

Science

Forward Exam Practice Test Grade 8



WISCONSIN DEPARTMENT OF
Public Instruction



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SCIENCE ITEMS—SESSION 1

Read the following information, and then answer questions 1-4.

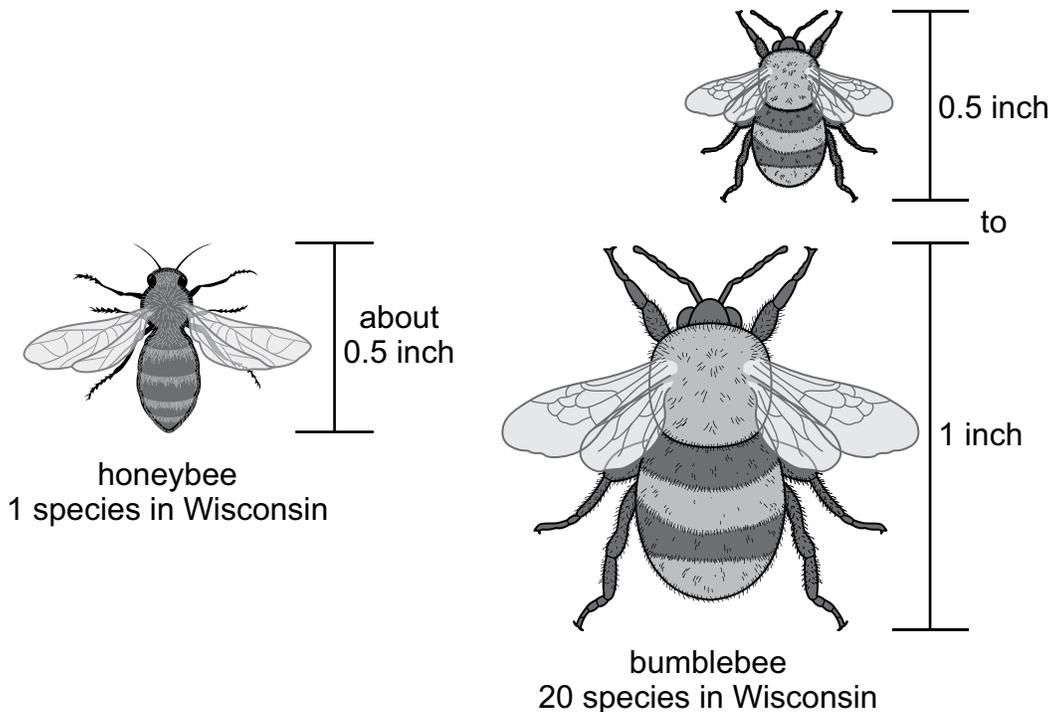
Wisconsin Bees

When people refer to bees, they typically mean European honeybees. These bees are very important to agriculture, but they are not native to Wisconsin. To survive Wisconsin winters, honeybees typically need humans to help take care of the hives.

Honeybees are known for doing a waggle dance, which is a series of movements they make after returning to the hive. The movements identify the direction and distance a patch of flowers is from the hive. The honeybees in the hive watch the waggle dance and use their antennae to smell the scent of the flowers on the returning honeybee. The returning honeybee may also share a sample of nectar from the flowers, which other honeybees can sense with hairs on their mouth, feet, and antennae.

The drawings compare the sizes of a honeybee and two species of bumblebees.

Honeybee and Bumblebee Size Comparison



In addition to the honeybee, there are over 400 species of wild bees living in Wisconsin. These bees support native habitats. There are differences between honeybees and native bee species, including the diseases that may affect them and the types of plants each is best at pollinating.

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1. A farmer notices that some cranberry plants are not producing as many cranberries each year as they used to. The farmer decides to plant a seed mix of 37 different native grasses and flowers in the field near the cranberry plants.

Which statement explains how planting pollinator habitat around a farm would most likely affect the relationship between the farm and the native habitat?

- A. Planting new pollinator habitat around a farm would increase the biodiversity of plants available to pollinators, which would increase crop results and reduce the dependence humans have on honeybees for honey products.
 - B. Planting new pollinator habitat around a farm would increase the biodiversity of plants available to pollinators, which would increase crop results and reduce the dependence humans have on honeybees for crop pollination.
 - C. Planting new pollinator habitat around a farm would increase the biodiversity of plants available to pollinators, which would decrease predation and reduce the dependence humans have on honeybees for honey products.
 - D. Planting new pollinator habitat around a farm would increase the biodiversity of plants available to pollinators, which would decrease predation and reduce the dependence humans have on honeybees for crop pollination.
2. A farmer notices that some of the honeybee colonies on the farm survive the winter without any human care. If this continues, what is the most likely outcome after hundreds of generations?
 - A. More honeybees would survive each year because the traits that help honeybees survive cold weather would become more common.
 - B. Fewer honeybees would survive each year because the traits that help honeybees survive cold weather would become less common.
 - C. More honeybees would survive each year because the traits that help honeybees survive are learned behaviors that are inherited.
 - D. Fewer honeybees would survive each year because the traits that help honeybees survive are learned behaviors that are inherited.

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3. A student is creating a model to show the flow of energy between Wisconsin flowering plants and honeybees.

Which table best describes the flow of energy between these organisms?

A.

	Wisconsin Flowering Plants	Honeybees
Source of Energy	water	sunlight
How Energy is Used	flying	drinking nectar

B.

	Wisconsin Flowering Plants	Honeybees
Source of Energy	sunlight	drinking nectar
How Energy is Used	making nectar	flying

C.

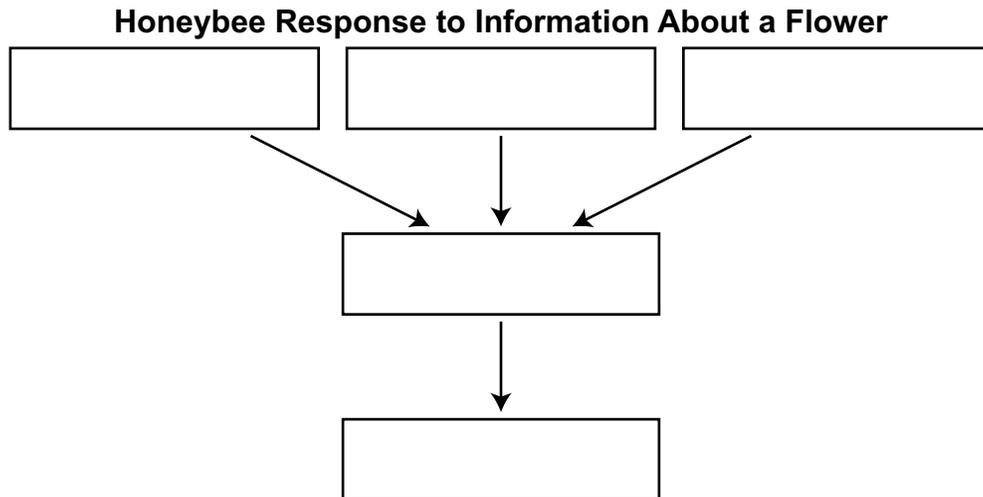
	Wisconsin Flowering Plants	Honeybees
Source of Energy	wind	water
How Energy is Used	making nectar	flying

D.

	Wisconsin Flowering Plants	Honeybees
Source of Energy	sunlight	wind
How Energy is Used	flying	drinking nectar

Go on to the next page.

4. A student is developing a model to show how a honeybee learns about the location of a flower and responds to that information. Complete the model by writing each letter in a box in the model.



- Ⓐ mouth tasting nectar
- Ⓑ honeybee flying toward flower
- Ⓒ eyes seeing the waggle dance
- Ⓓ antennae detecting flower scent
- Ⓔ nerves delivering message to brain

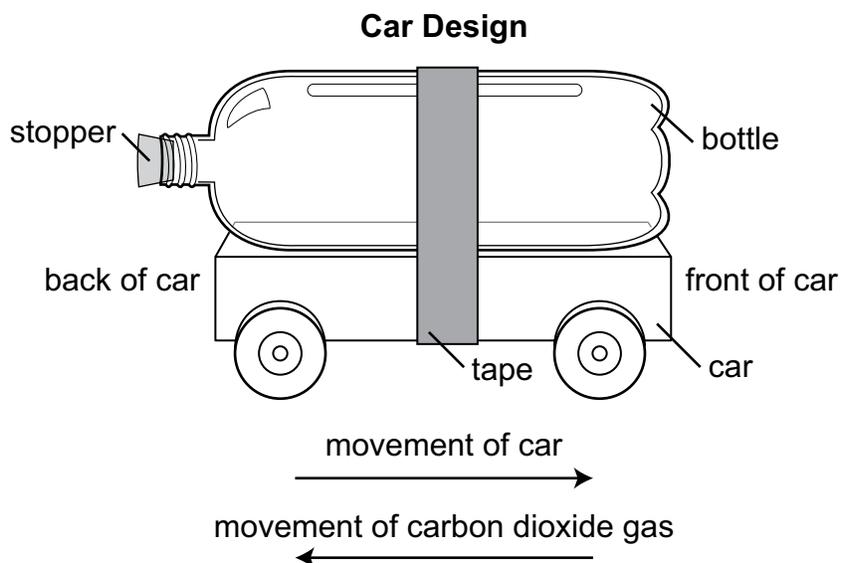
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Read the following information, and then answer questions 5–8.

Chemically Powered

A teacher assigned a project to students in which they had to build a toy car that was powered by the combination of baking soda (sodium bicarbonate) and citric acid. When both reactants are combined in a bottle, carbon dioxide gas is produced, which powers the car.



Carbon dioxide gas exerts pressure on the walls of the reaction vessel. Eventually the pressure increases enough to force the stopper out of the opening. Carbon dioxide escapes from the back of the car, propelling the car forward.

The students measured the speed of their cars and the distance they traveled. The students then modified various aspects of their designs to improve the overall function of the cars.

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5. Students combined two reactants (baking soda and citric acid) to determine if a chemical reaction takes place. The steps in the investigation are described.
1. Solid baking soda was dissolved in water.
 2. Solid citric acid was dissolved in water.
 3. The solutions of baking soda and citric acid were combined in an open flask, producing a gas.
 4. The temperature of the flask's contents decreased, and the mass decreased.

How can the information from the investigation be used to support the claim that a chemical reaction took place?

- A. A chemical reaction took place because the temperature of the system decreased and a gas was produced.
 - B. A chemical reaction took place because the temperature of the system decreased and the solid reactants dissolved in water.
 - C. A chemical reaction took place because a gas was produced, which resulted in an increase in mass.
 - D. A chemical reaction took place because the baking soda dissolved and there was an increase in mass.
6. A team of students wants to investigate the relationship between force, mass, and acceleration. Which set of changes to the experiment will all lead to an increase in the acceleration of the car?
1. increase the mass of the car
2. increase the amount of carbon dioxide released
3. increase the friction between the car and the ground
 1. decrease the mass of the car
2. decrease the amount of carbon dioxide released
3. decrease the friction between the car and the ground
 1. increase the mass of the car
2. decrease the amount of carbon dioxide released
3. increase the friction between the car and the ground
 1. decrease the mass of the car
2. increase the amount of carbon dioxide released
3. decrease the friction between the car and the ground

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7. Carbon dioxide gas is generated when baking soda and citric acid are combined. The carbon dioxide gas escapes from the bottle, which is the action force. According to Newton's third law, a reaction force will follow. Students want their car to move farther across the floor.

Solutions for Moving the Car Farther

Solutions	Descriptions
W	Form openings on the top of the bottle so the gas escapes from the top instead of the back.
X	Add more baking soda and citric acid so more gas is generated inside the bottle.
Y	Secure the stopper to the back of the bottle with a piece of tape so gas pressure increases.
Z	Remove the stopper from the back of the bottle so the gas produced can escape more easily.

Which pair of solutions apply Newton's third law to this goal?

- A. W and X
 B. X and Y
 C. Y and Z
 D. W and Z
8. Carbon dioxide (CO_2) gas is produced when baking soda and citric acid are combined. Solid CO_2 can be created from gaseous CO_2 when enough thermal energy is removed. A student wants to create a model of solid CO_2 using a computer simulation.

Select the three characteristics of an accurate model of solid CO_2 that should be included in the computer simulation.

- A. Molecules are moving randomly and in straight lines.
 B. Molecules are vibrating in fixed positions.
 C. Molecules are moving slowly with low average kinetic energy.
 D. Molecules are moving rapidly with high average kinetic energy.
 E. Molecules occupy the entire container and are spread far apart from each other.
 F. Molecules occupy only a portion of the container and are arranged very close to each other.

STOP.



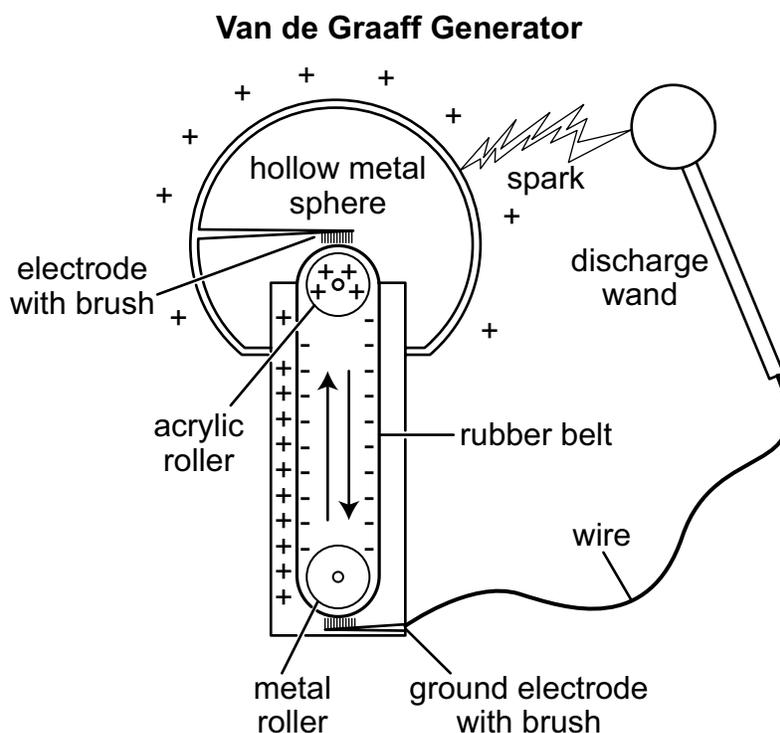
SCIENCE ITEMS—SESSION 2

Read the following information, and then answer questions 1–3.

It's Electric!

Have you ever shuffled your feet along a carpeted floor and then touched another person—giving him or her a small electric shock? The shock is caused by static electricity. The production of static electricity can be magnified in a classroom or laboratory with a machine called a Van de Graaff generator.

A Van de Graaff generator has moving parts that transfer electrons (electrically charged particles) and other parts that remove and store those charges. The diagram below shows parts and charges in a Van de Graaff generator.



Each side of the rubber belt is charged differently. Positive charges are picked off the belt by the brush along the acrylic roller. These charges are transferred along the electrode and stored in the hollow metal sphere until discharge. The negative charges on the belt return to the metal roller at the bottom of the generator where they are picked off by the brush attached to the ground electrode. Discharge occurs when the negatively charged wand is brought close to the sphere and a spark is produced.

Go on to the next page.

Similarly, a person can discharge the generator. But safety is critical—the person must stand on an electrical insulator when discharging the metal sphere to avoid receiving an electric shock. The picture below shows a teacher demonstrating how discharging the Van de Graaff generator can make hair stand on end. That is hair-raising fun!

**Teacher Demonstrating
Van de Graaff Generator**



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1. A student observes that getting shocked after shuffling across carpet occurs more often in winter than in summer. The student researches some factors that can affect static electricity, and the findings are shown below.

Fact: Humidity (measure of moisture in the air) affects electron flow between objects.

Fact: Moisture in the air creates a path for electron flow between objects.

Winter	Summer
lower humidity	higher humidity

The student wants to investigate the relationship between humidity and static electricity using a Van de Graaff generator and a discharge wand. Which question can the student investigate using a Van de Graaff generator and a discharge wand?

- A. Does humidity affect the distance from one end of a spark produced by the Van de Graaff generator to the other end of the spark?
- B. Does humidity affect the number of electrons produced by a Van de Graaff generator?
- C. Does the humidity change based on the distance of the wand from the Van de Graaff generator?
- D. Does the humidity change based on the size of the Van de Graaff generator?

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2. A student conducts an investigation to understand a particular type of force. The student moves a discharge wand toward the metal sphere of a Van de Graaff generator while it is operating.

Part A

Which two parts of the generator exert forces on each other without touching each other?

- A. metal roller and rubber belt
- B. metal roller and hollow metal sphere
- C. hollow metal sphere and discharge wand
- D. electrode with brush and acrylic roller

Part B

Which evidence can best be used to explain your answer to Part A?

- A. The metal roller collects negative charges from the rubber belt.
- B. The hollow metal sphere receives a spark from the discharge wand.
- C. The acrylic roller collects positive charges and stores them in the hollow metal sphere.
- D. The discharge wand and the ground electrode move charges from the bottom to the top of the generator.

3. A student develops an experiment to demonstrate the interaction of forces by using a Van de Graaff generator.

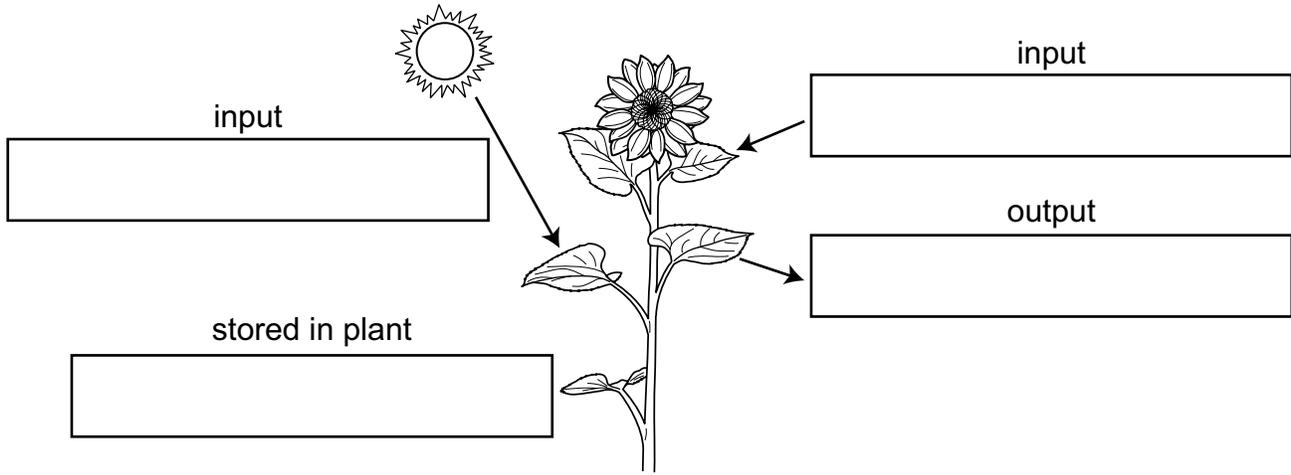
Which observation from this experiment best shows evidence of forces interacting?

- A. The insulating base is made of rubber.
- B. The metal sphere on the Van de Graaff generator feels cold.
- C. The discharge wand is connected to the Van de Graaff generator.
- D. The student's hair rises and stands on end.

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4. In a population of plants, a mutation allows one plant to grow taller than usual. As a result, the plant receives more sunlight than other plants in the area.

Write each term in a box in the model to show the transfer of energy and matter that results from the advantage of increased height.



electromagnetic waves

sugars

carbon dioxide

oxygen

STOP.



SCIENCE ITEMS—SESSION 3

Read the following information, and then answer questions 1–5.

Protecting Wisconsin's Streams

After a quiet Wisconsin winter, being near a stream in spring sounds like a festival. The sounds of frogs, songbirds, waterbirds, and insects are evidence of the diverse life in the stream ecosystem. Wildlife depend on these streams and the vegetation around them for water, food, and shelter. Wisconsin streams are home for many fish, including trout, bass, and walleye. At sunset, some mammals like deer, raccoons, and foxes come from the forest to find food in the water or in nearby fields.

Wisconsin has many freshwater streams. Beyond their rich ecological value, they also provide recreational opportunities for humans. Humans have many uses for streams, including fishing, canoeing, and kayaking. Farmers sometimes use streams for irrigating their fields. Land planners recognize the appeal of streams for property owners.

However, these demands can put Wisconsin streams at risk. Ecologists use the following landscape characteristics to help evaluate stream health.

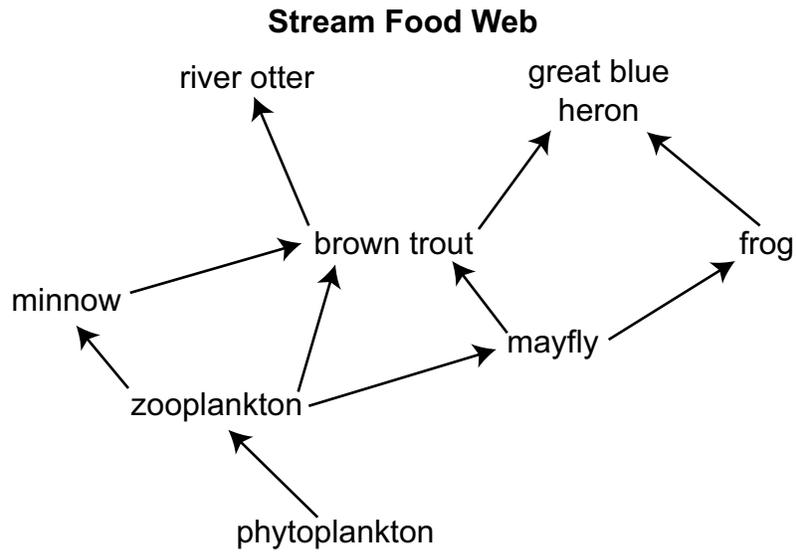
Landscape Characteristics

- percentage of wetlands remaining
- percentage of natural land cover remaining
- number of hubs (patches of unbroken natural areas) and corridors (undisturbed areas between hubs used for migration or local movement of organisms)

Areas with high percentages of wetlands and natural land cover support healthy stream ecosystems. Preserving areas with trees and other plants around streams helps prevent erosion and provides wildlife habitat. Maintaining forests and wetlands also provides habitat for many kinds of organisms. Preventing livestock access to streams may limit erosion and reduce bacterial pollution. Each of these actions for land usage can have a meaningful impact on stream health and help protect Wisconsin's streams.

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1. The food web below shows some of the ecosystem interactions in a Wisconsin stream. Some of the organisms compete for the same food sources.



How many other organisms from the stream food web does the great blue heron compete with for brown trout?

- A. one
- B. two
- C. three
- D. five

Go on to the next page.

2. Scientists monitor water quality and organisms in a stream. The scientists observe a decline in the population of brown trout, a fish that lives in the stream. The data table below shows the relationship between dissolved oxygen concentration and water quality. Brown trout require at least 6 milligrams per liter (mg/L) of dissolved oxygen to survive.

Dissolved Oxygen Concentration and Stream Water Quality

Dissolved Oxygen Concentration	Milligrams per Liter (mg/L) Stream Water	Water Quality
high	7.0–11.0	excellent
medium	4.0–6.9	good
low	2.0–3.9	poor
very low	0–1.9	very poor

Part A

Which statement describes how the dissolved oxygen concentration in the stream has most likely changed?

- A. The dissolved oxygen concentration in the stream has most likely become high or medium.
- B. The dissolved oxygen concentration in the stream has most likely become low or very low.

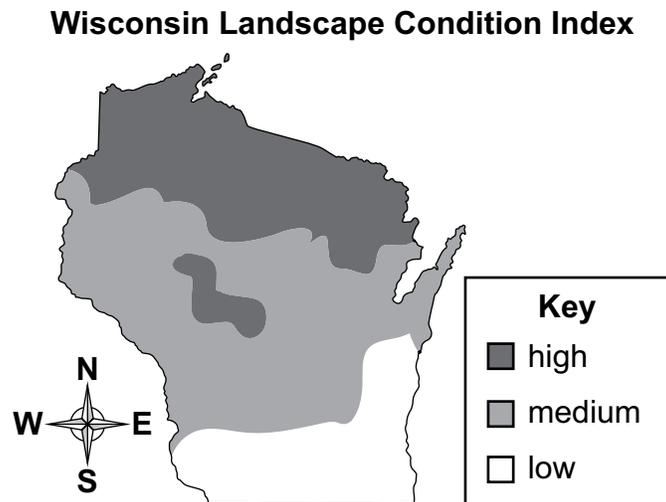
Part B

Which event most likely caused the change in dissolved oxygen concentration you selected in Part A?

- A. Brown trout used oxygen from the water during respiration.
- B. Water containing oxygen entered the stream after a rain storm.
- C. Bacteria used oxygen in the water to decompose organic matter.
- D. Aquatic plants increased oxygen in the water by performing photosynthesis.

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3. The map below shows results of landscape research in Wisconsin, which is used to help evaluate stream health. The map shows an index of landscape condition, which is based on the percentage of wetlands and natural land cover remaining and the number of hubs and corridors. “High” indicates the best landscape condition.



Which argument about stream health in Wisconsin is best supported by evidence?

- A. Stream health in northern Wisconsin is most likely better than that in southern Wisconsin because the landscape in northern Wisconsin has more buffer-zone areas around streams and more acres of fragmented landscape.
- B. Stream health in northern Wisconsin is most likely better than that in southern Wisconsin because the landscape in northern Wisconsin has more buffer-zone areas around streams and more acres of undisturbed landscape.
- C. Stream health in northern Wisconsin is most likely worse than that in southern Wisconsin because the landscape in northern Wisconsin has fewer buffer-zone areas around streams and more acres of fragmented landscape.
- D. Stream health in northern Wisconsin is most likely worse than that in southern Wisconsin because the landscape in northern Wisconsin has fewer buffer-zone areas around streams and more acres of undisturbed landscape.

Go on to the next page.

4. Livestock can harm streams when their hooves erode soil, which ends up in the stream. The soil reduces water clarity, harming plants and animals that live in the water. Several farmers are designing a process to minimize the impact of their livestock on a local stream.

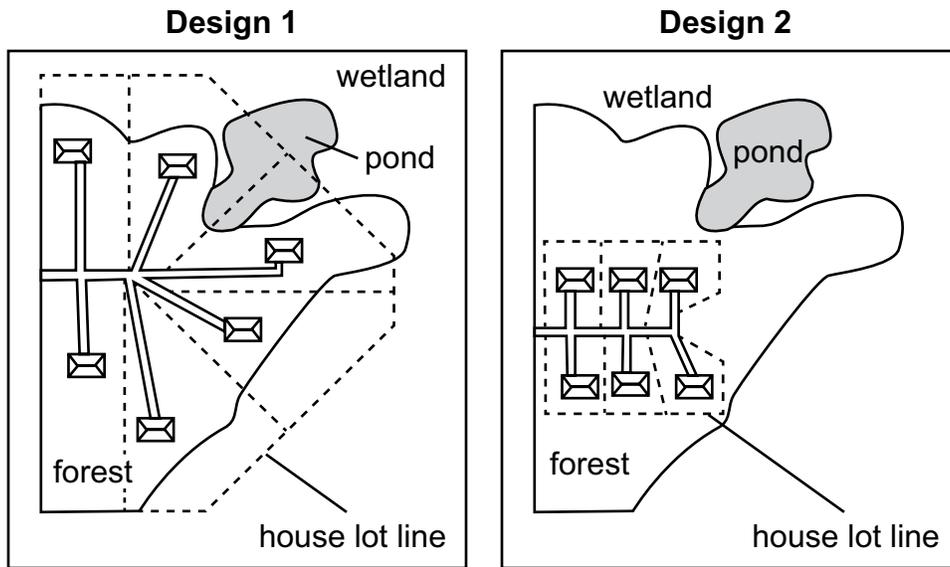
Check the boxes in the table next to two actions the farmers can take to reduce streambank erosion.

Layer rocks along a path to the stream.	
Select a steep area for cattle to access the stream.	
Provide access along the entire length of the stream.	
Install a livestock watering system away from the stream.	

Go on to the next page.

5. A residential developer is planning to build some houses on a property next to a wetland with a pond and a stream. The criteria for the project are listed below:
- six lots for houses
 - intact forested areas
 - forested area between wetland and lots for houses

The diagrams below show two designs for the project.



Which statement best explains why one of the designs is more appropriate for the project?

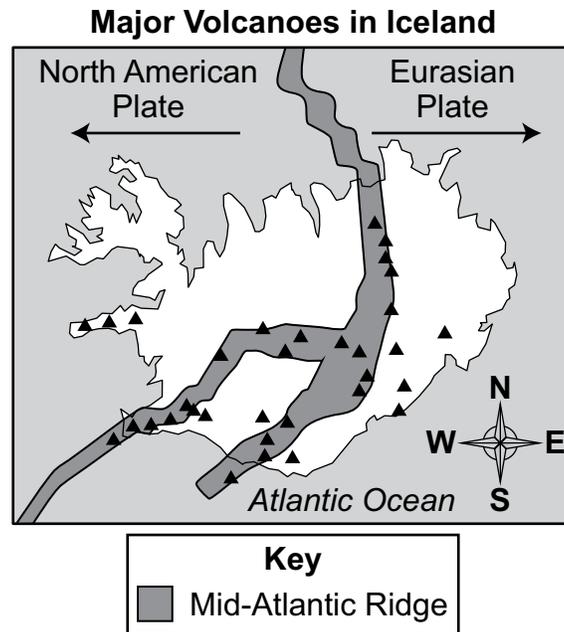
- A. Design 1 is more appropriate because it provides each house with access to the wetland.
- B. Design 1 is more appropriate because it provides larger lot sizes with more forest areas.
- C. Design 2 is more appropriate because it provides each house with privacy on all sides.
- D. Design 2 is more appropriate because it provides wetland protection with uninterrupted forest areas.

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Read the following information, and then answer questions 6–8.

Iceland

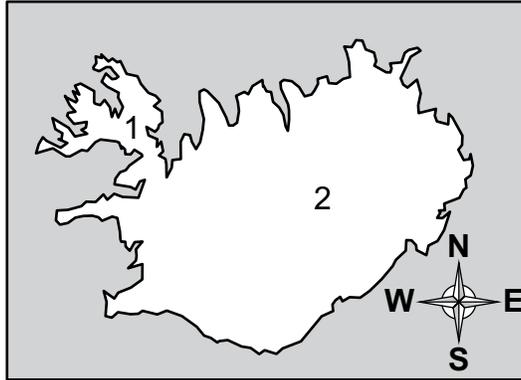
Iceland provides an amazing geologic laboratory for scientists. It is one of the few places on Earth where scientists can study seafloor spreading—above sea level. This is because Iceland is a product of volcanic activity along the Mid-Atlantic Ridge. The map below shows the path of the Mid-Atlantic Ridge through Iceland and the location of the country's major volcanoes.



Iceland is positioned along a divergent boundary where the North American and Eurasian Plates are moving away from one another. This divergence occurs as a result of convection in Earth's mantle. New, hot magma rises through Earth's mantle and escapes through cracks in Earth's crust. When the magma cools, it forms new crust.

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6. Compare the two locations on the map of Iceland below with the Major Volcanoes in Iceland map in the passage.

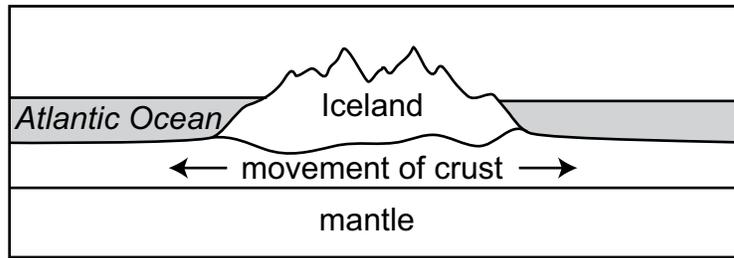


Which statement best compares the locations on the map?

- A. Location 1 is more likely than location 2 to experience a volcanic eruption because it is surrounded by water.
- B. Location 1 is more likely than location 2 to experience an earthquake because it is on a plate moving to the west.
- C. Location 2 is more likely than location 1 to experience a volcanic eruption because it is closer to the Mid-Atlantic Ridge.
- D. Location 2 is more likely than location 1 to experience an earthquake because it has a larger surrounding landmass.

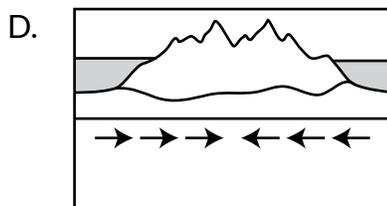
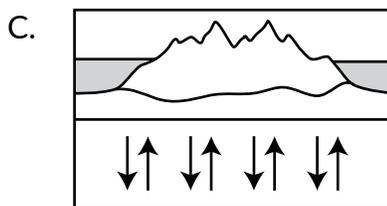
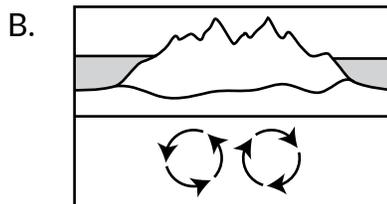
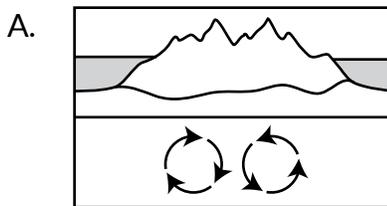
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7. The model below shows a cross section of Earth layers beneath Iceland.



Part A

Which cross section with arrows best shows the cycling of matter within the mantle beneath Iceland?



Part B

Complete the explanation for the process shown in the model from Part A. Circle a word below each blank line to correctly complete the sentences.

Heat energy from Earth's core is transferred to the mantle and causes rock in the mantle to

_____.

melt

crystallize

Molten rock rises, during which its temperature _____ from contact with

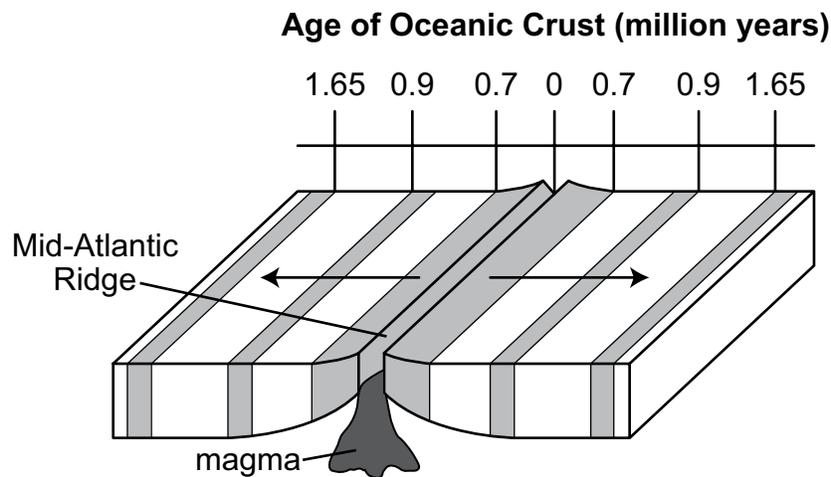
increases

decreases

Earth's crust. This temperature change causes the molten rock to become more dense.

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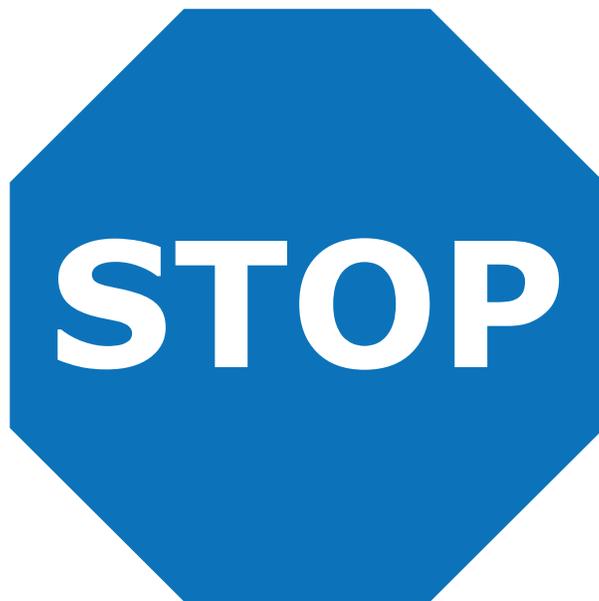
8. A student observes the model of the Mid-Atlantic Ridge below.



Which statement provides evidence for the process shown in the model?

- A. As the plates move apart, the oceanic crust gets older as the distance from the Mid-Atlantic Ridge increases.
- B. As the plates move apart, the oceanic crust gets younger as the distance from the Mid-Atlantic Ridge increases.
- C. As the plates move apart, the oceanic crust melts as the distance from the Mid-Atlantic Ridge increases.
- D. As the plates move apart, the oceanic crust erodes as the distance from the Mid-Atlantic Ridge increases.

STOP.



SCIENCE ITEMS—APPENDIX

SUMMARY DATA

Grade 8

Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
Session 1				
1	<p>SCI.LS2.D.m: Disciplinary Core Idea;</p> <p>SCI.SEP6.B.m: Designing Solutions;</p> <p>SCI.CC7.m: Stability and Change</p>	B	3	<p>A. Incorrect. Increasing the biodiversity of plants would most likely reduce the dependence humans have on honeybees for crop pollination, not the dependence humans have on honeybees for honey products.</p> <p>B. Correct. Planting new pollinator habitat around a farm would increase the biodiversity of plants available to pollinators, which would increase crop results and reduce the dependence humans have on honeybees for crop pollination.</p> <p>C. Incorrect. Increasing the biodiversity of plants would most likely increase crop results, not decrease predation, and reduce the dependence humans have on honeybees for crop pollination, not the dependence humans have on honeybees for honey products.</p> <p>D. Incorrect. Increasing the biodiversity of plants would most likely increase crop results, not decrease predation.</p>
2	<p>SCI.LS4.C.m: Disciplinary Core Idea;</p> <p>SCI.SEP6.A.m: Constructing an Explanation;</p> <p>SCI.CC2.m: Cause and Effect</p>	A	3	<p>A. Correct. The traits that help honeybees survive cold weather would become more common in these colonies as the honeybees successfully survive and reproduce each year.</p> <p>B. Incorrect. This is the opposite of the most likely outcome.</p> <p>C. Incorrect. More honeybees would likely survive in cold weather over time, but this would be due to inherited traits, not learned behaviors.</p> <p>D. Incorrect. More, not fewer, honeybees would likely survive in cold weather over time, and this would be due to inherited traits, not learned behaviors.</p>

SCIENCE ITEMS—APPENDIX

Grade 8

Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
3	<p>SCI.LS1.C.m: Disciplinary Core Idea;</p> <p>SCI.SEP2.m: Developing and Using Models;</p> <p>SCI.CC5.m: Energy and Matter</p>	B	2	<p>A. Incorrect. This table incorrectly identifies the source of energy and how energy is used by Wisconsin flowering plants and honeybees.</p> <p>B. Correct. The source of energy for Wisconsin flowering plants is sunlight and they use energy for making nectar. The source of energy for honeybees is drinking nectar and they use energy for flying.</p> <p>C. Incorrect. This table incorrectly identifies the source of energy for Wisconsin flowering plants and honeybees.</p> <p>D. Incorrect. This table incorrectly identifies the source of energy for honeybees and reverses how energy is used by Wisconsin flowering plants and honeybees.</p>
4	<p>SCI.LS1.D.m: Disciplinary Core Idea;</p> <p>SCI.SEP2.m: Developing and Using Models;</p> <p>SCI.CC4.m: Systems and System Models</p>	<p>Top row, any order: mouth tasting nectar, eyes seeing the waggle dance, antennae detecting flower scent; middle row: nerves delivering message to brain; bottom row: honeybee flying toward flower</p>	2	<p>The student develops a model to show how a honeybee learns about the location of a flower and responds to that information. The honeybee first uses its sense receptors to receive information: the mouth tasting nectar, the eyes seeing the waggle dance, and the antennae detecting the flower scent. Then, the honeybee's nerves transmit information from sense receptors to the brain. The resulting behavior is the honeybee flying toward the flower.</p>

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
5	<p>SCI.PS1.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP4.m: Analyzing and Interpreting Data;</p> <p>SCI.CC2.m: Cause and Effect</p>	A	3	<p>A. Correct. A chemical reaction took place, as indicated by the temperature change and production of a gas.</p> <p>B. Incorrect. Dissolving is a physical change.</p> <p>C. Incorrect. Mass was not shown to be conserved because the gas escaped the open container.</p> <p>D. Incorrect. Dissolving is a physical change. Mass was not shown to be conserved because the gas escaped the open container.</p>
6	<p>SCI.PS2.A.m: Disciplinary Core Idea;</p> <p>SCI.SEP3.m: Planning and Conducting Investigations;</p> <p>SCI.CC2.m: Cause and Effect</p>	D	2	<p>A. Incorrect. Increasing the mass of the car would decrease the acceleration of the car. Increasing the friction between the car and the ground would decrease the acceleration of the car.</p> <p>B. Incorrect. Decreasing the amount of carbon dioxide released would decrease the acceleration of the car.</p> <p>C. Incorrect. Increasing the mass of the car would decrease the acceleration of the car. Decreasing the amount of carbon dioxide released would decrease the acceleration of the car. Increasing the friction between the car and the ground would decrease the acceleration of the car.</p> <p>D. Correct. Decreasing the mass of the car would increase the acceleration of the car. Increasing the amount of carbon dioxide released would increase the acceleration of the car. Decreasing the friction between the car and the ground would increase the acceleration of the car.</p>

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
7	<p>SCI.PS2.A.m: Disciplinary Core Idea;</p> <p>SCI.SEP6.A.m: Constructing an Explanation;</p> <p>SCI.CC2.m: Cause and Effect</p>	B	3	<p>A. Incorrect. Solution W will not help the car move farther in a horizontal direction, because the action force would be downward.</p> <p>B. Correct. Solution X increases the action force by generating more gas inside the bottle. Solution Y increases the action force by increasing the gas pressure.</p> <p>C. Incorrect. Solution Z decreases the action force and decreases the reaction force; by removing the stopper, the gas pressure inside the reaction vessel decreases.</p> <p>D. Incorrect. Solution W will not help the car move farther in a horizontal direction, because the action force would be downward. Solution Z decreases the action force and decreases the reaction force; by removing the stopper, the gas pressure inside the reaction vessel decreases.</p>
8	<p>SCI.PS1.A.m: Disciplinary Core Idea;</p> <p>SCI.SEP2.m: Developing Models;</p> <p>SCI.CC4.m: Systems and System Models</p>	B, C, F	2	<p>A. Incorrect. This statement describes the motion of gas molecules.</p> <p>B. Correct. This statement describes the motion of molecules in a solid.</p> <p>C. Correct. This statement describes the motion and kinetic energy of molecules in a solid.</p> <p>D. Incorrect. This statement describes the motion and kinetic energy of gas molecules.</p> <p>E. Incorrect. This statement describes the positioning of gas molecules in a container.</p> <p>F. Correct. This statement describes the positioning of solid molecules in a container.</p>

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
Session 2				
1	<p>SCI.PS2.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP1.A.m: Asking Questions;</p> <p>SCI.CC2.m: Cause and Effect</p>	A	2	<p>A. Correct. The student can measure the distance between the Van de Graaff generator and the end of a spark at different humidity levels.</p> <p>B. Incorrect. Humidity affects the flow of electrons, which is related to discharge, not the number of electrons produced by the generator.</p> <p>C. Incorrect. This question suggests a misconception about the relationship.</p> <p>D. Incorrect. This question suggests a misconception about the relationship.</p>
2	<p>SCI.PS2.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP3.m: Planning and Conducting Investigations;</p> <p>SCI.CC2.m: Cause and Effect</p>	<p>Part A: C</p> <p>Part B: B</p>	2	<p>Part A</p> <p>A. Incorrect. The metal roller and rubber belt do not exert forces on each other.</p> <p>B. Incorrect. The metal roller and hollow metal sphere do not exert forces on each other.</p> <p>C. Correct. The hollow metal sphere and the discharge wand exert forces on each other without touching each other.</p> <p>D. Incorrect. The electrode with brush and acrylic roller are in contact with each other.</p> <p>Part B</p> <p>A. Incorrect. These parts are in contact with each other so the charges can be collected.</p> <p>B. Correct. The release of a spark indicates a force is being exerted, but the two parts touching.</p> <p>C. Incorrect. These parts are in contact with each other so the charges can be collected.</p> <p>D. Incorrect. These parts are in contact with each other through a wire.</p>

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
3	SCI.PS3.C.m: Disciplinary Core Idea; SCI.SEP3.m: Planning and Constructing Investigations; SCI.CC2.m: Cause and Effect	D	2	A. Incorrect. Rubber is an insulating material, but the type of material used for the base does not provide evidence of forces interacting. B. Incorrect. The metal sphere may feel cold, but that observation does not provide evidence of forces interacting. C. Incorrect. The discharge wand is connected to the ground electrode for safety; that observation does not provide evidence of forces interacting. D. Correct. The student’s hair rising and standing on end provides evidence that the person is discharging the Van de Graaff generator.
4	SCI.LS2.B.m: Disciplinary Core Idea; SCI.SEP2.m: Developing Models; SCI.CC5.m: Energy and Matter	Clockwise from top left: electro-magnetic waves, carbon dioxide, oxygen, sugars	2	The student labels the model. The model is correctly labeled to show the transfer of electromagnetic waves from the sun to the plant, carbon dioxide entering the leaves, oxygen released from the plant to the environment, and sugars stored in the plant.

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
Session 3				
1	<p>SCI.LS2.A.m: Disciplinary Core Idea;</p> <p>SCI.SEP2.m: Developing Models;</p> <p>SCI.CC1.m: Patterns</p>	A	2	<p>A. Correct. The great blue heron competes with the river otter for brown trout.</p> <p>B. Incorrect. The brown trout has two predators shown in the food web.</p> <p>C. Incorrect. The brown trout consumes three organisms shown in the food web.</p> <p>D. Incorrect. The brown trout has interactions with five other organisms shown in the food web.</p>
2	<p>SCI.LS2.A.m: Disciplinary Core Idea;</p> <p>SCI.SEP4.m: Analyzing and Interpreting Data;</p> <p>SCI.CC2.m: Cause and Effect</p>	<p>Part A: B</p> <p>Part B: C</p>	2	<p>Part A</p> <p>A. Incorrect. With a high or medium dissolved oxygen concentration in the stream, brown trout would be more likely to survive.</p> <p>B. Correct. The dissolved oxygen concentration in the stream has most likely decreased to low or very low.</p> <p>Part B</p> <p>A. Incorrect. Brown trout using oxygen from the water during respiration is less likely to cause the decrease in dissolved oxygen concentration than bacteria using oxygen in the water to decompose organic matter.</p> <p>B. Incorrect. Water containing oxygen entering the stream after a rain storm would not cause the decrease in dissolved oxygen concentration.</p> <p>C. Correct. Bacteria using oxygen in the water to decompose organic matter most likely caused the decrease in dissolved oxygen concentration.</p> <p>D. Incorrect. Photosynthesis adds oxygen to water, which would not cause the decrease in dissolved oxygen concentration.</p>

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Sample Number	Alignment	Key(s)	Depth of Knowledge	Annotations
3	<p>SCI.LS2.C.m: Disciplinary Core Idea;</p> <p>SCI.SEP7.m: Arguing from Evidence;</p> <p>SCI.CC7.m: Stability and Change</p>	B	3	<p>A. Incorrect. Northern Wisconsin has a high landscape condition as shown on the map, which means more acres of undisturbed landscape, not fragmented landscape.</p> <p>B. Correct. Northern Wisconsin has a high landscape condition as shown on the map, which means more buffer-zone areas around streams and more acres of undisturbed landscape.</p> <p>C. Incorrect. Northern Wisconsin has a high landscape condition as shown on the map, which means it most likely has better stream health and more buffer-zone areas, not fewer buffer-zone areas, and more acres of undisturbed landscape, not fragmented landscape.</p> <p>D. Incorrect. Northern Wisconsin has a high landscape condition as shown on the map, which means it most likely has better stream health and more buffer-zone areas, not fewer buffer-zone areas.</p>
4	<p>SCI.ESS3.C.m: Disciplinary Core Idea;</p> <p>SCI.SEP6.A.m: Constructing Explanation;</p> <p>SCI.CC2.m: Cause and Effect</p>	Layer rocks along a path to the stream; install a livestock watering system away from the stream	2	<p>The student checks two boxes in the table to indicate actions the farmer can take to reduce streambank erosion. Layering rocks along the path to the stream and installing a livestock watering system away from the stream are actions that can reduce streambank erosion by minimizing the impact of livestock.</p>

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5	<p>SCI.ETS1.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP7.m: Arguing from Evidence</p>	D	2	<p>A. Incorrect. Design 2 is more appropriate; providing each house with access to the wetland is not a criterion for the project.</p> <p>B. Incorrect. Design 2 is more appropriate; providing larger lot sizes with more forested areas is not a criterion for the project.</p> <p>C. Incorrect. Providing each house with privacy on all sides is not a criterion for the project.</p> <p>D. Correct. Design 2 keeps more forested areas intact and provides forested area between the wetland and the house lots.</p>
6	<p>SCI.ESS3.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP4.m: Analyzing and Interpreting Data;</p> <p>SCI.CC1.m: Patterns</p>	C	3	<p>A. Incorrect. Proximity to a plate boundary, not water, is a factor affecting volcanic activity.</p> <p>B. Incorrect. Proximity to a plate boundary, not direction of plate motion, is a major factor related to the effects of an earthquake.</p> <p>C. Correct. The closer proximity of location 2 to the Mid-Atlantic Ridge makes it more likely to experience a volcanic eruption.</p> <p>D. Incorrect. Proximity to a plate boundary, not necessarily the size of the surrounding landmass, is a major factor related to the effects of an earthquake.</p>

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7	SCI.ESS2.A.m: Disciplinary Core Idea; SCI.SEP2.m: Developing Models	Part A: B Part B: melt; decreases	2	Part A A. Incorrect. This model of convection within the mantle indicates a convergent plate boundary. B. Correct. This model of convection within the mantle indicates a divergent plate boundary. C. Incorrect. This model incorrectly represents the cycling of matter within the mantle beneath Iceland; matter does cycle up and down in relation to the crust, but it moves in a rising convection current. D. Incorrect. This model incorrectly represents the cycling of matter within the mantle beneath Iceland; matter moves in a rising convection current, not laterally beneath the crust. Part B The student circles the words that correctly complete the explanation for the process shown in the model from Part A. Heat energy from Earth’s core causes rock in the mantle to melt and flow; when rising molten rock contacts Earth’s crust, its temperature decreases.

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8	<p>SCI.ESS2.B.m: Disciplinary Core Idea;</p> <p>SCI.SEP4.m: Analyzing and Interpreting Data</p>	A	2	<p>A. Correct. According to the theory of seafloor spreading, oceanic crust that is formed at the Mid-Atlantic Ridge spreads away from the ridge in both directions over time.</p> <p>B. Incorrect. The youngest crust is located closest to the Mid-Atlantic Ridge, not farthest from it.</p> <p>C. Incorrect. Magma that rises through the crust at the Mid-Atlantic Ridge cools and solidifies when it reaches the sea floor.</p> <p>D. Incorrect. This statement does not provide evidence for the age of oceanic crust in relation to distance from the Mid-Atlantic Ridge as shown in the model.</p>

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