage is shorter than the egg mass stage.
- The larva stage occurs at a different time of year than the egg mass stage.
- The larvae develops from the egg masses, but the eggs develop from the adults.
- Moth larvae develop from the egg masses, but the moth pupa develops from a larva.
- The egg masses look smooth, but the moth larvae look hairy.

STUDENT RESPONSE

Response Score: 2 points

18. Use the diagram below to answer the question.

Life Cycle of the Gypsy Moth
(one year)



The diagram shows the life cycle of the gypsy moth.

Part A: Complete the life cycle of the gypsy moth by filling in the missing stages in the correct order below.

adults → egg masses → larvae → pupae

Part B: Describe one way that the larva stage is different from the egg mass stage.

The gypsy moth is in the larva stage for a shorter time than the egg mass stage.

This response demonstrates a *thorough* understanding of how to describe the life cycles of different organisms. In part A, the missing stages of the gypsy moth life cycle are in the correct order (*"egg masses → larvae → pupae"*). In part B, the response (*"The gypsy moth is in the larva stage for a shorter time than the egg mass stage"*) correctly describes one way that the larva stage is different from the egg mass stage. The response is clear, complete, and correct.

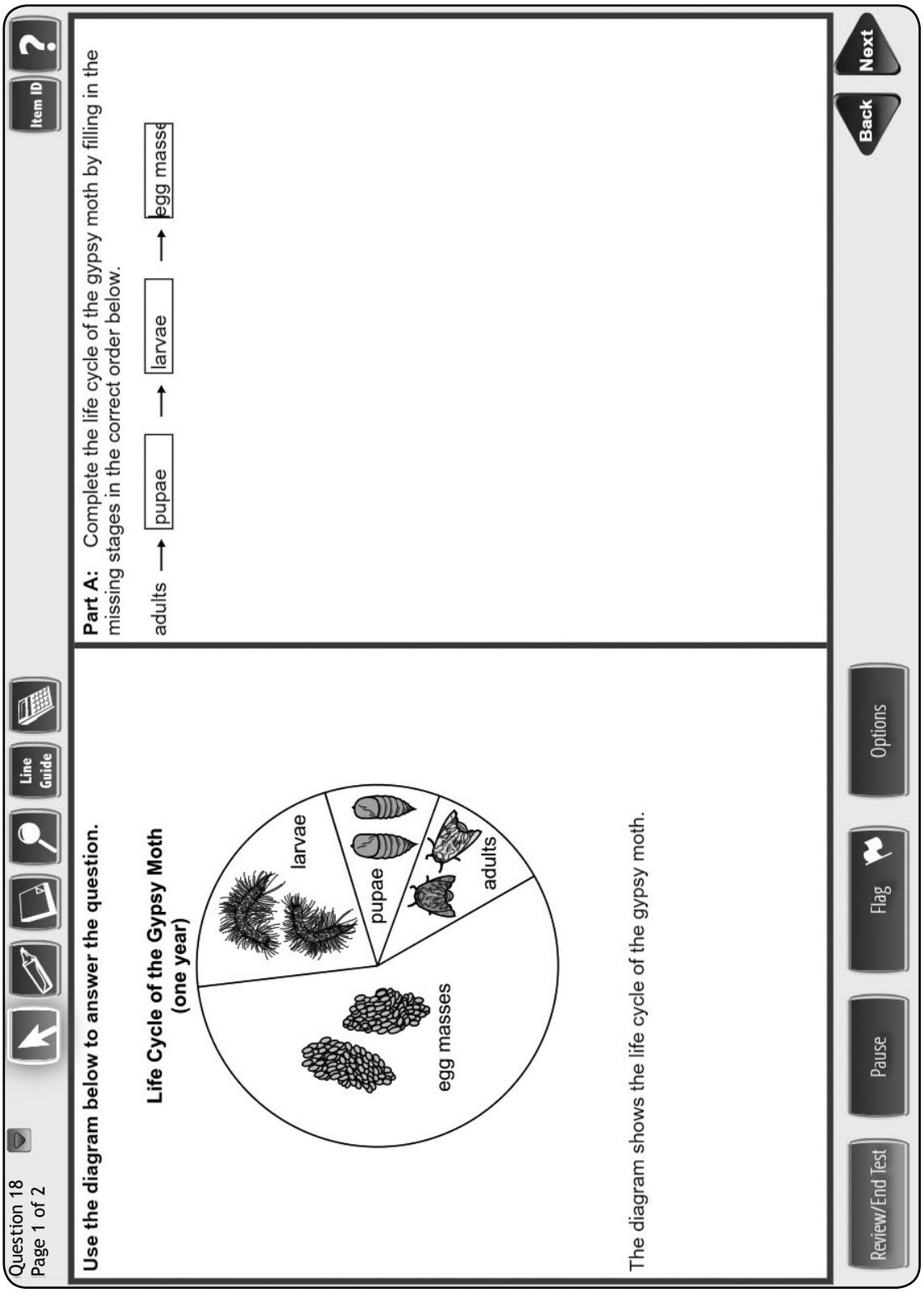
AFTER YOU HAVE CHECKED YOUR WORK, CLOSE YOUR ANSWER BOOKLET AND TEST BOOKLET SO YOUR TEACHER WILL KNOW YOU ARE FINISHED.

STOP

STUDENT RESPONSE

Response Score: 1 point

PART A

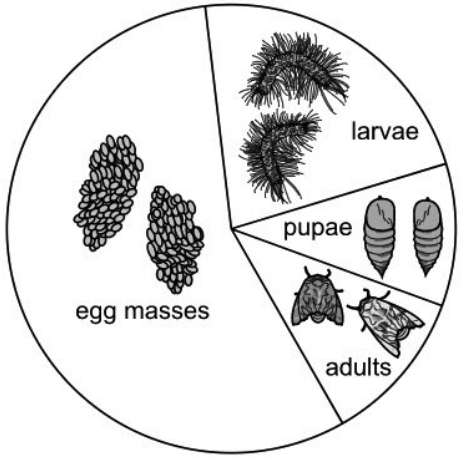


Question 18
Page 2 of 2

Line Guide | Item ID | ?

Use the diagram below to answer the question.

Life Cycle of the Gypsy Moth (one year)



The diagram shows the life cycle of the gypsy moth.

Part B: Describe one way that the larva stage is different from the egg mass stage.

EQ

A larvae can move around a little bit.

38 / 1000

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

This response demonstrates a *partial* understanding of how to describe the life cycles of different organisms. In part A, the stages of the gypsy moth life cycle are in an incorrect order (*"pupae → larvae → egg masses"*) and receive no credit. In part B, the response (*"A larvae can move around a little bit"*) correctly describes one way that the larva stage is different from the egg mass stage.

STUDENT RESPONSE

Response Score: 0 points

PART A

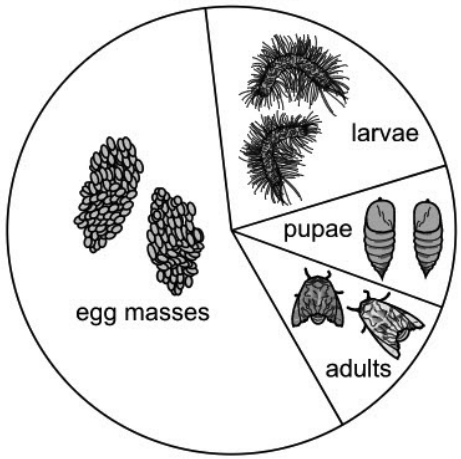
Question 18
Page 2 of 2

Line Guide

Item ID

Use the diagram below to answer the question.

Life Cycle of the Gypsy Moth (one year)



The diagram shows the life cycle of the gypsy moth.

Part B: Describe one way that the larva stage is different from the egg mass stage.

EQ

Because its just like a baby some day it will become an adult.

62 / 1000

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

This response provides *insufficient* evidence to demonstrate any understanding of how to describe the life cycles of different organisms. In part A, the stages of the gypsy moth life cycle are in an incorrect order (*"pupae → larvae → egg masses"*) and receive no credit. In part B, the response (*"Because its just like a baby some day it will become an adult"*) does not describe a way the larva stage is different from the egg mass stage and does not receive any credit.

SAMPLE ITEM SUMMARY

MULTIPLE-CHOICE

Sample Number	Alignment	Answer Key	Depth of Knowledge	*p*-values A	*p*-values B	*p*-values C	*p*-values D
1	S4.A.1.1.2	C	2	11%	16%	63%	10%
2	S4.A.1.3.1	A	2	65%	7%	16%	12%
3	S4.A.1.3.1	D	2	15%	11%	10%	64%
4	S4.A.2.1.2	B	3	24%	54%	11%	11%
5	S4.A.2.1.3	D	2	14%	11%	21%	54%
6	S4.A.3.1.1	D	2	28%	23%	8%	41%
7	S4.A.3.1.1	C	2	14%	31%	41%	14%
8	S4.A.3.1.2	C	2	18%	25%	47%	10%
9	S4.B.1.1.4	A	2	64%	6%	16%	14%
10	S4.B.2.2.1	C	2	14%	18%	57%	11%
11	S4.B.3.2.3	C	3	20%	20%	49%	11%
12	S4.C.2.1.2	C	2	10%	13%	70%	7%
13	S4.C.2.1.3	D	3	23%	12%	13%	52%
14	S4.C.3.1.2	D	2	22%	10%	11%	57%
15	S4.D.1.3.1	A	2	49%	20%	20%	11%
16	S4.D.2.1.2	D	2	11%	10%	35%	44%

OPEN-ENDED

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	S4.A.2.2.1	2	2	1.50
18	S4.B.1.1.5	2	2	1.11

THIS PAGE IS INTENTIONALLY BLANK.

PSSA Grade 4 Science
Item and Scoring Sampler