

Multiple-Choice Questions

1. Use the information below to answer the question.

Life in a Leafcutter Ant Colony

1. Large ants find and cut leaves.
2. Large ants bring leaves to the nest.
3. Small ants cut the leaves into pieces.
4. Worker ants use leaf pieces to grow a fungus.
5. The smallest ants remove mold to keep the fungus clean.

Leafcutter ants live underground in groups. Which statement explains one way that leafcutter ants can survive?

- Ⓐ The larger ants can compete with the smaller ants for food.
- Ⓑ The worker ants have the most important job in providing food.
- Ⓒ The smallest ants use leaves for food when the fungus becomes moldy.
- Ⓓ The ants each have a different job to do to provide food for the whole colony.

Category	Item-Specific Information
Alignment	3.1.3.B
Answer Key	D
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Competition among ants in the same colony is unlikely to help the ants survive.</p> <p>B. The importance of a specific job does not explain how the ants survive.</p> <p>C. This statement is not supported by the information in the list.</p> <p>D. Key: Having different ways to contribute to the process of providing food can help the ants in the colony survive.</p>

2. A pond in a city park was polluted with litter. People noticed that there were fewer water plants, frogs, and fish in the pond. The people cleaned the pond by removing the litter. They also added a device to the pond that puts more oxygen into the water. During the next few years, the people noticed that there were more water plants, frogs, and fish in the pond.

Which claim is **best** supported by the data from the pond?

- Ⓐ Litter had both helpful and harmful effects on pond life.
- Ⓑ Removing litter from the pond helped organisms survive.
- Ⓒ Invasive species do not survive when habitats are restored.
- Ⓓ An environment can be restored to its original condition within a year.

Category	Item-Specific Information
Alignment	3.1.3.H
Answer Key	B
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. There is no evidence of the pond life benefiting from litter.</p> <p>B. Key: People noticed that there were more plants and animals in the pond after they removed litter.</p> <p>C. There is no evidence or data about invasive species in the pond.</p> <p>D. No information about the time frame in which a pond environment can be restored was provided.</p>

3. Students in Pennsylvania are learning about recycling programs in their state. About 94% of the state’s population has access to recycling programs. About 79% of those people have their recyclables collected. Some people in rural areas need to bring their recyclable trash to a drop-off area.

Which claim about recycling in Pennsylvania is **best** supported by this information?

- Ⓐ People in rural areas should not have to recycle, because their trash is not collected for them.
- Ⓑ Recycling is more important in urban areas than in rural areas because more people live there.
- Ⓒ The amount of recycling is high enough so that people do not need to bring their trash to a drop-off area.
- Ⓓ Most people in Pennsylvania have access to recycling, even if the material must be brought to a drop-off area.

Category	Item-Specific Information
Alignment	3.4.3-5.B
Answer Key	D
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. The information does not suggest that rural areas should not recycle.</p> <p>B. The importance of recycling does not depend on population density.</p> <p>C. The information does not suggest that enough trash is already being recycled so that drop-off areas are unnecessary.</p> <p>D. Key: The information shows that approximately 94% of the population has access to recycling.</p>

4. Buildings, roads, and highways often divide wildlife habitats. In 2022, people started building the world's largest wildlife crossing. The crossing will connect two protected areas that are divided by a large highway. The goal is to help animals safely cross to find food, water, and mates.

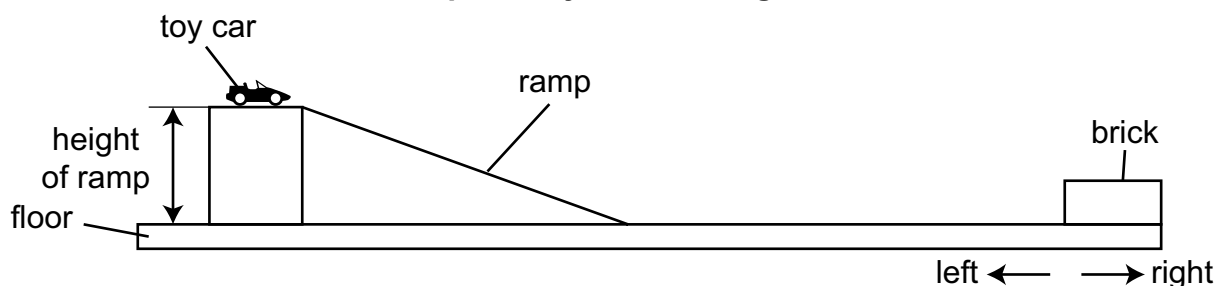
Which action would **best** help scientists decide whether the wildlife crossing meets the goal?

- Ⓐ comparing the population sizes of different animals before and after the crossing is built
- Ⓑ counting the number of different animals that live in the areas on each side of the crossing
- Ⓒ comparing the areas on each side of the crossing to learn which area the animals like best
- Ⓓ setting up cameras to count the total number of animals that use the crossing during one day

Category	Item-Specific Information
Alignment	3.4.3-5.B
Answer Key	A
Depth of Knowledge	3
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Key: A comparison of population sizes before and after the crossing was built would provide evidence of whether the crossing helps animals.</p> <p>B. Counting the number of different animals would not provide evidence of whether the crossing helps animals.</p> <p>C. Identifying the area preferred by the animals would not provide evidence of whether the crossing helps animals.</p> <p>D. A camera may not capture an accurate count of daily animal crossings.</p>

5. Use the information below to answer the question.

Setup for Toy Car Investigation



Results of Toy Car Investigation

Test Number	Ramp Height (centimeters)	Distance Toy Car Travels after Hitting Brick (centimeters)	Direction Toy Car Travels after Hitting Brick
1	2	1	left
2	4	2	left
3	6	3	left
4	8	4	left
5	10	?	?

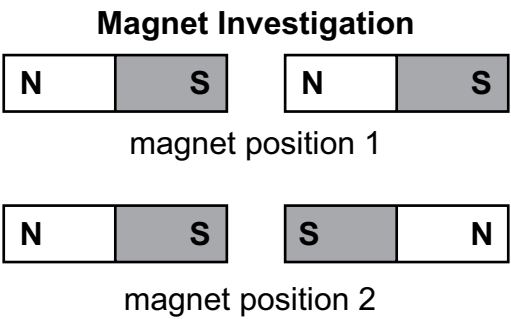
A student places a toy car on the top of a ramp and then lets it go during an investigation. The toy car moves down the ramp and along the floor. Then the toy car hits a brick. The student observes the direction and distance the toy car travels after hitting the brick. The student continues the investigation, changing the height of the ramp for each test. The table shows the investigation results.

What is the **most likely** distance and direction the toy car travels when the ramp height is 10 centimeters (cm)?

- Ⓐ 5 cm to the left
- Ⓑ 5 cm to the right
- Ⓒ 10 cm to the left
- Ⓓ 10 cm to the right

Category	Item-Specific Information
Alignment	3.2.3.A
Answer Key	A
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Key: The data for tests 1–4 suggest that the car will likely move 5 cm to the left after hitting the brick.</p> <p>B. The data for tests 1–4 suggest that the car will not likely move to the right.</p> <p>C. The data for tests 1–4 suggest that the car will not likely move 10 cm.</p> <p>D. The data for tests 1–4 suggest that the predicted distance and direction are both unlikely.</p>

6. Use the diagram below to answer the question.



A student is doing an investigation with two magnets. The student arranges the magnets in two positions. Which question about magnets could **best** be answered by this investigation?

- Ⓐ In which position are the magnets most useful?
- Ⓑ At which distances do the magnets generate electricity?
- Ⓒ How do the positions of the magnets affect the motion of the magnets?
- Ⓓ How does the distance between the magnets affect the strength of the magnetic force?

Category	Item-Specific Information
Alignment	3.2.3.C
Answer Key	C
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<div>A. The investigation does not test how magnets are used.</div> <div>B. The investigation does not test whether magnets generate electricity.</div> <div>C. Key: The positions of the magnets show the different ways magnets can move toward or away from each other.</div> <div>D. The investigation does not test different distances between magnets.</div>

7. Use the table below to answer the question.

Investigation Results

Speed of Bowling Ball	Distance Bowling Pin Traveled (centimeters)
slow	30
medium	60
fast	90

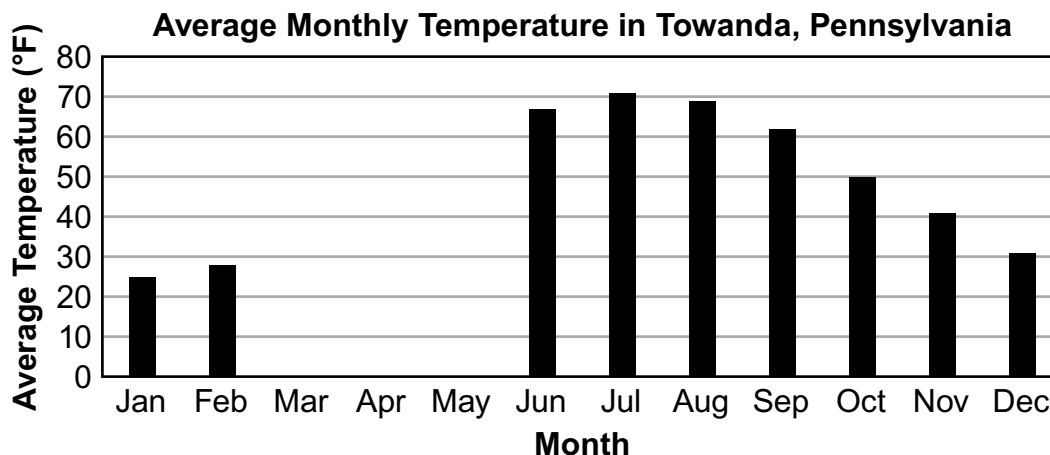
A student rolled a bowling ball toward a bowling pin at three different speeds during an investigation. The ball hit the pin each time the ball was rolled. The student measured the distance the pin traveled after being hit.

Which statement explains the relationship between the speed of the ball and the distance the pin traveled?

- Ⓐ The pin traveled farthest when the ball had the most mass.
- Ⓑ The pin traveled farthest when the ball had the most energy.
- Ⓒ The pin traveled farthest when the ball traveled the least distance.
- Ⓓ The pin traveled farthest when the ball traveled the greatest distance.

Category	Item-Specific Information
Alignment	3.2.4.A
Answer Key	B
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. The mass of the ball was not changed during the investigation.</p> <p>B. Key: The pin traveled the greatest distance when the ball had the most speed, and objects that move faster have more energy than objects that move slower.</p> <p>C. The distance between the ball and the pin was not changed during the investigation.</p> <p>D. The distance between the ball and the pin was not changed during the investigation.</p>

8. Use the information below to answer the question.



Average Monthly Temperature in Towanda, Pennsylvania

March	April	May
36°F	48°F	58°F

The graph shows the average temperature for each of nine months in Towanda, Pennsylvania. It is missing data for the spring months. The table shows the average monthly temperature for each of the missing months.

Based on the table, which statement **best** describes the bars that should be added to complete the graph?

- Ⓐ The bar for each month should be the same height as the bar for June.
- Ⓑ The bar for each month should be taller than the bar for the month before.
- Ⓒ The bar for each month should be the same height as the bar for February.
- Ⓓ The bar for each month should be shorter than the bar for the month before.

Category	Item-Specific Information
Alignment	3.3.3.A
Answer Key	B
Depth of Knowledge	3
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. The temperatures for March, April, and May are lower than the temperature for June.</p> <p>B. Key: The temperature pattern between January and July indicates that the temperatures from March to May should increase gradually.</p> <p>C. The temperatures for March, April, and May are higher than the temperature for February.</p> <p>D. The monthly temperatures increase from March through May.</p>

9. Use the table below to answer the question.

River Height on Different Dates

Date	River Height (meters)
March 1	10
March 15	13
April 1	11
April 15	11
May 1	14
May 15	13

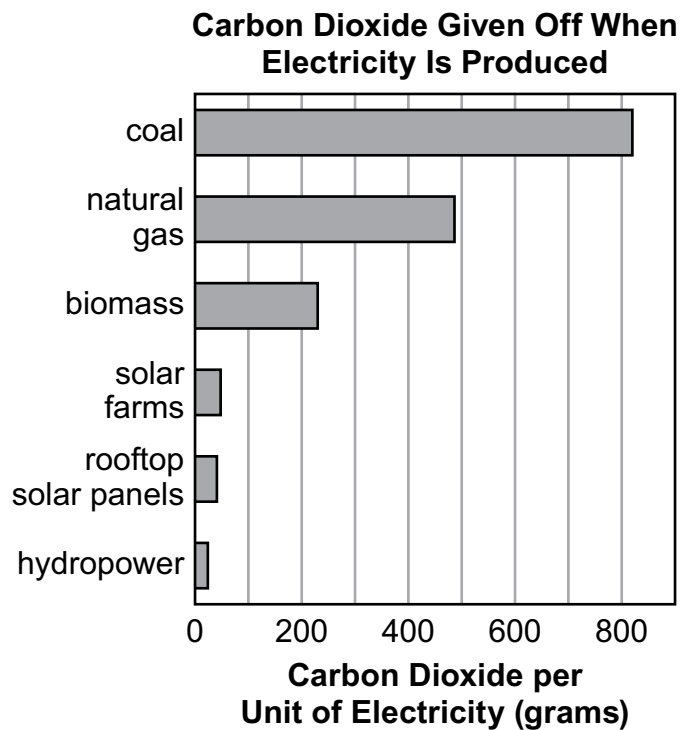
The table shows the height of a river on different dates in March, April, and May. Floods happen when the river is higher than 11 meters. People in the surrounding area want to build a wall to help prevent flood damage.

Which claim about building a wall is **best** supported by data in the table?

- Ⓐ A wall is not needed, because this river rarely floods.
- Ⓑ A wall is not needed, because a flood is a natural event.
- Ⓒ A wall that is 1 meter tall will help prevent flood damage.
- Ⓓ A wall that is 4 meters tall will help prevent flood damage.

Category	Item-Specific Information
Alignment	3.3.3.C
Answer Key	D
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. A wall is needed because the data show that the river height can rise above 11 meters.</p> <p>B. A wall is needed, and both natural and non-natural events can cause flooding.</p> <p>C. The data suggest that a 1-meter wall will not be sufficient to prevent flooding.</p> <p>D. Key: The data suggest that a 4-meter wall will be able to prevent flooding.</p>

10. Use the graph below to answer the question.



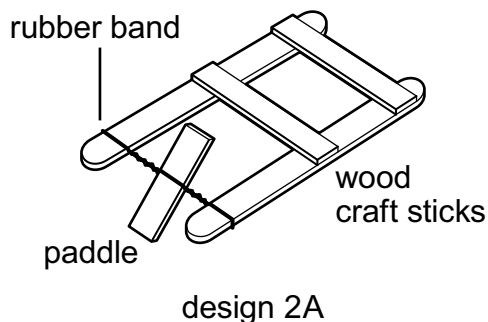
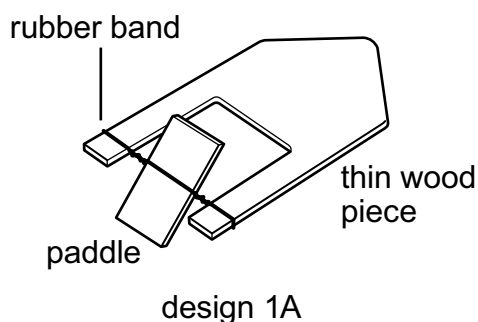
The graph shows the amount of carbon dioxide given off into the air while electricity is being produced. How could the amount of carbon dioxide released into the air be reduced?

- Ⓐ by increasing the amount of electricity produced by burning coal
- Ⓑ by decreasing the amount of electricity produced by hydropower
- Ⓒ by producing more electricity from biomass than from solar farms
- Ⓓ by producing more electricity from rooftop solar panels than from natural gas

Category	Item-Specific Information
Alignment	3.3.4.D
Answer Key	D
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. According to the data, burning coal to produce electricity releases the largest amount of carbon dioxide. Increasing the use of coal to produce electricity would add more carbon dioxide into the air.</p> <p>B. According to the data, using hydropower to produce electricity releases the least amount of carbon dioxide, so this method should not be decreased.</p> <p>C. According to the data, producing electricity from biomass releases more carbon dioxide than producing electricity from solar farms does.</p> <p>D. Key: According to the data, using rooftop solar panels to produce electricity releases less carbon dioxide than using natural gas to produce electricity does.</p>

11. Use the information below to answer the question.

Student's Original Paddleboat Designs



Paddleboat Test Results

Original Design	Observation	Changed Design	Observation
1A	moved halfway across the tub	1B: covered in duct tape	moved halfway across the tub
2A	spun around and sank	2B: added foam blocks to the bottom	moved halfway across the tub

A student wants to race toy paddleboats. The student designed two paddleboats and tested them in a tub of water. Then the student changed the designs and repeated the test. The table shows the test results.

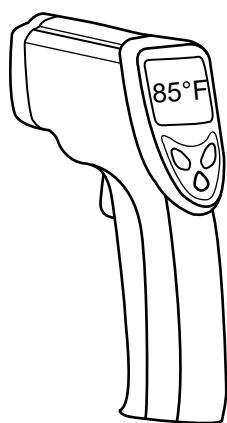
Which statement **best** evaluates the paddleboat designs?

- Ⓐ Design 1A floated in the water better than design 1B.
- Ⓑ Design 1A used stronger materials than design 2B.
- Ⓒ Design 2B was an improvement over design 2A.
- Ⓓ Design 2B was an improvement over design 1B.

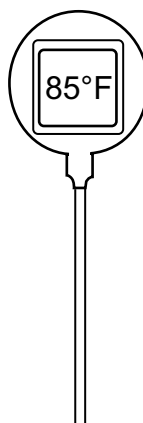
Category	Item-Specific Information
Alignment	3.5.3-5.P
Answer Key	C
Depth of Knowledge	3
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. There were no observations made of design 1A or design 1B sinking.</p> <p>B. The designs did not measure the strength of the materials.</p> <p>C. Key: Design 2B moved halfway across the tub and performed better than design 2A, which was unable to move halfway across the tub.</p> <p>D. Design 2B and design 1B resulted in the same movement.</p>

12. Use the information below to answer the question.

Digital Thermometers



infrared
thermometer



probe
thermometer

Comparing Digital Thermometers

Infrared	Probe
<ul style="list-style-type: none"> • uses a beam of light to measure temperature • works from a distance • takes measurements quickly • is less exact than a probe 	<ul style="list-style-type: none"> • measures temperature through the tip of the probe • must touch the object • takes measurements slowly • provides exact measurements

Students are comparing two different types of thermometers. Which statement describes a disadvantage of using one of the thermometers?

- Ⓐ The infrared thermometer can measure temperature at a distance.
- Ⓑ The infrared thermometer takes quick temperature measurements.
- Ⓒ The probe thermometer provides exact temperature measurements.
- Ⓓ The probe thermometer takes temperature measurements only when touching an object.

Category	Item-Specific Information
Alignment	3.5.3-5.B
Answer Key	D
Depth of Knowledge	3
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Being able to measure temperatures from a distance is considered an advantage of using an infrared thermometer.</p> <p>B. Being able to measure temperatures quickly is considered an advantage of using an infrared thermometer.</p> <p>C. Being able to provide accurate temperature measurements is considered an advantage of using a probe thermometer.</p> <p>D. Key: The probe thermometer must always be in contact with the object being measured, which is a limitation of how the probe thermometer can be used.</p>

13. Use the information below to answer the question.

Cell Phone Waste

- results in a loss of raw materials
- does not break down over time
- leaks dangerous materials that harm the environment

Four Actions a Person Can Take with Old and New Cell Phones

1	Get a new cell phone when the old cell phone no longer works.
2	Get a new cell phone each time a new model is offered.
3	Recycle the old cell phone when a new cell phone is purchased.
4	Throw the old cell phone into the trash when a new cell phone is purchased.

The list shows some information about what happens to cell phones that are not recycled and become waste. The table describes four actions a person can take with old and new cell phones.

Which actions would decrease cell phone waste the **most**?

- Ⓐ actions 1 and 4
- Ⓑ actions 1 and 3
- Ⓒ actions 2 and 3
- Ⓓ actions 2 and 4

Category	Item-Specific Information
Alignment	3.5.3-5.E
Answer Key	B
Depth of Knowledge	3
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Throwing the old phone in the trash produces more waste.</p> <p>B. Key: Replacing a phone only when the phone no longer works helps reduce waste, and recycling the old phone helps reduce waste.</p> <p>C. Getting a new phone each time a new model is offered increases the amount of raw materials used, which does not reduce the amount of waste produced.</p> <p>D. Getting a new phone each time a new model is offered and throwing the old phone in the trash produces the most waste.</p>

14. Use the table below to answer the question.

Comparing Materials		
	Natural Rubber	Silicone Rubber
How the Rubber Is Made	Sap is harvested from a rubber tree.	Quartz sand is heated to very high temperatures.
Properties of the Rubber	<ul style="list-style-type: none"> • is flexible • has low strength • breaks down at high temperatures and in sunlight 	<ul style="list-style-type: none"> • is flexible • has low strength • is not affected by sunlight or most chemicals

A student compares information about natural rubber and a human-made material called silicone rubber. When would silicone rubber **most likely** be used instead of natural rubber to make a product?

- Ⓐ when the product needs to be used outside
- Ⓑ when the product needs to hold a heavy load
- Ⓒ when the product needs to break down outside
- Ⓓ when the product needs to be soft and bend easily

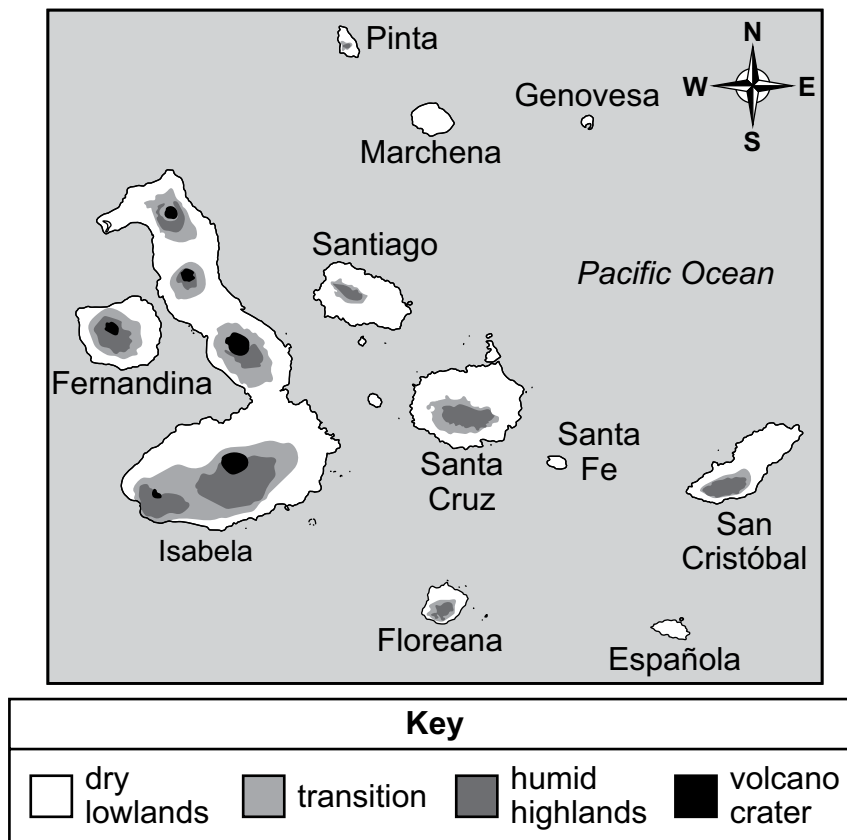
Category	Item-Specific Information
Alignment	3.5.3-5.FF
Answer Key	A
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. Key: Silicone rubber is not affected by sunlight.</p> <p>B. Neither type of rubber has high strength.</p> <p>C. Silicone rubber does not break down easily outside.</p> <p>D. Both types of rubber are soft and flexible.</p>

Directions: Use the information presented on page 29 to answer questions 15 and 16.

The Galápagos Islands

The Galápagos Islands are famous for unusual animals found nowhere else on Earth. Spanish explorers named the islands Galápagos, which means “tortoise,” because of the giant tortoises they found there. The volcanic islands have many mountains, craters, and cliffs. Most islands are warm and get very little rainfall. The islands have cactus forests growing in dry lowlands and thick plants covering the humid highlands. The plant life affects the types of animals that can live on each island. The map shows the climate zones of the islands.

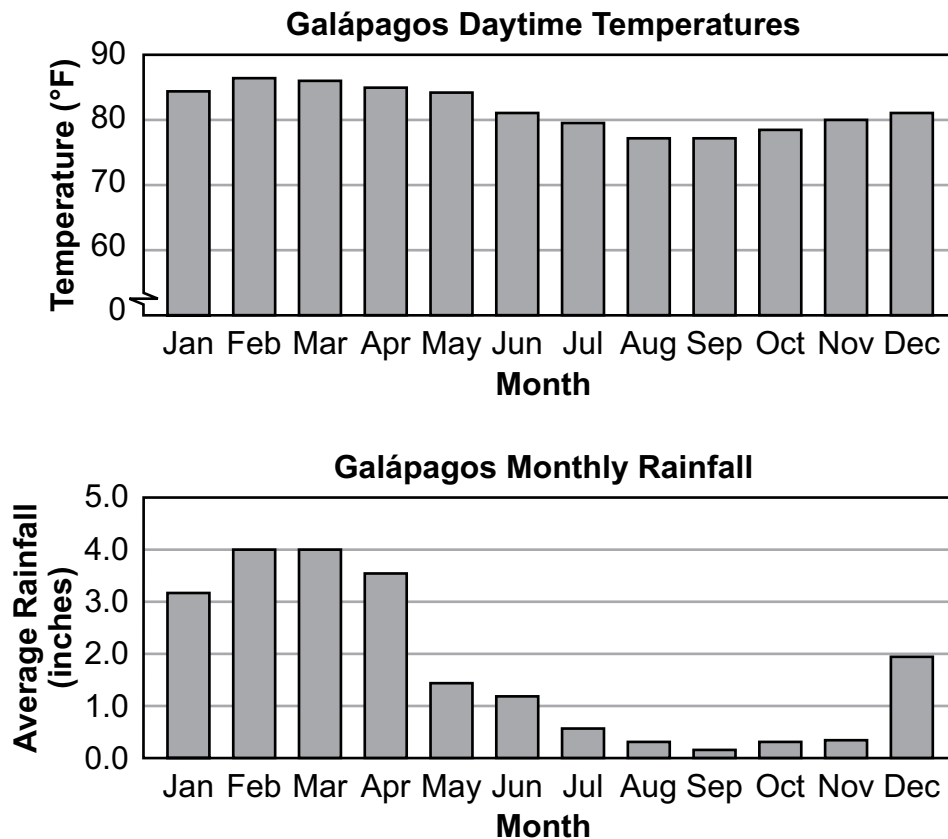
Climate Zones of the Galápagos Islands



In the nineteenth century, Charles Darwin studied differences in plants and animals on the islands to explain how living things change over time. Today, most of the islands are national parks. Many people and scientists come from all over the world to visit and study the animals found on the islands.

15. Use the graphs below to answer the question.

Climate Data



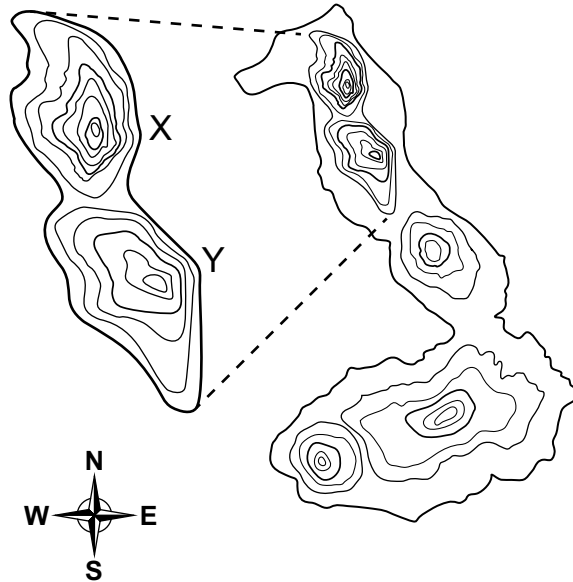
Which conclusion about the typical weather for the Galápagos Islands is supported by the graphs?

- Ⓐ February and March are the coolest months and have the least rain.
- Ⓑ February and March are the warmest months and have the most rain.
- Ⓒ August and September are the coolest months and have the most rain.
- Ⓓ August and September are the warmest months and have the least rain.

Category	Item-Specific Information
Alignment	3.3.3.A
Answer Key	B
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. February and March have the highest temperatures and have the highest average rainfall.</p> <p>B. Key: The data show that February and March are the warmest months and receive the most rain.</p> <p>C. August and September have the lowest average rainfall.</p> <p>D. August and September have the lowest temperatures.</p>

16. Use the map below to answer the question.

Isabela Island



The topographical map shows two land features found on Isabela Island. Which description **best** matches these two features?

- Ⓐ Feature X is a valley, and feature Y is a mountain.
- Ⓑ Feature Y is a valley, and feature X is a mountain.
- Ⓒ Both features are mountains, and feature X is steeper.
- Ⓓ Both features are mountains, and feature Y is steeper.

Category	Item-Specific Information
Alignment	3.3.4.C
Answer Key	C
Depth of Knowledge	2
p-value A	N/A
p-value B	N/A
p-value C	N/A
p-value D	N/A
Option Annotations	<p>A. The concentric lines indicate that both features are mountains.</p> <p>B. The concentric lines indicate that both features are mountains.</p> <p>C. Key: Feature X has more concentric lines than feature Y has and the lines are closer together, indicating that feature X is steeper than feature Y.</p> <p>D. Feature Y has fewer concentric lines than feature X has and the lines are farther apart, indicating that feature Y is not as steep as feature X.</p>

Open-Ended Item

17. Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part A: Identify whether the Chartiers Creek environmental issue likely needed human action and explain why.

Part B: A Pennsylvania government group helps set rules for protecting land and water in Pennsylvania. Describe a helpful action the government group likely took when it learned about the die-off event.

17. **Continued.** Please refer to the previous page for task explanation.

Part C: Describe an action the community can take to help prevent more fish die-offs in the future.

Item-Specific Scoring Guideline

#17 Item Information

Category	Item-Specific Information
Alignment	3.4.3-5.E
Depth of Knowledge	3
Mean Score	N/A

Item-Specific Scoring Guideline

Score	Description
3	<p>The response demonstrates a <i>thorough</i> understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions by</p> <ul style="list-style-type: none"> identifying whether the Chartiers Creek environmental issue likely needed human action and explaining why <p>AND</p> <ul style="list-style-type: none"> describing a helpful action the government group likely took when it learned about the die-off event <p>AND</p> <ul style="list-style-type: none"> describing an action the community can take to help prevent more fish die-offs in the future. <p>The response is clear, complete, and correct.</p>
2	<p>The response demonstrates a <i>partial</i> understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions by fulfilling two of the bullets listed under the 3-point response.</p> <p>The response may contain some work that is incomplete or unclear.</p>
1	<p>The response demonstrates a <i>minimal</i> understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions by fulfilling one of the bullets listed under the 3-point response.</p> <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):**

- Yes, the issue needed human action because a large number of animals (and/or multiple species) died.
- Yes, the issue needed human action because the ecosystem is out of balance (harmed/in danger).
- Yes, the issue needed human action because it could have been caused by humans.
- Yes, the issue needed human action because the community will likely not want this to happen again in the future.

Part B (1 point):

- The government investigated the possible pollution sources in the watershed.
- The government gathered data (e.g., types of organisms that died and/or survived, water quality characteristics) about the die-off event.
- The government made a plan to respond to the die-off event.

Part C (1 point):

- The community can limit the amount of pollution entering the watershed.
- The community can have a clean-up event to reduce the effects of pollutants in the area.
- The community can monitor water quality in the watershed.
- The community can help restore the populations affected by the die-off event.
- The community can work with the government group to carry out their plan.

STUDENT RESPONSE

Response Score: 3 points

17. Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part A: Identify whether the Chartiers Creek environmental issue likely needed human action and explain why.

Yes, cause a lot of animals died in the creek.

Part B: A Pennsylvania government group helps set rules for protecting land and water in Pennsylvania. Describe a helpful action the government group likely took when it learned about the die-off event.

They could find out if pollution made the animals die.

17. **Continued.** Please refer to the previous page for task explanation.


Part C: Describe an action the community can take to help prevent more fish die-offs in the future.







The community could find a way to stop pollution there.


This response demonstrates a thorough understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions. In Part A, the response correctly identifies that the Chartiers Creek environmental issue likely needed human action and explains why (*Yes, cause a lot of animals died*). In Part B, the response correctly describes a helpful action the government group likely took when it learned about the die-off event (*find out if pollution made the animals die*). In Part C, the response correctly describes an action the community can take to prevent more fish die-offs in the future (*find a way to stop pollution there*). The response is clear, complete, and correct.

STUDENT RESPONSE

 **Computer Response Score: 2 points****PARTS A and B**

Question 17 
Page 1 of 2

Item ID 

Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part A: Identify whether the Chartiers Creek environmental issue likely needed human action and explain why.

EQ

Yes, action is needed because people probably caused the fishes to die.

71 / 500

Part B: A Pennsylvania government group helps set rules for protecting land and water in Pennsylvania. Describe a helpful action the government group likely took when it learned about the die-off event.

EQ

They added a bunch more fish to the creek

41 / 500

Review/End Test Pause Flag Options

Next

PART C

Question 17
Page 2 of 2

Item ID ?

Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part C: Describe an action the community can take to help prevent more fish die-offs in the future.

The community can take action and clean up any trash in or near the creek.

74 / 500

Review/End Test Pause Flag Options Back Next

This response demonstrates a partial understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions. In Part A, the response correctly identifies that the Chartiers Creek environmental issue likely needed human action and explains why (*Yes . . . because people probably caused the fishes to die*). In Part B, the response (*added a bunch more fish to the creek*) does not correctly describe a helpful action the government group likely took when it learned about the die-off event and receives no credit. In Part C, the response correctly describes an action the community can take to prevent more fish die-offs in the future (*clean up any trash in or near the creek*).

STUDENT RESPONSE

Response Score: 1 point

17. Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part A: Identify whether the Chartiers Creek environmental issue likely needed human action and explain why.

No, the die-off event already happened.

Part B: A Pennsylvania government group helps set rules for protecting land and water in Pennsylvania. Describe a helpful action the government group likely took when it learned about the die-off event.

They found out what kinds of animals died.

17. **Continued.** Please refer to the previous page for task explanation.

Part C: Describe an action the community can take to help prevent more fish die-offs in the future.

The community can't do anything. The fish already died.

This response demonstrates a minimal understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions. In Part A, the response (*No, the die-off event already happened*) does not correctly identify or explain why the Chartiers Creek environmental issue likely needed human action and receives no credit. In Part B, the response correctly describes a helpful action the government group likely took when it learned about the die-off event (*found out what kinds of animals died*). In Part C, the response (*community can't do anything*) does not correctly describe an action the community can take to prevent more fish die-offs in the future and receives no credit.

STUDENT RESPONSE

Response Score: 0 points

17. Chartiers Creek is a stream in western Pennsylvania. It flows into the Ohio River. Recently, community members noticed an environmental issue. They noticed that thousands of fish and other aquatic animals had died in Chartiers Creek. When large numbers of organisms in an area die from environmental factors, it is called a die-off event.

Part A: Identify whether the Chartiers Creek environmental issue likely needed human action and explain why.

No, people don't need to do anything

Part B: A Pennsylvania government group helps set rules for protecting land and water in Pennsylvania. Describe a helpful action the government group likely took when it learned about the die-off event.

They let the fish die

17. **Continued.** Please refer to the previous page for task explanation.

Part C: Describe an action the community can take to help prevent more fish die-offs in the future.

stop fishing

This response demonstrates insufficient evidence to demonstrate any understanding of constructing an argument to support whether action is needed on a selected environmental issue and proposing possible solutions. In Part A, the response (*No, people don't need to do anything*) does not correctly identify or explain why the Chartiers Creek environmental issue likely needed human action and receives no credit. In Part B, the response (*They let the fish die*) does not correctly describe a helpful action the government group likely took when it learned about the die-off event and receives no credit. In Part C, the response (*stop fishing*) does not correctly describe an action the community can take to prevent more fish die-offs in the future and receives no credit.

Open-Ended Item

18. An elementary school needs a new swing set for its playground. The school leaders created a list of requirements for the new swing set.

Requirements for New Swing Set

- The swing set must cost \$1,000 or less.
- Each swing must be a belt swing, not a tire swing.
- The chains holding each swing must be at least 5 feet long.
- The seat of each swing must be 16 inches or less above the ground.
- There must be at least 2 feet of space between each swing.

The table shows information on swing sets the school leaders are considering.

Description of Swing Set Options

Factor	Swing Set 1	Swing Set 2	Swing Set 3
Cost	\$500	\$900	\$950
Number and Type of Swing	2 tire swings	3 belt swings	2 belt swings
Length of Supporting Chains	hangs from 4-foot chains	hangs from 6-foot chains	hangs from 5-foot chains
Seat Height	16 inches	16 inches	18 inches
Distance between Swings	2 feet	2.5 feet	1.5 feet

Part A: Identify the swing set that the school leaders should choose.

Swing set ____

18. **Continued.** Please refer to the previous page for task explanation.

Part B: Describe **two** reasons why the swing set selected for Part A would be the **best** swing set for the playground.

Reason 1: _____

Reason 2: _____

Item-Specific Scoring Guideline

#18 Item Information

Category	Item-Specific Information
Alignment	3.5.3-5.U
Depth of Knowledge	2
Mean Score	N/A

Item-Specific Scoring Guideline

Score	Description
3	<p>The response demonstrates a <i>thorough</i> understanding of evaluating designs based on criteria, constraints, and standards by</p> <ul style="list-style-type: none"> identifying the swing set that the school leaders should choose <p>AND</p> <ul style="list-style-type: none"> describing two reasons why the swing set selected in Part A would be the best swing set for the playground. <p>The response is clear, complete, and correct.</p>
2	<p>The response demonstrates a <i>partial</i> understanding of evaluating designs based on criteria, constraints, and standards by</p> <ul style="list-style-type: none"> identifying the swing set that the school leaders should choose <p>AND</p> <ul style="list-style-type: none"> describing one reason why the swing set selected in Part A would be the best swing set for the playground <p>OR</p> <ul style="list-style-type: none"> describing two reasons why the swing set selected in Part A would be the best swing set for the playground. <p>The response may contain some work that is incomplete or unclear.</p>
1	<p>The response demonstrates a <i>minimal</i> understanding of evaluating designs based on criteria, constraints, and standards by</p> <ul style="list-style-type: none"> identifying the swing set that the school leaders should choose <p>OR</p> <ul style="list-style-type: none"> describing one reason why the swing set selected in Part A would be the best swing set for the playground. <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):**

- Swing set 2 is the best choice for the playground.

Part B (Student correctly identifies criteria for one swing set: 2 points, 1 point for each correct description):

- Swing set 2 is the only swing set that meets all the requirements.
- Swing set 2 costs less than \$1,000.00.
- Swing set 2 has all belt swings.
- Swing set 2 has more than two feet of distance between swings.
- Swing set 2 has a length of chain that is more than 5 feet long.
- Swing set 2 has seats 16 inches above the ground.
- Swing set 3 costs less than \$1,000.00.
- Swing set 3 has all belt swings.
- Swing set 3 has a length of chain that is 5 feet long.
- Swing set 1 costs less than \$1,000.00.
- Swing set 1 has seats 16 inches above the ground.
- Swing set 1 has two feet of space between the swings.

STUDENT RESPONSE



Computer Response Score: 3 points

PARTS A and B

Question 18

Item ID

An elementary school needs a new swing set for its playground. The school leaders created a list of requirements for the new swing set.

Requirements for New Swing Set

- The swing set must cost \$1,000 or less.
- Each swing must be a belt swing, not a tire swing.
- The chains holding each swing must be at least 5 feet long.
- The seat of each swing must be 16 inches or less above the ground.
- There must be at least 2 feet of space between each swing.

The table shows information on swing sets the school leaders are considering.

Description of Swing Set Options

Factor	Swing Set 1	Swing Set 2	Swing Set 3
Cost	\$500	\$900	\$950
Number and Type of Swing	2 tire swings	3 belt swings	2 belt swings
Length of Supporting Chains	hangs from 4-foot chains	hangs from 6-foot chains	hangs from 5-foot chains
Seat Height	16 inches	16 inches	18 inches
Distance between Swings	2 feet	2.5 feet	1.5 feet

Part A: Identify the swing set that the school leaders should choose.

Swing set

Part B: Describe **two** reasons why the swing set selected for Part A would be the **best** swing set for the playground.

Reason 1:

24 / 500

Reason 2:




30 / 500

This response demonstrates a thorough understanding of evaluating designs based on criteria, constraints, and standards. In Part A, the response correctly identifies the swing set that the school leaders should choose (Swing set: 2). In Part B, the response correctly describes two reasons why the swing set selected in Part A would be the best swing set for the playground (Reason 1: *It costs less than \$1000* and Reason 2: *chain is long enough at 6 feet*). The response is clear, complete, and correct.

STUDENT RESPONSE

 **Computer Response Score: 2 points**

PARTS A and B

Question 18   

An elementary school needs a new swing set for its playground. The school leaders created a list of requirements for the new swing set.

Requirements for New Swing Set

- The swing set must cost \$1,000 or less.
- Each swing must be a belt swing, not a tire swing.
- The chains holding each swing must be at least 5 feet long.
- The seat of each swing must be 16 inches or less above the ground.
- There must be at least 2 feet of space between each swing.

The table shows information on swing sets the school leaders are considering.

Description of Swing Set Options


Factor	Swing Set 1	Swing Set 2	Swing Set 3
Cost	\$500	\$900	\$950
Number and Type of Swing	2 tire swings	3 belt swings	2 belt swings
Length of Supporting Chains	hangs from 4-foot chains	hangs from 6-foot chains	hangs from 5-foot chains
Seat Height	16 inches	16 inches	18 inches
Distance between Swings	2 feet	2.5 feet	1.5 feet

Part A: Identify the swing set that the school leaders should choose.

Swing set


Part B: Describe **two** reasons why the swing set selected for Part A would be the **best** swing set for the playground.

Reason 1:

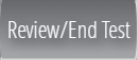
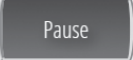
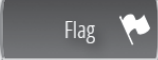
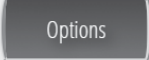

 Fits all the requirements.

26 / 500

Reason 2:

 It would be fun to have a swingset.

35 / 500

This response demonstrates a partial understanding of evaluating designs based on criteria, constraints, and standards. In Part A, the response correctly identifies the swing set that the school leaders should choose (Swing set: 2). In Part B, the response correctly describes one reason why the swing set selected in Part A would be the best swing set for the playground (Reason 1: *Fits all the requirements*). The second reason (Reason 2: *It would be fun to have a swingset*) does not reference any of the criteria for the swing set and receives no credit.

STUDENT RESPONSE

Response Score: 1 point

18. An elementary school needs a new swing set for its playground. The school leaders created a list of requirements for the new swing set.

Requirements for New Swing Set

- The swing set must cost \$1,000 or less.
- Each swing must be a belt swing, not a tire swing.
- The chains holding each swing must be at least 5 feet long.
- The seat of each swing must be 16 inches or less above the ground.
- There must be at least 2 feet of space between each swing.

The table shows information on swing sets the school leaders are considering.

Description of Swing Set Options

Factor	Swing Set 1	Swing Set 2	Swing Set 3
Cost	\$500	\$900	\$950
Number and Type of Swing	2 tire swings	3 belt swings	2 belt swings
Length of Supporting Chains	hangs from 4-foot chains	hangs from 6-foot chains	hangs from 5-foot chains
Seat Height	16 inches	16 inches	18 inches
Distance between Swings	2 feet	2.5 feet	1.5 feet

Part A: Identify the swing set that the school leaders should choose.

Swing set 1

18. **Continued.** Please refer to the previous page for task explanation.

Part B: Describe **two** reasons why the swing set selected for Part A would be the **best** swing set for the playground.

Reason 1: it costed under \$1000

Reason 2: Tire swings are great they would be the best on a
swing set

This response demonstrates a minimal understanding of evaluating designs based on criteria, constraints, and standards. In Part A, the response (Swing set: 1) does not correctly identify the swing set the school leaders should choose and receives no credit. In Part B, the response correctly describes one reason why the swing set selected in Part A would be the best swing set for the playground (Reason 1: *it costed under \$1000*). The second reason (Reason 2: *Tire swings are great*) does not correctly reference the criteria for the swing set and receives no credit.

STUDENT RESPONSE

Response Score: 0 points

18. An elementary school needs a new swing set for its playground. The school leaders created a list of requirements for the new swing set.

Requirements for New Swing Set

- The swing set must cost \$1,000 or less.
- Each swing must be a belt swing, not a tire swing.
- The chains holding each swing must be at least 5 feet long.
- The seat of each swing must be 16 inches or less above the ground.
- There must be at least 2 feet of space between each swing.

The table shows information on swing sets the school leaders are considering.

Description of Swing Set Options

Factor	Swing Set 1	Swing Set 2	Swing Set 3
Cost	\$500	\$900	\$950
Number and Type of Swing	2 tire swings	3 belt swings	2 belt swings
Length of Supporting Chains	hangs from 4-foot chains	hangs from 6-foot chains	hangs from 5-foot chains
Seat Height	16 inches	16 inches	18 inches
Distance between Swings	2 feet	2.5 feet	1.5 feet

Part A: Identify the swing set that the school leaders should choose.

Swing set 3

18. **Continued.** Please refer to the previous page for task explanation.

Part B: Describe **two** reasons why the swing set selected for Part A would be the **best** swing set for the playground.

Reason 1: kids like to play on swing sets

Reason 2: and run around on the playground

This response demonstrates insufficient evidence to demonstrate any understanding of evaluating designs based on criteria, constraints, and standards. In Part A, the response (Swing set: 3) does not correctly identify the swing set the school leaders should choose and receives no credit. In Part B, neither response (Reason 1: *kids like to play on swing sets* or Reason 2: *run around on the playground*) references any of the criteria for the swing set 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	3.1.3.B	D	2	N/A	N/A	N/A	N/A
2	3.1.3.H	B	2	N/A	N/A	N/A	N/A
3	3.4.3-5.B	D	2	N/A	N/A	N/A	N/A
4	3.4.3-5.B	A	3	N/A	N/A	N/A	N/A
5	3.2.3.A	A	2	N/A	N/A	N/A	N/A
6	3.2.3.C	C	2	N/A	N/A	N/A	N/A
7	3.2.4.A	B	2	N/A	N/A	N/A	N/A
8	3.3.3.A	B	3	N/A	N/A	N/A	N/A
9	3.3.3.C	D	2	N/A	N/A	N/A	N/A
10	3.3.4.D	D	2	N/A	N/A	N/A	N/A
11	3.5.3-5.P	C	3	N/A	N/A	N/A	N/A
12	3.5.3-5.B	D	3	N/A	N/A	N/A	N/A
13	3.5.3-5.E	B	3	N/A	N/A	N/A	N/A
14	3.5.3-5.FF	A	2	N/A	N/A	N/A	N/A
15	3.3.3.A	B	2	N/A	N/A	N/A	N/A
16	3.3.4.C	C	2	N/A	N/A	N/A	N/A

Open-Ended

Sample Number	Alignment	Points	Depth of Knowledge	Mean Score
17	3.4.3-5.E	3	3	N/A
18	3.5.3-5.U	3	2	N/A