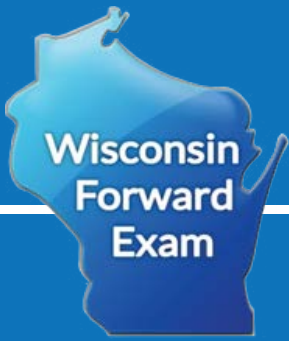


Wisconsin WFE Grade 8 Science Practice

Exam Materials
Pages 2 - 28

Answer Key Materials
Pages 29 - 37



WISCONSIN DEPARTMENT OF
Public Instruction

Science Item Sampler Grade 8



SCENARIO 1

Read the following scenario. Then answer items 1 through 5. You may look back at the scenario to help you answer the items.

Safeguarding Wisconsin's Streams

After the quiet of a Wisconsin winter, being streamside in spring sounds like a festival. The chorus of frogs, calls of songbirds and waterbirds, and buzzing of insects are evidence of the life teeming along these waterways. The wildlife depends upon these streams and their bankside vegetation for food, cover, and shelter. At dusk, certain mammals like raccoons and foxes emerge from their forested shelter to find food in shallow pools of water or in nearby fields.

Wisconsin has a wealth of freshwater streams. Beyond their rich ecological value, they provide recreational opportunities for humans who enjoy fishing, canoeing, or kayaking. Farmers value streams for irrigating fields. Residential developers recognize the appeal of streams for property owners. Land along streams is in high demand.

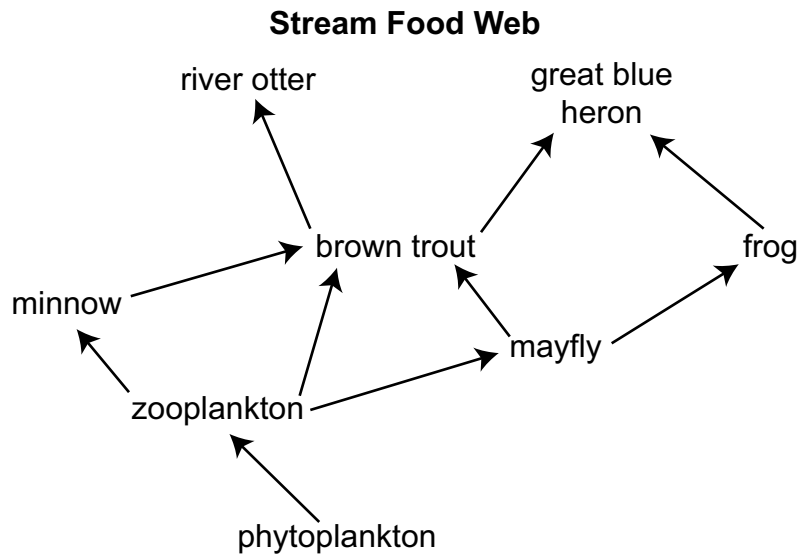
However, these demands can put Wisconsin streams at risk. Ecologists use the following landscape characteristics to help evaluate stream health:

- 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 these characteristics support healthy streams and, consequently, entire ecosystems. Preserving streamside vegetation areas (called buffer zones) helps prevent erosion and provides wildlife habitat. Maintaining streamside forests and wetlands also provides habitat for mammals, birds, and insects. Preventing livestock access to streams limits erosion and reduces bacterial pollution. Each of these land-use actions can have a meaningful impact on stream health and help safeguard Wisconsin's streams.

Go on to the next page.

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

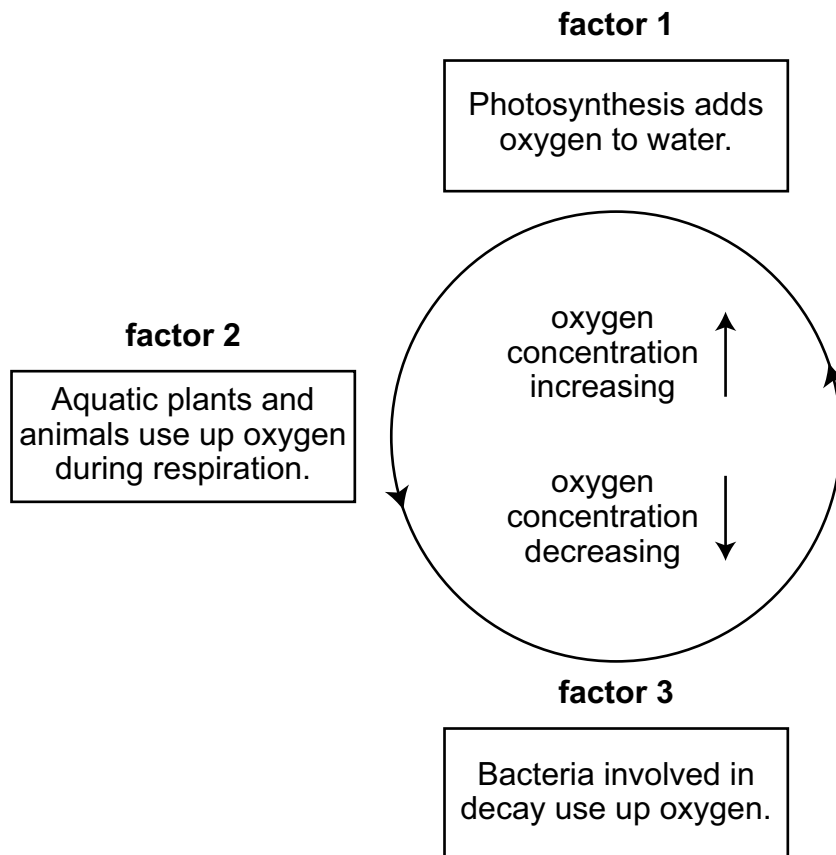
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2. Scientists monitor a stream and determine that the population of brown trout has declined. The scientists study the data below to investigate the role of dissolved oxygen in this population change. Brown trout require at least 6 milligrams per liter (mg/L) of dissolved oxygen to support normal bodily functions.

Dissolved Oxygen Concentrations and Stream Water Quality

Dissolved Oxygen Concentrations	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

The model below shows factors that can affect dissolved oxygen concentration in streams.



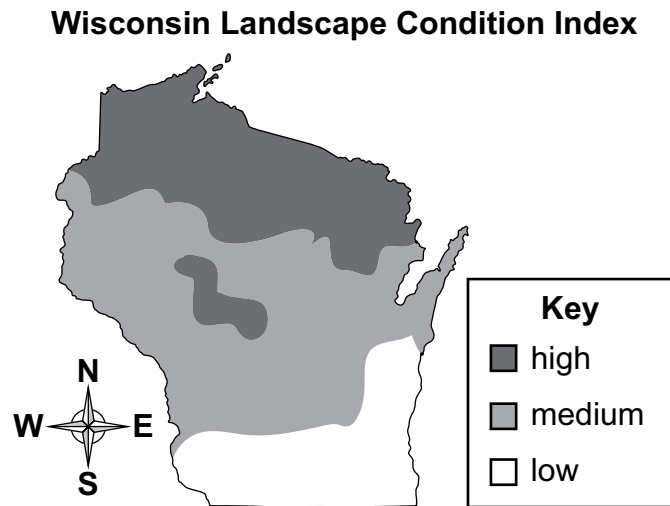
Go on to the next page.

How has the dissolved oxygen concentration in the stream most likely changed, and which factors in the model are most likely contributing to the decline in the brown trout population?

- A. change in dissolved oxygen concentration in stream: increased
factors contributing to population decline: 1 and 2
- B. change in dissolved oxygen concentration in stream: increased
factors contributing to population decline: 2 and 3
- C. change in dissolved oxygen concentration in stream: decreased
factors contributing to population decline: 1 and 2
- D. change in dissolved oxygen concentration in stream: decreased
factors contributing to population decline: 2 and 3

Go on to the next page.

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.

Which table shows checked boxes next to two actions the farmers can take to reduce streambank erosion?

A.

layer rocks along path to the stream	<input checked="" type="checkbox"/>
select a steep area for cattle to access the stream	<input checked="" type="checkbox"/>
provide access along the entire length of the stream	<input type="checkbox"/>
install a livestock watering system away from the stream	<input type="checkbox"/>

B.

layer rocks along path to the stream	<input type="checkbox"/>
select a steep area for cattle to access the stream	<input checked="" type="checkbox"/>
provide access along the entire length of the stream	<input checked="" type="checkbox"/>
install a livestock watering system away from the stream	<input type="checkbox"/>

C.

layer rocks along path to the stream	<input checked="" type="checkbox"/>
select a steep area for cattle to access the stream	<input type="checkbox"/>
provide access along the entire length of the stream	<input type="checkbox"/>
install a livestock watering system away from the stream	<input checked="" type="checkbox"/>

D.

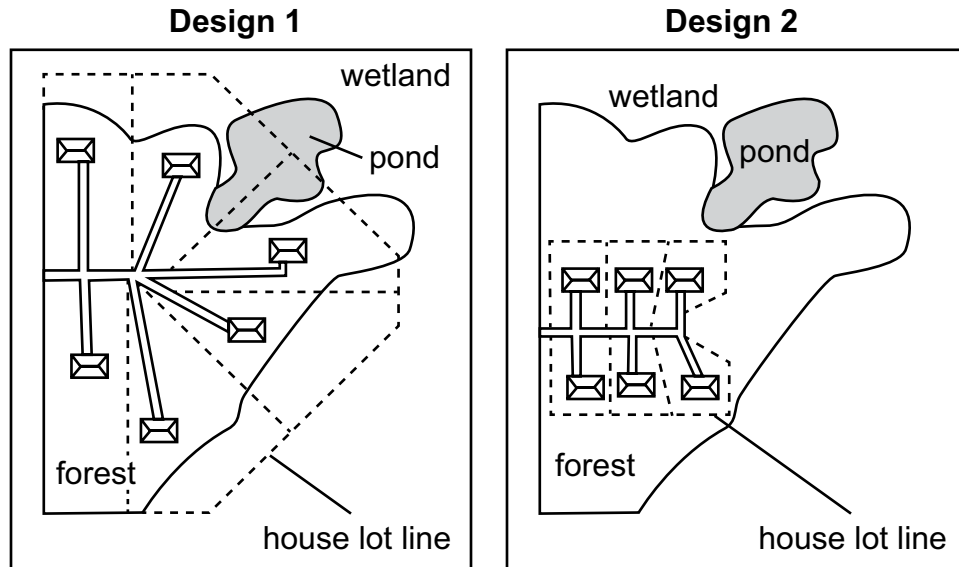
layer rocks along path to the stream	<input type="checkbox"/>
select a steep area for cattle to access the stream	<input checked="" type="checkbox"/>
provide access along the entire length of the stream	<input type="checkbox"/>
install a livestock watering system away from the stream	<input checked="" type="checkbox"/>

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?

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

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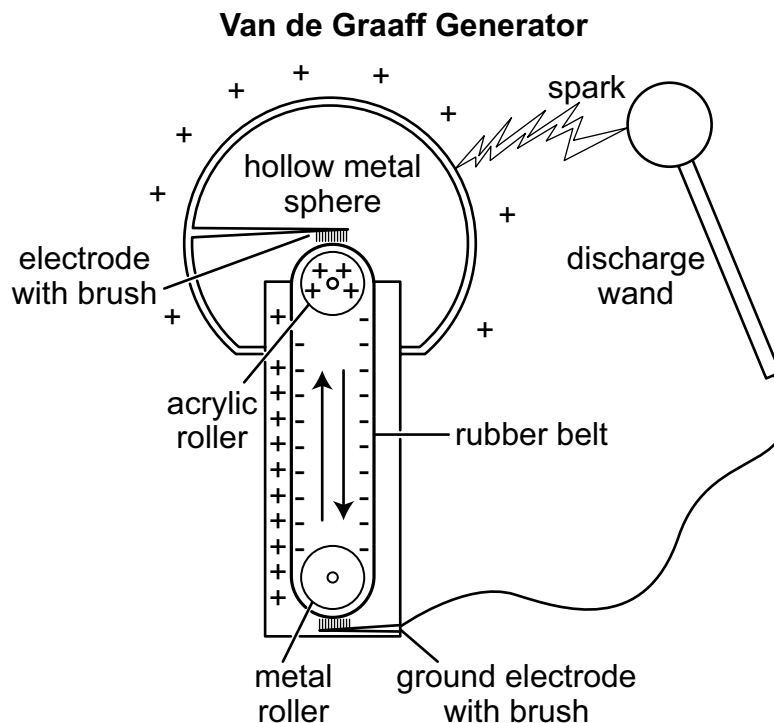
SCENARIO 2

Read the following scenario. Then answer items 6 through 8. You may look back at the scenario to help you answer the items.

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**



Go on to the next page.

6. 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?

Go on to the next page.

7. 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 type of force is the student investigating?

- A. electric
- B. frictional
- C. gravitational
- D. magnetic

Part B

Which piece of evidence best supports the idea that the discharge wand and metal sphere can exert forces on each other without being in contact?

- A. The discharge wand is connected to the generator by a wire.
- B. The distance is reduced from the discharge wand to the metal sphere.
- C. A spark is released when the discharge wand moves toward the metal sphere.
- D. A sound is produced when the generator is turned on and the rubber belt moves.

Go on to the next page.

8. 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.



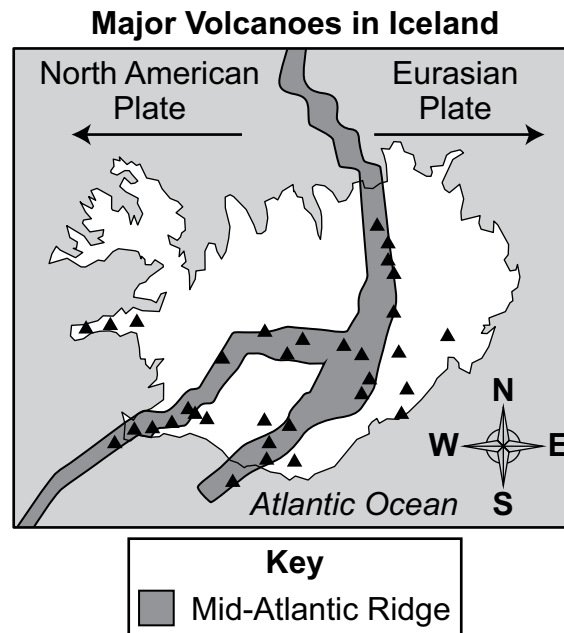
STOP.

SCENARIO 1

Read the following scenario. Then answer items 1 through 3. You may look back at the scenario to help you answer the items.

Iceland

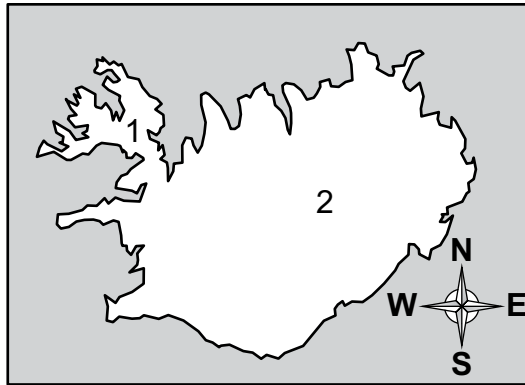
Iceland provides an amazing geologic laboratory for scientists. It is one of the few places on Earth where scientists can study seafloor spreading—above sea level. This is because Iceland is a product of volcanic activity along the Mid-Atlantic Ridge. The map below shows the path of the Mid-Atlantic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

Go on to the next page.

1. Compare the two locations on the map of Iceland below with the Major Volcanoes in Iceland map in the scenario.

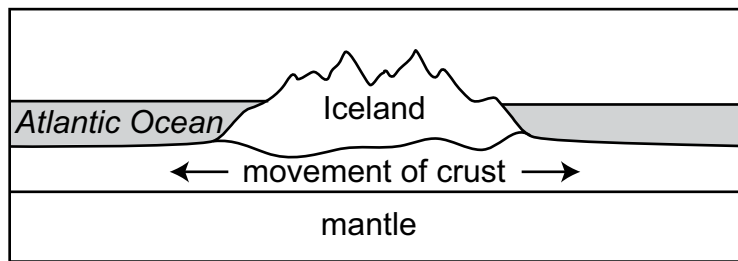


Which statement best compares the locations on the map?

- 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.

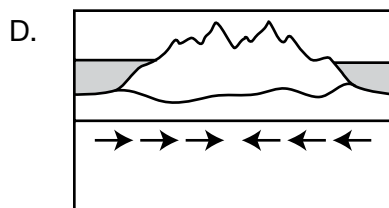
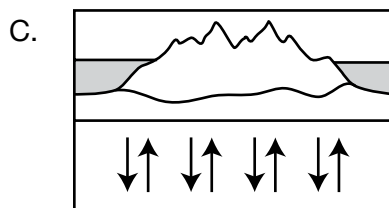
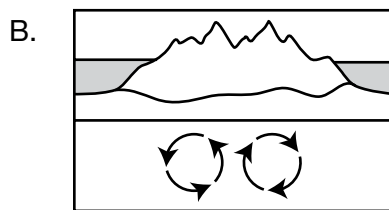
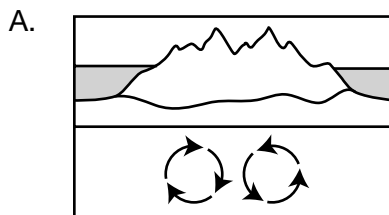
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2. The model below shows a cross section of Earth layers beneath Iceland.



Part A

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



Go on to the next page.

Part B

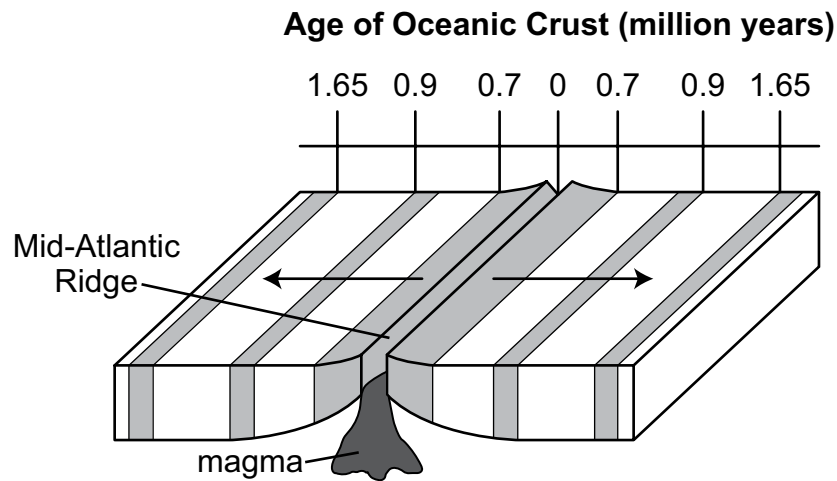
Heat energy from Earth's core is transferred to the mantle and causes rock in the mantle to ____ 1 _____. Molten rock rises, which its temperature ____ 2 _____ from contact with Earth's crust. This temperature change causes the molten rock to become more dense.

Which terms best complete the explanation for the process shown in the model from Part A?

- A. 1. melt
2. increases
- B. 1. crystallize
2. increases
- C. 1. melt
2. decreases
- D. 1. crystallize
2. decreases

Go on to the next page.

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



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

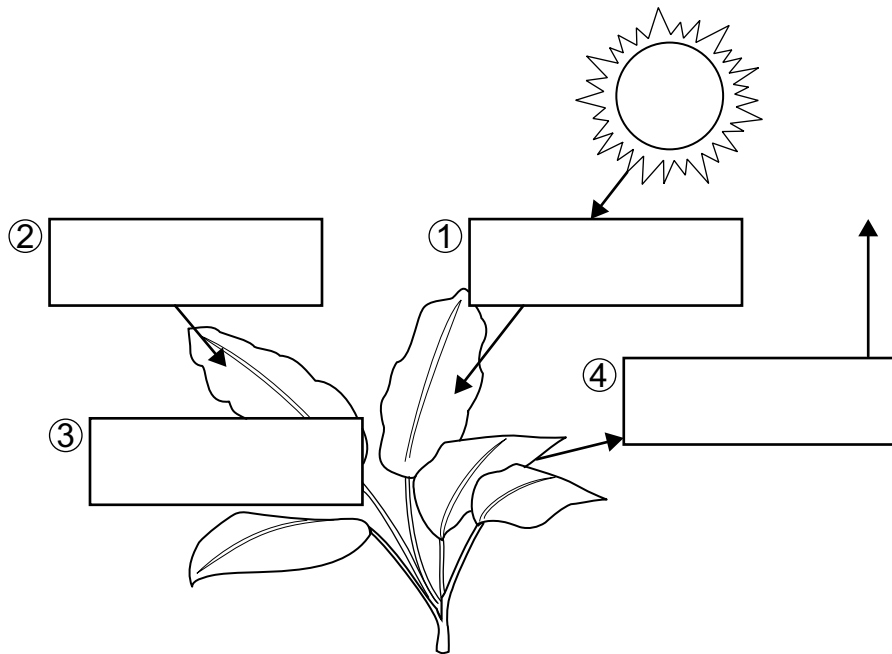
- A. As the plates move apart, the oceanic crust gets older as the distance from the Mid-Atlantic Ridge increases.
- B. As the plates move apart, the oceanic crust gets younger as the distance from the Mid-Atlantic Ridge increases.
- C. As the plates move apart, the oceanic crust melts as the distance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

Go on to the next page.

STANDALONE ITEMS

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.

Which list correctly shows the terms that should be added to the model to show the energy transfer process in which this plant's height gives it an advantage?



- A. 1. electromagnetic waves
2. carbon dioxide
3. sugars
4. oxygen
- B. 1. oxygen
2. sugars
3. carbon dioxide
4. electromagnetic waves
- C. 1. electromagnetic waves
2. sugars
3. carbon dioxide
4. oxygen
- D. 1. oxygen
2. carbon dioxide
3. sugars
4. electromagnetic waves

Go on to the next page.

5. A student examines the data table shown.

Planet	Distance from the Sun (x 1,000,000 km)
Jupiter	778.6
Saturn	1,433.5
Uranus	2,872.5

These data allow the student to produce which type of diagram?

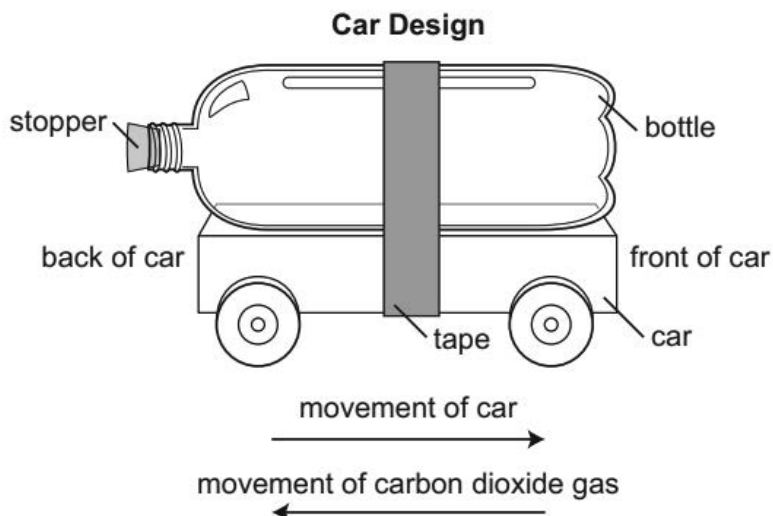
- A. a diagram comparing the compositions of planets
- B. a diagram comparing the surface features and temperatures of planets
- C. a diagram comparing the locations of planets in the solar system
- D. a diagram comparing the sizes of planets



STOP.

SCENARIO 1**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.

Go on to the next page.

1. 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.
-
2. 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 the acceleration of the car?

 - A.
 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
 - B.
 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
 - C.
 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
 - D.
 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

Go on to the next page.

3. 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

Go on to the next page.

4. 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 accurate model of solid CO_2 that should be included in the computer simulation.

1. Molecules are moving randomly and in straight lines.
2. Molecules are vibrating in fixed positions.
3. Molecules are moving slowly with low average kinetic energy.
4. Molecules are moving rapidly with high average kinetic energy.
5. Molecules occupy the entire container and are spread far apart from each other.
6. Molecules occupy only a portion of the container and are arranged very close to each other.



STOP.

SUMMARY DATA

Grade 8

Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
Session 1				
1	SCI.LS2.A.m: Disciplinary Core Idea; SCI.SEP2.A.m: Developing Models; SCI.CC1.m: Patterns	A	2	A. Correct. The great blue heron competes with the river otter for brown trout. B. The brown trout has two predators shown in the food web. C. The brown trout consumes three organisms shown in the food web. D. The brown trout has interactions with five other organisms shown in the food web.
2	SCI.LS2.A.m: Disciplinary Core Idea; SCI.SEP4.A.m: Analyze and Interpret Data; SCI.CC2.m: Cause and Effect	D	2	A. The dissolved oxygen concentration most likely decreased, not increased, in the stream; and photosynthesis adds oxygen to water, which would not cause the brown trout population to decline. B. The dissolved oxygen concentration most likely decreased, not increased, in the stream. C. Photosynthesis adds oxygen to water, which would not cause the brown trout population to decline. D. Correct. The dissolved oxygen concentration most likely decreased in the stream; and the factors that use up oxygen in streams most likely contributed to the decline in the brown trout population.

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Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
3	<p>SCI.LS2.C.m: Disciplinary Core Idea;</p> <p>SCI.SEP7.A.m: Argue from Evidence;</p> <p>SCI.CC7.m: Stability and Change</p>	B	3	<p>A. 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. 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. 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: Construct Explanation</p> <p>SCI.CC2.m: Cause and Effect</p>	C	2	<p>A. Selecting a steep area for cattle to access the stream may increase streambank erosion when hooves erode soil on the hill, which ends up in the stream.</p> <p>B. Providing livestock with access along the entire length of the stream may increase erosion when hooves erode soil along the streambank, which ends up in the stream.</p> <p>C. Correct. 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> <p>D. Selecting a steep area for cattle to access the stream may increase streambank erosion when hooves erode soil on the hill, which ends up in the stream.</p>

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Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
5	SCI.ETS1.B.m: Disciplinary Core Idea; SCI.SEP7.A.3-5: Argue from Evidence	D	2	<p>A. Design 2 is more appropriate; providing each house with access to the wetland is not a criterion for the project.</p> <p>B. Design 2 is more appropriate; providing from larger lot sizes with more forested areas is not a criterion for the project.</p> <p>C. 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	SCI.ETS1.B.m: Disciplinary Core Idea; SCI.SEP1.A.m: Asking Questions; SCI.CC2.m: Cause and Effect	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. Humidity affects the flow of electrons, which is related to discharge, not the number of electrons produced by the generator.</p> <p>C. This question suggests a misconception about the relationship.</p> <p>D. This question suggests a misconception about the relationship.</p>

Grade 8

Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
7	SCI.PS2.B.m: Disciplinary Core Idea; SCI.SEP3.A.m: Planning and Conducting Investigations; SCI.CC2.m: Cause and Effect	Part A: A Part B: C	2	Part A A. Correct. The student is investigating electric force using a Van de Graaff generator. B. The student is not investigating frictional force using a Van de Graaff generator. C. The student is not investigating gravitational force using a Van de Graaff generator. D. The student is not investigating magnetic force using a Van de Graaff generator. Part B A. The discharge wand wire is connected to the ground electrode. B. Reducing the distance between the wand and the sphere does not provide evidence that the wand and sphere can exert force on each other without touching. C. Correct. The release of a spark indicates that the wand and the sphere can exert force on each other without touching. D. The sound produced when the Van de Graaff generator is operating does not provide evidence that the wand and sphere can exert force on each other without touching.
8	SCI.PS3.C.m: Disciplinary Core Idea; SCI.SEP3.A.m: Planning and Constructing Investigations; SCI.CC2.m: Cause and Effect	D	2	A. Rubber is an insulating material, but the type of material used for the base does not provide evidence of forces interacting. B. The metal sphere may feel cold, but that observation does not provide evidence of forces interacting. C. 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.

Grade 8

Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
Session 2				
1	SCI.ESS3.B.m: Disciplinary Core Idea; SCI.SEP4.A.m: Analyze and Interpret Data SCI.CC1.m: Patterns	C	3	A. Proximity to a plate boundary, not water, is a factor affecting volcanic activity. B. Proximity to a plate boundary, not direction of plate motion, is a major factor related to the effects of an earthquake. C. Correct. The closer proximity of location 2 to the Mid-Atlantic Ridge makes it more likely to experience a volcanic eruption. D. Proximity to a plate boundary, not necessarily the size of the surrounding landmass, is a major factor related to the effects of an earthquake.

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Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
2	SCI.ESS2.A.m: Disciplinary Core Idea; SCI.SEP2.A.m: Developing Models	Part A: B Part B: C	2	<p>Part A</p> <p>A. This model of convection within the mantle indicates a convergent plate boundary.</p> <p>B. Correct. This model of convection within the mantle indicates a divergent plate boundary.</p> <p>C. 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.</p> <p>D. 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.</p> <p>Part B</p> <p>A. When rising molten rock contacts Earth's crust, its temperature decreases, not increases.</p> <p>B. Heat energy from Earth's core causes rock in the mantle to melt, not crystallize; when rising molten rock contacts Earth's crust, its temperature decreases, not increases.</p> <p>C. Correct. 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.</p> <p>D. Heat energy from Earth's core causes rock in the mantle to melt, not crystallize.</p>

Grade 8

Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
3	SCI.ESS2.B.m: Disciplinary Core Idea; SCI.SEP4.A.m: Analyze and Interpret Data	A	2	<p>A. Correct. According to the theory of sea floor spreading, oceanic crust that is formed at the Mid-Atlantic Ridge spreads away from the ridge in both and Interpret Data directions over time.</p> <p>B. The youngest crust is located closest to the Mid-Atlantic Ridge, not farthest from it.</p> <p>C. Magma that rises through the crust at the Mid-Atlantic Ridge cools and solidifies when it reaches the sea floor.</p> <p>D. 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>
4	SCI.LS2.B.m: Disciplinary Core Idea; SCI.SEP2.A.m: Developing Models; SCI.CC5.m: Energy and Matter	A	2	<p>A. Correct. The model is correctly labeled to show electromagnetic waves from the sun to the plant, carbon dioxide entering the leaves, sugars produced during photosynthesis, and oxygen released from the plant to the surrounding environment.</p> <p>B. None of the labels correctly indicate the energy transfer process for the plant shown in the model.</p> <p>C. Only electromagnetic waves and oxygen are correctly labeled to indicate the energy transfer process for the plant shown in the model.</p> <p>D. Only carbon dioxide and sugars are correctly labeled to indicate the energy transfer process for the plant shown in the model.</p>
5	SCI.ESS1.B.m: Disciplinary Core Idea; SCI.SEP4.A.m: Analyze and Interpret Data; SCI.CC3.m: Scale, Proportion, and Quantity	C	2	<p>A. The data table does not provide data about the compositions of the planets.</p> <p>B. The data table does not provide data about the surface features or temperatures of the planets.</p> <p>C. Correct. The data table provides data about distance from the sun, which could be used to produce a diagram showing relative locations of planets in the solar system.</p> <p>D. The data table does not provide data about the sizes of the planets.</p>

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Sample Number	Alignment	Answer Key	Depth of Knowledge	Annotations
Session 3				
1	<p>SCI.PS1.B.m: Disciplinary Core Idea</p> <p>SCI.SEP4.A.m: Analyze and Interpret 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. Dissolving is a physical change.</p> <p>C. Mass was not shown to be conserved because the gas escaped the open container.</p> <p>D. Dissolving is a physical change. Mass was not shown to be conserved because the gas escaped the open container.</p>
2	<p>SCI.PS2.A.m: Disciplinary Core Idea</p> <p>SCI.SEP3.A.m: Planning and Conducting Investigations</p> <p>SCI.CC2.m: Cause and Effect</p>	D	2	<p>A. 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. Decreasing the amount of carbon dioxide released would decrease the acceleration of the car.</p> <p>C. 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	Answer Key	Depth of Knowledge	Annotations
3	SCI.PS2.A.m: Disciplinary Core Idea SCI.SEP6.A.m: Construct an Explanation SCI.CC2.m: Cause and Effect	B	3	A. Solution W will not help the car move farther in a horizontal direction, because the action force would be upward. 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. C. Solution Z decreases the action force and decreases the reaction force; by removing the stopper, the gas pressure inside the reaction vessel decreases. D. Solution W will not help the car move farther in a horizontal direction, because the action force would be upward. Solution Z decreases the action force and decreases the reaction force; by removing the stopper, the gas pressure inside the reaction vessel decreases.
4	SCI.PS1.A.m: Disciplinary Core Idea SCI.SEP2.A.m: Developing Models SCI.CC4.m: Systems and System Models	B,C,F	2	A. This statement describes the motion of gas molecules. B. Correct. This statement describes the motion of molecules in a solid. C. Correct. This statement describes the motion and kinetic energy of molecules in a solid. D. This statement describes the motion and kinetic energy of gas molecules. E. This statement describes the positioning of gas molecules in a container. F. Correct. This statement describes the positioning of solid molecules in a container.