

# Pennsylvania PSSA 2022 Grade 4 Science

Exam & Answer Key Materials  
Pages 2 - 36



**pennsylvania**  
DEPARTMENT OF EDUCATION

# The Pennsylvania System of School Assessment

## Science Item and Scoring Sampler



**2022–2023**  
**Grade 4**

## 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

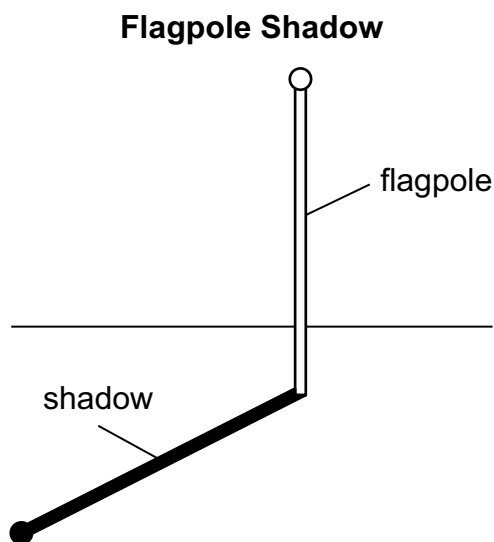
1. A student was birdwatching in a park. She wrote down statements in a notebook about the birds she saw. Some of the statements were facts, while others were opinions. Which statement is an opinion?
- A. The red bird has an orange beak.
  - B. The red bird is prettier than the blue bird.
  - C. The brown bird is smaller than the blue bird.
  - D. There are more brown birds in the tree than there are red birds.

Item Information	
Alignment	S4.A.1.1.1
Answer Key	B
Depth of Knowledge	2
p-value A	6%
p-value B	79% (correct answer)
p-value C	7%
p-value D	8%
Option Annotations	<p>A. This statement is a fact because the color of a beak can be supported with evidence.</p> <p>B. Key: This statement is an opinion because it is based on a judgement made by an individual.</p> <p>C. This statement is a fact because the size of the bird can be measured.</p> <p>D. This statement is a fact because the birds can be counted.</p>

2. In the past, typing or handwriting letters and putting them in the mail was the most popular way of delivering messages over long distances. Today, electronic tools, such as computers and phones, are used to send messages. In which way has this change in communication **most likely** had a positive impact on people?
- A. Messages can be sent faster.
  - B. The amount of waste is reduced.
  - C. Messages cannot be lost or damaged.
  - D. More energy is needed to communicate.

Item Information	
Alignment	S4.A.1.1.2
Answer Key	A
Depth of Knowledge	2
p-value A	56% (correct answer)
p-value B	12%
p-value C	21%
p-value D	11%
Option Annotations	<p>A. Key: Electronic tools have allowed messages to be sent faster than methods in the past, such as paper letters, allowed.</p> <p>B. Properly disposing of electronic waste such as old computers and cellular phones is a major challenge.</p> <p>C. Electronic messages can be accidentally lost or damaged.</p> <p>D. Additional energy requirements, such as the need to charge electronic devices, can have a negative impact on communication.</p>

3. Use the diagram below to answer the question.



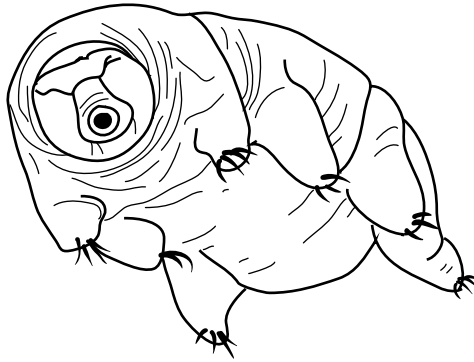
A student records the length of the shadow cast by a flagpole every hour from 7 A.M. until noon. Which statement **best** explains why the student recorded the length every hour?

- A. It allows the student to make more accurate measurements.
- B. It allows the student to recognize and correct procedure errors.
- C. It allows the student to identify how the shadow changes over time.
- D. It allows the student to measure the shadows for more than one flagpole.

Item Information	
Alignment	S4.A.1.3.1
Answer Key	C
Depth of Knowledge	2
p-value A	16%
p-value B	9%
p-value C	67% (correct answer)
p-value D	8%
Option Annotations	<p>A. The number of times the shadow was measured does not impact the accuracy of the measurements.</p> <p>B. The timing of the measurements is not likely to help the student recognize or correct errors in the procedure.</p> <p>C. Key: Taking the measurement every hour will help the student determine whether the shadow is changing over time.</p> <p>D. The student is measuring only one flagpole.</p>

## 4. Use the drawing below to answer the question.

Tardigrade



The drawing shows a tiny animal called a tardigrade. When a tardigrade cannot find water, it enters a state of no activity. It remains in this state until water is present in the environment again. How is the behavior of a tardigrade different from **most** other animals?

- A. Other animals do not require water to live.
- B. Other animals die if water is not available for a long period.
- C. Other animals become more active when water is not available for a long period.
- D. Other animals use different resources in place of water when water is not available.

Item Information	
Alignment	S4.A.1.3.4
Answer Key	B
Depth of Knowledge	2
p-value A	7%
p-value B	61% (correct answer)
p-value C	10%
p-value D	22%
Option Annotations	<p>A. All organisms require water to live.</p> <p>B. Key: Most animals will die if water is not available for a long period of time.</p> <p>C. Animals tend to become less active when water is not available for a long period of time.</p> <p>D. Water cannot be replaced with other resources as a necessary component of life.</p>



## 5. Use the list below to answer the question.

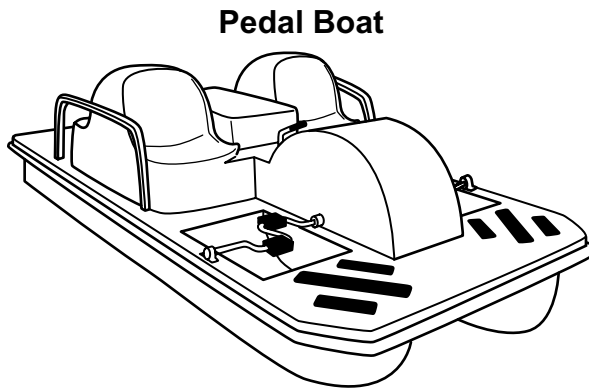
1. Pour two 1-liter samples of water into two flasks.
2. Stir 10 grams of salt into the water in one flask.
3. Place a thermometer into the water in each flask.
4. Heat the water in each flask until it boils.

A student follows the steps shown. Which question is the student **most likely** trying to answer?

- A. What is the weight of a sample of water?
- B. What is the volume of a sample of water?
- C. Does mixing salt with water change its temperature?
- D. Does mixing salt with water change its boiling point?

Item Information	
Alignment	S4.A.2.1.2
Answer Key	D
Depth of Knowledge	3
p-value A	11%
p-value B	16%
p-value C	37%
p-value D	36% (correct answer)
Option Annotations	<p>A. Since each flask is being heated, it is unlikely that the student is trying to determine the weight of the water in this experiment.</p> <p>B. It is stated in the experimental procedure that the volume of water in each flask is the same.</p> <p>C. It is stated in the experimental procedure that heat was added to both flasks until the liquid inside of each flask came to a boil.</p> <p>D. Key: The only difference between the two flasks is that salt was added to one flask but not to the other flask. The scientific question being asked is whether salt changes the boiling point of water.</p>

6. Use the information below to answer the question.



Speed of a Pedal Boat Over Time

Time (minutes)	Speed (km per hour)
0	0
5	0.5
10	1.1
15	0
20	1.6

Two people rode in a pedal boat. The boat recorded the speed at which they traveled. The table shows the speed of their boat over time. Based on the table, what **most likely** happened at the fifteen-minute mark?

- A. They stopped pedaling and took a break.
- B. They pedaled harder to see how fast they could go.
- C. One person stopped pedaling, and the other continued to pedal.
- D. One person stopped pedaling, and the other pedaled backwards.

#### Item Information

Alignment	S4.A.2.1.4
Answer Key	A
Depth of Knowledge	3
p-value A	70% (correct answer)
p-value B	10%
p-value C	13%
p-value D	7%
Option Annotations	<p>A. Key: The speed of the boat is 0 km/hr, so it is likely that the two people stopped pedaling.</p> <p>B. Since the speed of the boat is 0 km/hr, it is unlikely that the people are pedaling harder.</p> <p>C. If one of the two people were still pedaling forward, it is likely that the speed would be greater than 0 km/hr.</p> <p>D. If one of the two people were pedaling backwards, it is likely that the speed would be greater than 0 km/hr.</p>

7. Three different containers are each filled with 25 milliliters of water. They are placed in the sunlight for one week. Which tools should a student use to measure the change in volume and change in temperature in each of the containers?
- A. volume: beaker  
temperature: ruler
  - B. volume: balance scale  
temperature: hand lens
  - C. volume: beaker  
temperature: thermometer
  - D. volume: balance scale  
temperature: thermometer

Item Information	
Alignment	S4.A.2.2.1
Answer Key	C
Depth of Knowledge	2
p-value A	13%
p-value B	8%
p-value C	54% (correct answer)
p-value D	25%
Option Annotations	<p>A. A ruler is used to measure length, not temperature.</p> <p>B. A balance scale is used to measure mass, not volume; a hand lens magnifies an object but cannot measure temperature.</p> <p>C. Key: A beaker can be used to measure the volume of a liquid, and a thermometer is used to measure temperature.</p> <p>D. A balance scale is used to measure mass, not volume.</p>

8. A student places a terrarium on a window ledge in the sunlight. How does the sunlight affect the terrarium system?
- A. It is a living component that provides energy to the terrarium system.
  - B. It is a living component that provides nutrients to the terrarium system.
  - C. It is a nonliving component that provides energy to the terrarium system.
  - D. It is a nonliving component that provides nutrients to the terrarium system.

Item Information	
Alignment	S4.A.3.1.2
Answer Key	C
Depth of Knowledge	2
p-value A	24%
p-value B	24%
p-value C	32% (correct answer)
p-value D	20%
Option Annotations	<p>A. Sunlight is a nonliving component of this system.</p> <p>B. Sunlight is a nonliving component of this system, and it provides energy rather than nutrients to this system.</p> <p>C. Key: Sunlight is a nonliving component that provides light energy to this system.</p> <p>D. Sunlight provides energy rather than nutrients to this system.</p>

## 9. Use the list below to answer the question.

**Steps in a Process That Occurs in Humans**

Step 1: Air with oxygen is inhaled through the nose and mouth.  
 Step 2: Air enters the lungs.  
 Step 3: Oxygen from air is carried to body cells.  
 Step 4: Body cells return carbon dioxide to the lungs to be removed from the body.  
 Step 5: Air with carbon dioxide is exhaled into the environment.

The list shows the steps that occur in a process of the human body. How can this process **best** be identified?

- A. digestion
- B. growth
- C. reproduction
- D. respiration

Item Information	
Alignment	S4.B.1.1.1
Answer Key	D
Depth of Knowledge	2
p-value A	14%
p-value B	18%
p-value C	29%
p-value D	39% (correct answer)
Option Annotations	<p>A. Digestion involves organs such as the stomach and intestines.</p> <p>B. Growth involves an increase in the number of cells in the body through processes such as cell division.</p> <p>C. Reproduction involves sex organs and the formation of offspring.</p> <p>D. Key: Respiration involves the lungs and the exchange of oxygen and carbon dioxide from the air.</p>

10. In the past, people built dams on rivers to produce electricity. Today, many of those dams are no longer in use. A water power company wants to remove some dams that are no longer used to make electricity. Which statement explains how removing the dam would **most likely** affect the river ecosystem?
- A. The water in the river would dry up over time.
  - B. Fish would be able to travel along the river more easily.
  - C. The river water would move too fast for any organisms to survive.
  - D. New predators would move into the river habitat and eat all of the fish.

Item Information	
Alignment	S4.B.3.2.2
Answer Key	B
Depth of Knowledge	2
p-value A	15%
p-value B	31% (correct answer)
p-value C	33%
p-value D	21%
Option Annotations	<p>A. It is unlikely that the naturally occurring river would become dry if an artificial dam were removed.</p> <p>B. Key: The removal of a dam could allow some fish to reach parts of the river they may not have been able to reach when the dam was in place.</p> <p>C. There are aquatic organisms that are adapted to living in fast-moving water.</p> <p>D. It is unlikely that predators would remove all of the prey from the river.</p>

11. Which two physical properties of matter describe a wire made of iron?

- A. It is a solid and it is magnetic.
- B. It is a liquid and it conducts heat.
- C. It is magnetic and it is an insulator.
- D. It is an insulator and it has a black color.

Item Information	
Alignment	S4.C.1.1.1
Answer Key	A
Depth of Knowledge	2
p-value A	56% (correct answer)
p-value B	11%
p-value C	22%
p-value D	11%
Option Annotations	<p>A. Key: An iron wire is solid and magnetic.</p> <p>B. An iron wire can conduct heat, but it is in a solid state.</p> <p>C. Iron is magnetic, but it is a conductor of heat and electric currents.</p> <p>D. An iron wire could be black, but it is a conductor of heat and electric currents.</p>

12. Which sentence describes a parallel circuit?

- A. It must have two or more batteries for electricity to flow through.
- B. It must have two or more pathways for electricity to flow through.
- C. It must have two or more light bulbs and a single pathway for electricity to flow through.
- D. It must have the number of batteries and light bulbs equal to the number of pathways for electricity to flow through.

Item Information	
Alignment	S4.C.2.1.3
Answer Key	B
Depth of Knowledge	2
p-value A	14%
p-value B	49% (correct answer)
p-value C	13%
p-value D	24%
Option Annotations	<p>A. A parallel circuit can have one battery.</p> <p>B. Key: A parallel circuit has more than one path for electricity to return back to the battery.</p> <p>C. A parallel circuit has more than one pathway for electricity to flow.</p> <p>D. In a parallel circuit, the number of batteries and light bulbs can be different than the number of pathways electricity can flow.</p>



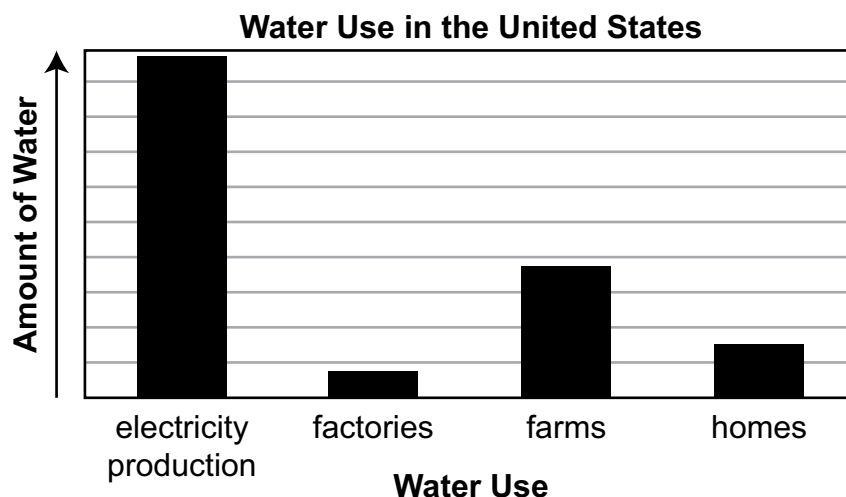
13. A person riding a bicycle down a hill does not have to keep pedaling to move. Which statement **best** explains why the person does not have to pedal when moving downhill?
- A. Magnetic force pulls the bicycle downhill.
  - B. Gravitational force pulls the bicycle downhill.
  - C. Stored energy in the bicycle's chain pushes the bicycle downhill.
  - D. Stored energy in the bicycle's wheels pushes the bicycle downhill.

Item Information	
Alignment	S4.C.3.1.1
Answer Key	B
Depth of Knowledge	2
p-value A	11%
p-value B	67% (correct answer)
p-value C	9%
p-value D	13%
Option Annotations	<p>A. Earth has a magnetic field, but the magnetic force is not strong enough to move an object down a hill.</p> <p>B. Key: The force of gravity is pulling the bicycle down the hill toward the center of Earth.</p> <p>C. As the bicycle is moving down the hill, stored energy is being converted to kinetic energy to do work.</p> <p>D. Gravitational energy is pulling the bicycle down the hill.</p>

14. Cement is made of Earth materials, including limestone and gypsum. Concrete is made by mixing cement with other materials, such as sand or gravel. Where would a person **most likely** observe cement and concrete products being used?
- A. at a farm where food is being grown
  - B. at a factory where clothing is being produced
  - C. at a site where a new building is being constructed
  - D. at a location where a natural ecosystem is being preserved

Item Information	
Alignment	S4.D.1.2.2
Answer Key	C
Depth of Knowledge	2
p-value A	5%
p-value B	5%
p-value C	76% (correct answer)
p-value D	14%
Option Annotations	<p>A. Products related to the planting, growing, and harvesting of crops are most likely to be found on a farm, and those products are not commonly made of cement or concrete.</p> <p>B. A factory where clothing is being produced would include machinery involved in the processing of fiber into yarn and fabric, such as weaving and sewing machines, and those machines are not commonly made of cement or concrete.</p> <p>C. Key: Concrete and cement products are typically used as building materials to make or repair structures such as walls, floors, roads, and curbs.</p> <p>D. Concrete and cement products are human-made and could potentially disturb an ecosystem.</p>

15. Use the graph below to answer the question.

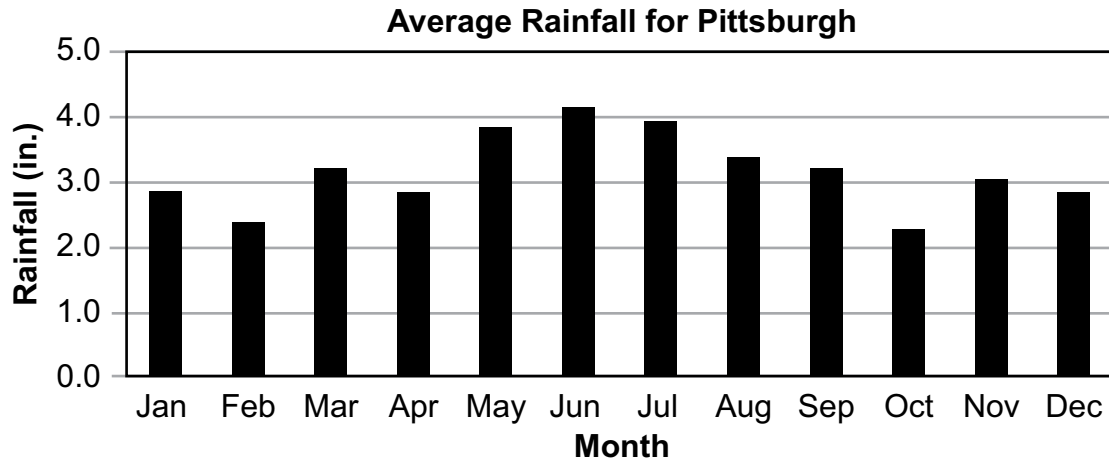


Which conclusion about how humans benefit from using water is **best** supported by the graph?

- A. Farms need water to grow food.
- B. Factories and homes use more water than farms.
- C. Electricity production uses the least amount of water.
- D. Homes save the most amount of water in the United States.

Item Information	
Alignment	S4.D.1.2.3
Answer Key	A
Depth of Knowledge	2
p-value A	67% (correct answer)
p-value B	9%
p-value C	12%
p-value D	12%
Option Annotations	<p>A. Key: The purpose of farms is to grow food. The graph indicates that farms use water, supporting the conclusion that farms need water to grow food.</p> <p>B. The graph shows that farms use more water than factories and homes.</p> <p>C. The graph shows that electricity production uses the largest amount of water.</p> <p>D. The graph does not provide information about the amount of water saved by homes in the United States.</p>

16. Use the graph below to answer the question.



The graph shows the amount of precipitation that fell each month for one year in Pittsburgh, Pennsylvania. Which conclusion about the pattern of precipitation is **best** supported by the data?

- A. Pittsburgh receives the highest levels of rain between the months of May and July.
- B. Pittsburgh receives the lowest levels of rain between the months of August and October.
- C. Pittsburgh receives more than three inches of rain each month during the fall and winter.
- D. Pittsburgh receives more than three inches of rain each month during the spring and summer.

Item Information	
Alignment	S4.D.2.1.2
Answer Key	A
Depth of Knowledge	3
p-value A	61% (correct answer)
p-value B	8%
p-value C	9%
p-value D	22%
Option Annotations	<p>A. Key: The graph shows that the greatest amount of precipitation fell from May through July.</p> <p>B. The graph shows that about 9 inches of rain fell between August and October, which is greater than other time periods on the graph.</p> <p>C. The graph shows that multiple months during the fall and winter receive less than three inches of rain.</p> <p>D. The graph shows that April receives less than 3 inches of rain.</p>

**OPEN-ENDED ITEM**

17. During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part A:** Identify **one** way that technology used for transportation has changed.

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**Part B:** Explain one **positive** impact this change has had on society or the environment.

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## SCORING GUIDE

## #17 Item Information

Alignment	S4.A.1.1.2	Depth of Knowledge	2	Mean Score	1.20
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## Item-Specific Scoring Guideline

Score	Description
2	<p>The response demonstrates a <i>thorough</i> understanding of how to identify and describe examples of common technological changes, past to present, in the community (e.g., energy production, transportation, communications, agriculture, packaging materials) that have either positive or negative impacts on society or the environment by</p> <ul style="list-style-type: none"> <li>identifying one way that technology used for transportation has changed</li> </ul> <p><b>AND</b></p> <ul style="list-style-type: none"> <li>explaining one positive impact this change has had on society or the environment.</li> </ul> <p>The response is clear, complete, and correct.</p>
1	<p>The response demonstrates a <i>partial</i> understanding of how to identify and describe examples of common technological changes, past to present, in the community (e.g., energy production, transportation, communications, agriculture, packaging materials) that have either positive or negative impacts on society or the environment by</p> <ul style="list-style-type: none"> <li>identifying one way that technology used for transportation has changed</li> </ul> <p><b>OR</b></p> <ul style="list-style-type: none"> <li>explaining one positive impact this change has had on society or the environment.</li> </ul> <p>The response may contain some work that is incomplete or unclear.</p>
0	<p>The response provides <i>insufficient</i> evidence to demonstrate any understanding of the concept being tested.</p>

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

**Responses that will receive credit:****Part A (1 point):**

- Technology for transportation has gotten faster—planes, cars, trains, and boats all move faster than modes of transportation used in the past.
- Unlike horse-drawn plows and wagons, technology for transportation depends on fuel.
- Compared to walking or riding a horse, technology for transportation today, like buses, planes, trains, and boats, can carry many people at one time.
- Manufacturing technology for transportation today requires more natural resources than modes of transportation 100 years ago.

**Part B (1 point):**

- One positive impact that today's transportation technologies have on society is that goods can get to people much more quickly than in the past. This helps goods stay fresh.
- One positive impact that today's transportation technologies have on society is that people are able to visit more places more easily than in the past.
- One positive impact that today's transportation technologies have on society is that travel to many places is now safer.
- One positive impact that today's transportation technologies have on society is that many people have jobs in the development, manufacturing, distribution, and selling of these transportation technologies.

## STUDENT RESPONSE

## Response Score: 2 points

17. During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part A:** Identify **one** way that technology used for transportation has changed.

One way that technology used for transportation has changed is people used to transport goods in a wagon, but now we use trucks which are faster to deliver goods.

**Part B:** Explain one **positive** impact this change has had on society or the environment.

One positive impact this change has had on society lets us send or receive goods from farther away places get to people faster.

This response demonstrates a thorough understanding of how to identify and describe examples of common technological changes, past to present, in the community that have either positive or negative impacts on society or the environment. In Part A, the response correctly identifies one way that technology used for transportation has changed (*used to transport goods in a wagon, but now we use trucks*). In Part B, the response correctly explains one positive impact this change has had on society (*lets us send or receive goods from farther away places get to people faster*). The response is clear, complete, and correct.



## STUDENT RESPONSE

Response Score: 1 point



## PART A

Question 17  
Page 1 of 2

Item ID

?

During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part A:** Identify **one** way that technology used for transportation has changed.

it used to be horseback now its gas-powered vehicles

52 / 1000

Next

Options

Flag

Pause

Review/End Test

## PART B

Question 17  
Page 2 of 2

Item ID ?

During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part B:** Explain one **positive** impact this change has had on society or the environment.

more pollution in the environment which causes animals to die and air bad to breath in

886 / 10000

Review/End Test Pause Flag Options

Back Next

This response demonstrates a partial understanding of how to identify and describe examples of common technological changes, past to present, in the community that have either positive or negative impacts on society or the environment. In Part A, the response correctly identifies one way that technology used for transportation has changed (*it used to be horseback now its gas-powered vehicles*). In Part B, the response (*more pollution in the environment*) does not explain a positive impact this change has had on society or the environment and receives no credit.

## STUDENT RESPONSE

Response Score: 0 points



## PART A

Question 17  
Page 1 of 2

Item ID ?

During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part A:** Identify **one** way that technology used for transportation has changed.

we can run out of power

23 / 1000

Next

Options

Flag

Pause

Review/End Test

## PART B

Question 17  
Page 2 of 2

Item ID ?

During the last 100 years, humans have developed many new technologies for moving people and goods from one place to another.

**Part B:** Explain one **positive** impact this change has had on society or the environment.

we can use to much stuff from the forest

40 / 1000

Review/End Test Pause Flag Options Back Next

This response provides insufficient evidence to demonstrate any understanding of how to identify and describe examples of common technological changes, past to present, in the community that have either positive or negative impacts on society or the environment. In Part A, the response (*we can run out of power*) does not identify one way that technology used for transportation has changed and receives no credit. In Part B, the response (*we can use to much stuff from the forest*) does not explain a positive impact this change has had on society or the environment and receives no credit.

## OPEN-ENDED ITEM

18. Use the drawing below to answer the question.

Great Blue Heron



The drawing shows a great blue heron in a wetland environment. Identify **two** adaptations that allow the great blue heron to survive in the wetland environment, and explain how each adaptation helps the great blue heron survive in the wetland environment.

**Adaptation 1:** \_\_\_\_\_

**How Adaptation 1 Helps Survival:** \_\_\_\_\_

\_\_\_\_\_

**Adaptation 2:** \_\_\_\_\_

**How Adaptation 2 Helps Survival:** \_\_\_\_\_

\_\_\_\_\_

**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.2.1.1	Depth of Knowledge	3	Mean Score	0.62
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## Item-Specific Scoring Guideline

Score	Description
2	<p>The response demonstrates a <i>thorough</i> understanding of how to identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest) by</p> <ul style="list-style-type: none"> <li>identifying <b>two</b> adaptations that allow the great blue heron to survive in the wetland environment, and explaining how each adaptation helps the great blue heron survive in the wetland environment.</li> </ul> <p>The response is clear, complete, and correct.</p>
1	<p>The response demonstrates a <i>partial</i> understanding of how to identify characteristics for plant and animal survival in different environments (e.g., wetland, tundra, desert, prairie, deep ocean, forest) by</p> <ul style="list-style-type: none"> <li>identifying <b>one</b> adaptation that allows the great blue heron to survive in the wetland environment, and explaining how this adaptation helps the great blue heron survive in the wetland environment.</li> </ul> <p>The response may contain some work that is incomplete or unclear.</p>
0	<p>The response provides <i>insufficient</i> evidence to demonstrate any understanding of the concept being tested.</p>

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

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

Adaptation and Explanation (1 point for each set of information; 2 points total):

Set 1

**Adaptation:** long legs

**How Adaptation Helps Survival:** The heron has long legs that help it wade in shallow water. Also, its long legs allow the great blue heron to stand above the water while looking for prey.

Set 2

**Adaptation:** long, pointed beak

**How Adaptation Helps Survival:** This type of beak helps the heron spear and grasp its prey, such as fish, frogs, and crustaceans.

Set 3

**Adaptation:** long, flexible neck

**How Adaptation Helps Survival:** The great blue heron's long and flexible neck helps the great blue heron move quickly to spear prey in the water.

Set 4

**Adaptation:** wide talons

**How Adaptation Helps Survival:** Wide talons help the great blue heron balance in the shallow mud.

## STUDENT RESPONSE

Response Score: 2 points

18. Use the drawing below to answer the question.

Great Blue Heron



The drawing shows a great blue heron in a wetland environment. Identify **two** adaptations that allow the great blue heron to survive in the wetland environment, and explain how each adaptation helps the great blue heron survive in the wetland environment.

**Adaptation 1:** Long, bony legs

**How Adaptation 1 Helps Survival:** It helps the heron to  
move throughout the wetland.

**Adaptation 2:** Sharp, pointy talons

**How Adaptation 2 Helps Survival:** It helps the heron to catch the  
slippery fish they eat.

This response demonstrates a thorough understanding of how to identify characteristics for plant and animal survival in different environments. This response correctly identifies two adaptations that allow the great blue heron to survive in the wetland environment (Adaptation 1: *Long, bony legs*; Adaptation 2: *Sharp, pointy talons*), and correctly explains how each adaptation helps the great blue heron survive in the wetland environment (Adaptation 1: *helps the heron to move throughout the wetland*; Adaptation 2: *helps the heron to catch the slippery fish*). The response is clear, complete, and correct.



## STUDENT RESPONSE

Response Score: 1 point

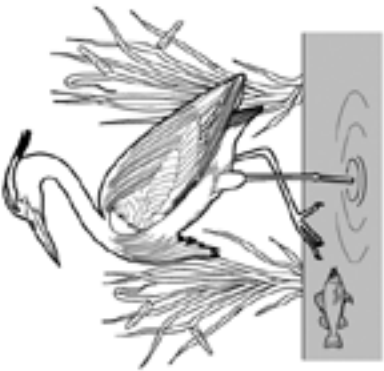


## PART A

Question 18  
Page 1 of 2

Use the drawing below to answer the question.

**Great Blue Heron**



The drawing shows a great blue heron in a wetland environment. Identify **two** adaptations that allow the great blue heron to survive in the wetland environment, and explain how each adaptation helps the great blue heron survive in the wetland environment.

**Adaptation 1:**

has long legs.

14 / 1000

**How Adaptation 1 Helps Survival:**

this helps him/her to stand without getting his/her feeters wet.

64 / 1000

Next

Options

Flag

Pause

Review/End Test


## PART B

Question 18  
Page 2 of 2

Item ID ?

Use the drawing below to answer the question.

**Great Blue Heron**



The drawing shows a great blue heron in a wetland environment. Identify **two** adaptations that allow the great blue heron to survive in the wetland environment, and explain how each adaptation helps the great blue heron survive in the wetland environment.

**Adaptation 2:**

long neck.

10 / 1000

**How Adaptation 2 Helps Survival:**

this helps him/her to catch fish easier.

40 / 1000

Review/End Test Pause Flag Options Back Next

This response demonstrates a partial understanding of how to identify characteristics for plant and animal survival in different environments. This response correctly identifies two adaptations but correctly explains how only one of those adaptations helps the great blue heron survive in the wetland environment (Adaptation 2: *long neck*; *helps him/her to catch fish easier*). There is a correct adaptation identified for Adaptation 1 (*long legs*); however, the explanation (*stand without getting his/her feathers wet*) is incorrect and receives no credit.

## STUDENT RESPONSE

Response Score: 0 points



19. Use the drawing below to answer the question.

Great Blue Heron



The drawing shows a great blue heron in a wetland environment. Identify **two** adaptations that allow the great blue heron to survive in the wetland environment, and explain how each adaptation helps the great blue heron survive in the wetland environment.

Adaptation 1: food

How Adaptation 1 Helps Survival: all animals need food  
without food they can die

Adaptation 2: water

How Adaptation 2 Helps Survival: Some animals need water  
like a Great blue Heron a Great Blue Heron is a  
animal, needs water so they can live.

The response provides insufficient evidence to demonstrate any understanding of how to identify characteristics for plant and animal survival in different environments. The responses provided for Adaptation 1 (*food; without food they can die*) and Adaptation 2 (*water; needs water so they can live*) do not identify or explain adaptations that help the great blue heron survive in the wetland environment, and receive 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.1.1.1	B	2	6%	79%	7%	8%
2	S4.A.1.1.2	A	2	56%	12%	21%	11%
3	S4.A.1.3.1	C	2	16%	9%	67%	8%
4	S4.A.1.3.4	B	2	7%	61%	10%	22%
5	S4.A.2.1.2	D	3	11%	16%	37%	36%
6	S4.A.2.1.4	A	3	70%	10%	13%	7%
7	S4.A.2.2.1	C	2	13%	8%	54%	25%
8	S4.A.3.1.2	C	2	24%	24%	32%	20%
9	S4.B.1.1.1	D	2	14%	18%	29%	39%
10	S4.B.3.2.2	B	2	15%	31%	33%	21%
11	S4.C.1.1.1	A	2	56%	11%	22%	11%
12	S4.C.2.1.3	B	2	14%	49%	13%	24%
13	S4.C.3.1.1	B	2	11%	67%	9%	13%
14	S4.D.1.2.2	C	2	5%	5%	76%	14%
15	S4.D.1.2.3	A	2	67%	9%	12%	12%
16	S4.D.2.1.2	A	3	61%	8%	9%	22%

## Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	S4.A.1.1.2	2	2	1.20
18	S4.B.2.1.1	2	3	0.62