Texas STAAR 2022 Grade 5 Science

Exam Materials
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Answer Key Materials
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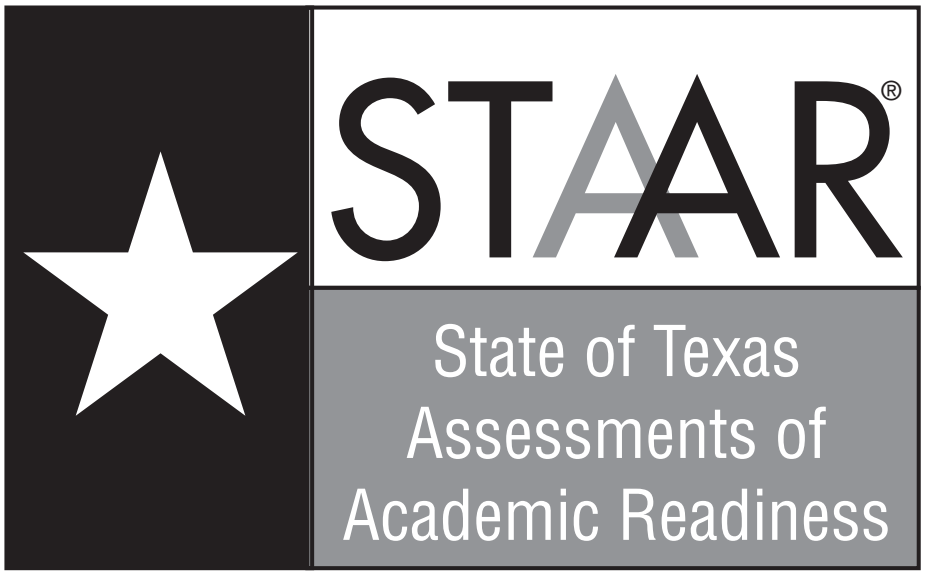


GRADE 5

Science

Administered May 2022

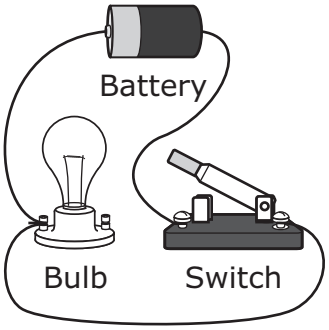
RELEASED

DIRECTIONS

Read each question carefully. Determine the best answer to the question from the four answer choices provided. Then fill in the answer on your answer document.

1 Which circuit shown will produce light when the switch is closed?

A



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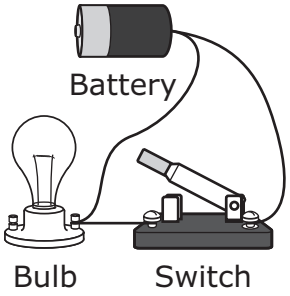
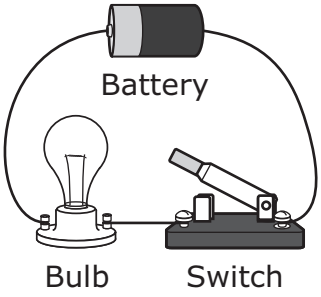


B



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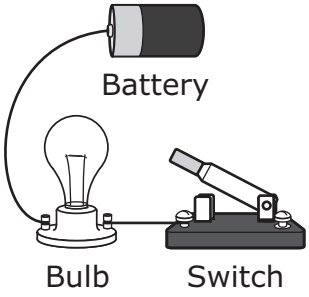

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2 Which statement best explains why the sun appears to move across the sky during the day?

F The Earth is closest to the sun in the winter.

G The Earth is revolving around the sun.

H The Earth is tilted at 23.5 degrees.

J The Earth is rotating on its axis.

3 A student is looking directly at a lit nightlight through two different cardboard tubes as shown.

Through which tube, if any, will the light be seen and why?

A The bent tube only because the light bounces off the sides of the tube and travels through the tube to the student's eye

B The straight tube only because the light travels in a straight line directly to the student's eye

C Both tubes because light travels equally well along straight and curved paths

D Neither tube because both tubes absorb all of the light

4 A student places objects in a bucket of water to determine if they will float.

Object
Toothpick
Plastic paper clip
Penny
Cork
Metal spoon
Vegetable oil

Which set of items is less dense than water?

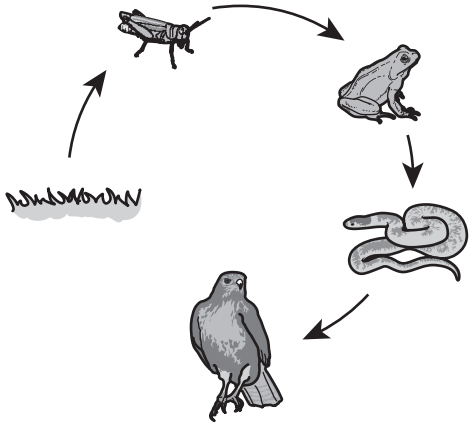
F Plastic paper clip, penny, and cork

G Toothpick, metal spoon, and plastic paper clip

H Metal spoon, vegetable oil, and penny

J Toothpick, cork, and vegetable oil

5 A food chain is shown.



Which role do the grasses have in the food chain?

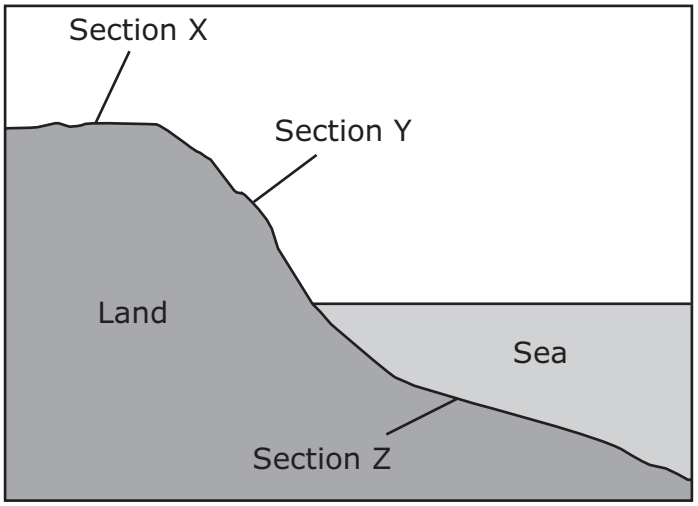
A They decompose small organisms to produce energy.

B They prevent the food chain from containing too many carnivores.

C They capture the energy from the sun and are food for consumers.

D They break down dead organisms into simpler substances.

6 A diagram of different sections of land is shown.



Which action is most likely happening in Section Y in the diagram?

F Wind and rain compacting rock into larger pieces

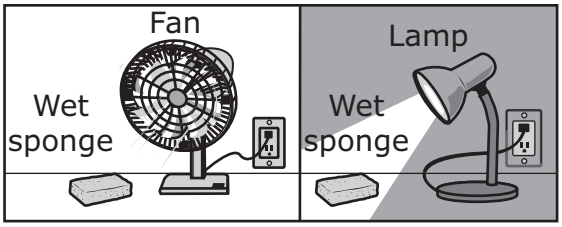
G Water carrying rocky material to a new location

H Chemicals in water gluing sediments to each other

J Pressure causing layers of sediment to form over time

7 A student uses the setup shown to investigate ways to speed up evaporation.

Evaporation Investigation



Which forms of energy are being compared in the student's investigation?

A Light energy and electrical energy

B Mechanical energy and electrical energy

C Light energy and thermal energy

D Mechanical energy and thermal energy

8 A gardener plants seeds in the garden. After the flower stage, the fruits and vegetables grow. A table of how many days are needed for some plants to be ready for harvest is shown.

Plant	Days to Sprout	Days until Ready for Harvest
Green beans	6	50–70
Watermelon	4–5	80–100
Cucumber	2–5	55–65
Pumpkin	3–4	85–120

Which statement is supported by the data shown in the table?

F Pumpkins take the most time to sprout and to be ready for harvesting.

G Green bean seeds sprout faster because they are smaller than other seeds.

H Cucumbers are ready for harvest in less time than watermelons.

J Watermelon seeds take longer to sprout because watermelon plants produce large fruits.

---

9 Students make a solar system model on the playground. The school building represents the sun. They label round objects for each planet.

Which planet should they place at the greatest distance from the school building?

A Jupiter

B Neptune

C Mercury

D Saturn

10 Students observe a gerbil in a cage. They write their observations as shown.

- It twitches its whiskers.
- It burrows in the bedding.
- It drinks water from a metal tube.
- It walks on four legs.

Which of these observations is most likely a learned behavior?

F Twitching its whiskers

G Burrowing in the bedding

H Drinking water from a metal tube

J Walking on four legs

---

11 A student plans to make a chart that describes each process in the water cycle. Which sentence should the student use to describe the process of condensation?

A Water flows downhill.

B Liquid water turns into water vapor.

C Polar ice turns into liquid water.

D Water vapor collects to form droplets.

12 Students study barracudas. They gather some observations of barracudas. A barracuda is shown.

Barracuda

Which observation describes barracudas interacting with the living elements of their ecosystem?

F Barracudas can travel quickly using surface ocean currents.

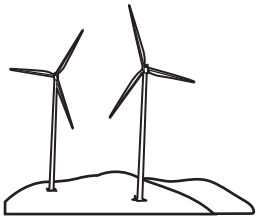
G Barracudas live around hard structures such as oil rigs and jetties.

H Barracudas are predators of other fish.

J Barracudas tend to live in warm waters.

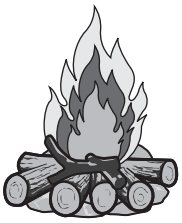
13 Examples of objects that use different types of energy to perform their functions are shown.

Example 1



Wind turbines spinning

Example 2

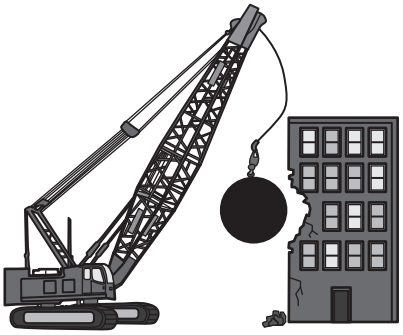


Campfire burning

Example 3

Hammer hitting a nail

Example 4



Wrecking ball breaking down a building

Which examples use mechanical energy to perform their functions?

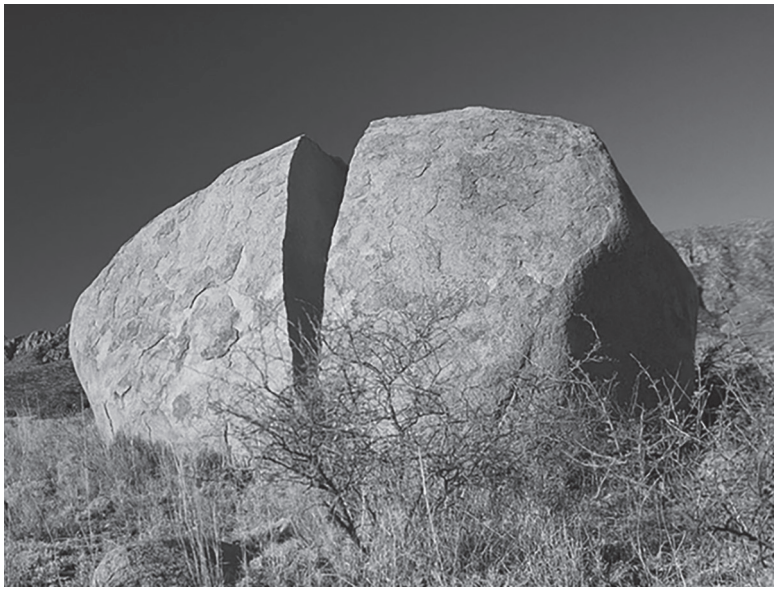
A Examples 1, 2, and 4

B Examples 1, 3, and 4

C Examples 1 and 2 only

D Examples 3 and 4 only

14 A picture of a rock is shown.



George F. Mobley/National Geographic Creative

Which process most likely caused the crack in the rock?

F Water freezing and thawing in the rock

G Wind blowing particles against the rock

H Water moving and dropping the rock

J Glaciers scraping over the surface of the rock

15 The foot of a hawk and the foot of a chicken are shown.

Hawk	Chicken
	

The difference between the shapes of their feet is most likely associated with the —

A predators that hunt them

B climate in which they live

C way they get their food

D distance they can fly

16 A student is classifying objects. Answering which question will provide the best evidence that an object is a metal?

F What is its mass?

G What is its physical state?

H Does it conduct thermal energy?

J How quickly does it dissolve in water?

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17 Two box turtles live in an area in a zoo's reptile house. Zoo visitors made a list of observations of the turtles. The list is shown.

1. Sliding into a small pond
2. Eating a strawberry
3. Digging a hole in the sandy soil
4. Climbing onto a flat rock
5. Holding an earthworm in its mouth
6. Walking across the area

Which observations best describe how box turtles interact with living parts of their environment?

A Observation 4 and observation 6

B Observation 2 and observation 5

C Observation 1 and observation 5

D Observation 3 and observation 4

18 A student pours 14 grams of sugar into a jar filled with 500 milliliters of water. The student thoroughly stirs the sugar and water to make a solution.

Which change most likely occurs to the sugar when it is added to the water?

F The sugar breaks down to form a new substance in the solution.

G The sugar changes water into a new substance in the solution.

H The sugar floats on the surface of the water in the solution.

J The sugar completely dissolves in the solution.

19 The student is observing part of a plant with a microscope.

Which statement describes a behavior of light in the microscope?

A Light travels through the microscope lens without changing direction.

B Moving in straight lines causes light to increase in brightness.

C Light refracts through the lens of the microscope.

D Moving in straight lines keeps light from reflecting.

20 A student lists resources that can be used to produce electricity. The list is shown.

- Wind
- Coal
- Natural gas
- Water power
- Petroleum

Which of the resources are renewable resources?

F Wind, water power

G Wind, coal, and natural gas

H Coal, water power, and petroleum

J Coal, natural gas, water power, and petroleum

GO ON

21 Butterflies have very long, tubelike tongues. Hummingbirds have very long tongues.

© iStock.com/njtalor

© iStock.com/Wildnerdpix

Which statement best describes why butterflies and hummingbirds both have long tongues?

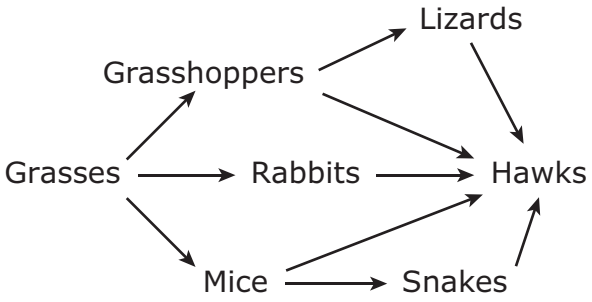
A Butterflies and hummingbirds both migrate.

B Butterflies and hummingbirds are attracted to brightly colored flowers.

C Butterflies and hummingbirds eat the same food.

D Butterflies and hummingbirds have the same predators.

22 A food web of a grassland ecosystem is shown.



Which organisms rely on the same food source?

F Snakes and hawks

G Rabbits and lizards

H Mice and snakes

J Grasshoppers and lizards

---

23 Students conduct an investigation with breakfast cereal. The first four steps of the students' investigation are in the table shown.

Breakfast Cereal Investigation

1. Grind 50 grams of cereal into a fine powder.
2. Stir the cereal powder into 500 milliliters of warm water.
3. Hold a magnet against the side of the beaker at the 250-milliliter mark.
4. Stir the mixture for three minutes.

The students are trying to determine the presence of which substance in the cereal?

A Sugar

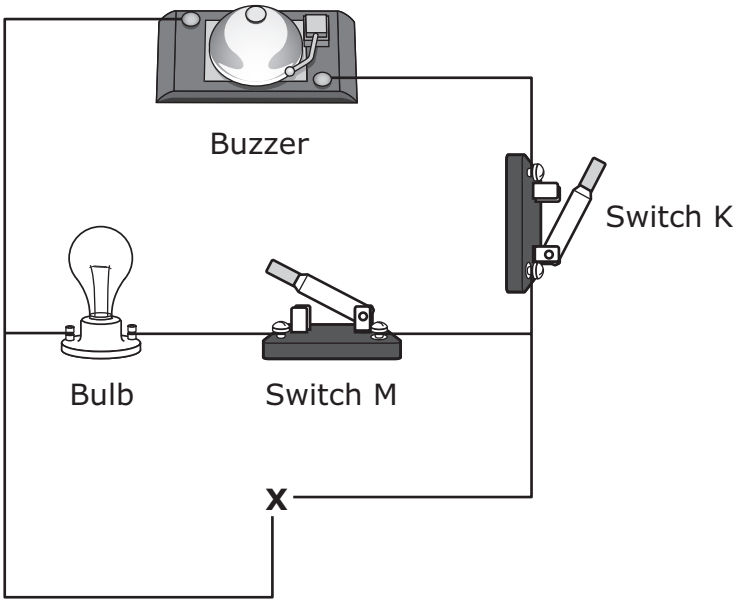
B Iron

C Salt

D Wheat

GO ON

24 A group of students is building the circuit represented in the diagram.



What object can be used at Position X for the buzzer to sound when Switch K is closed?

F A power source

G An insulated wire

H Another bulb

J Another switch

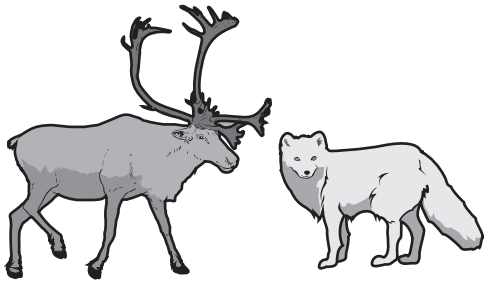
GO ON

25 Some characteristics of the tundra are described.

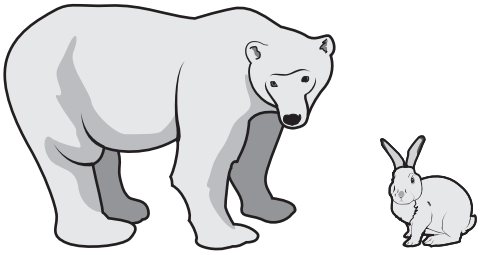
- Long winters with temperatures at −34 °C
- Less than 25 centimeters of precipitation each year
- Thin layer of topsoil covers the frozen ground
- Some types of plants found there are mosses, grasses, small shrubs, and trees

Based on this description, which pair of animals is LEAST likely to live in the tundra?

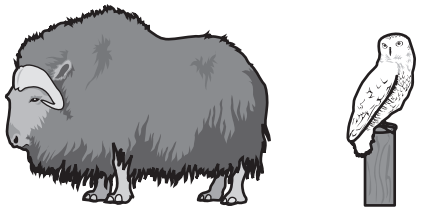
A



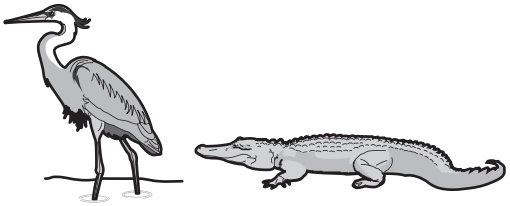
C



B

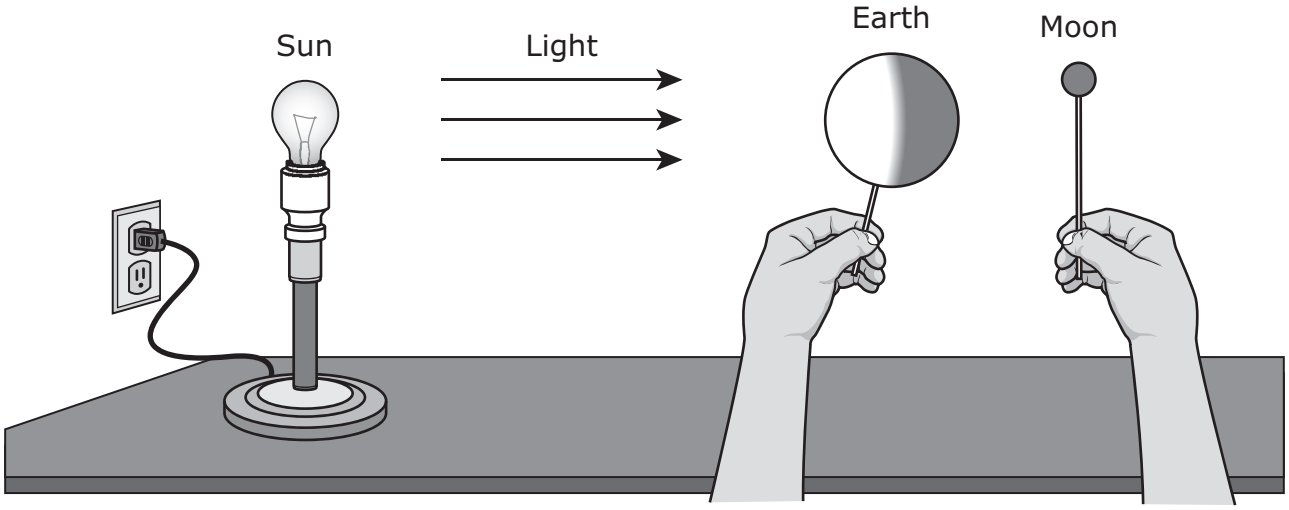


D



GO ON

26 A student makes the model shown with objects representing the sun, Earth, and the moon to use in a class demonstration.



Which action should the student do with the objects to demonstrate a complete day-night cycle of Earth?

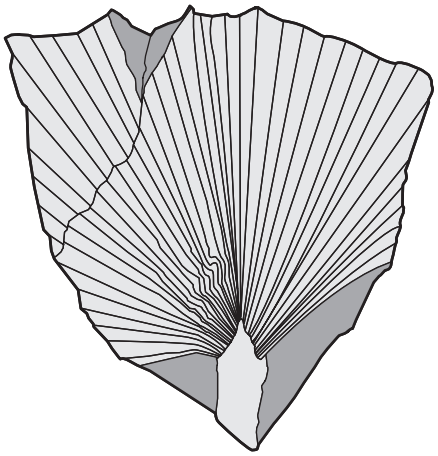
F Move the moon around Earth once

G Spin the sun in a circle once

H Move Earth around the sun once

J Spin Earth in a circle once

27 Scientists have uncovered palm plant fossils in Alaska, the northern-most state of the United States. Modern-day palm plants grow in tropical climates. A picture of a palm fossil that measures almost one meter across is shown.



This discovery suggests to scientists that this area in Alaska once was —

A covered with an ocean

B warmer than it is now

C populated by polar bears

D changed by earthquakes

---

28 Which Texas land formation is correctly paired with the force that made the land formation?

F A canyon at Palo Duro Canyon State Park was formed by a river.

G A sand dune at Monahans Sandhills State Park was formed by an earthquake.

H A delta at the end of the Guadalupe River was formed by wind.

J A rock formation with layers on Mustang Island was formed by ice.

29 A group of students at a park used a collecting net to capture several insects. The teacher transferred the insects to small terrariums that allowed the students to observe the insects before releasing them outside.

Each of the following characteristics is likely an inherited trait EXCEPT —

A a fly's missing antenna

B a butterfly's black-and-yellow stripes

C a dragonfly's two sets of wings

D a beetle's green spots

30 A group of students wants to build a desert garden at school. They need soil that allows water to drain away easily for the desert plants in this garden. The students test different soils to determine how much water passes through and how much water remains in each soil as shown in the table.

Student Investigation of Soils

Soil Type	Initial Volume of Water (mL)	Volume of Water That Went Through the Soil After 5 Minutes (mL)	Volume of Water Remaining in the Soil After 5 Minutes (mL)
Sand	200	175	25
Clay	200	115	85
Silt	200	150	50
Gravel	200	190	10

Based on the table, which types of soils are best to use to build the garden?

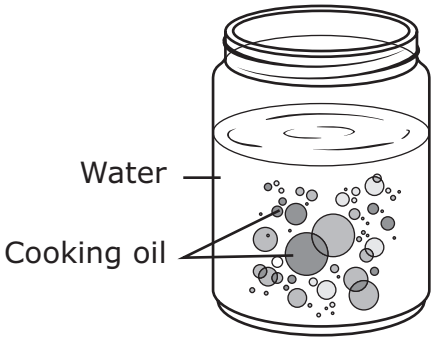
F Clay and sand

G Sand and gravel

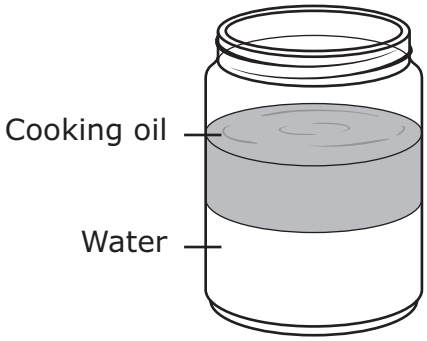
H Gravel and silt

J Silt and clay

31 A student poured equal amounts of water and cooking oil into a jar. The student placed a lid on the jar and shook the mixture for five seconds and then let the jar sit for ten minutes. The results of this investigation are shown.



Immediately after shaking



Ten minutes after shaking

Which conclusion best compares a property of cooking oil and water shown in this investigation?

A Cooking oil is less dense than water.

B Water is less dense than cooking oil.

C Water dissolves in cooking oil.

D Cooking oil dissolves in water.

32 Many of America's large oil fields are found underground at the Permian Basin in West Texas. An area of the Permian Basin is shown.

© iStock.com/FerrizFrame

How did these oil fields form?

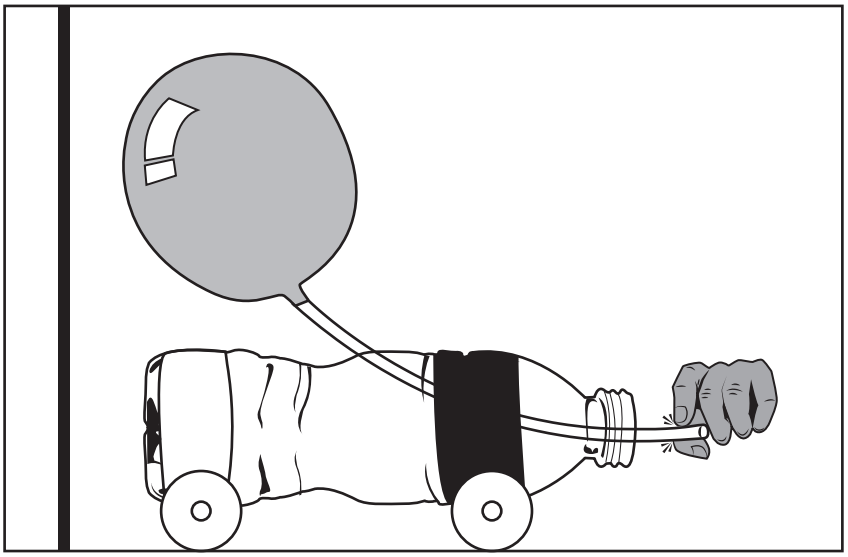
F Dead plants and animals were buried for millions of years.

G Plants were eaten by consumers that left fossilized remains.

H Heat caused underground rocks to undergo chemical changes.

J Rocks at the surface of Earth melted and then solidified.

33 Students build a balloon-rocket car using a balloon, a straw, a water bottle, and some tape. When the straw is released by a student, the air from the balloon comes out. A diagram of the car is shown.



Which statement best describes the motion of the car when the straw is released?

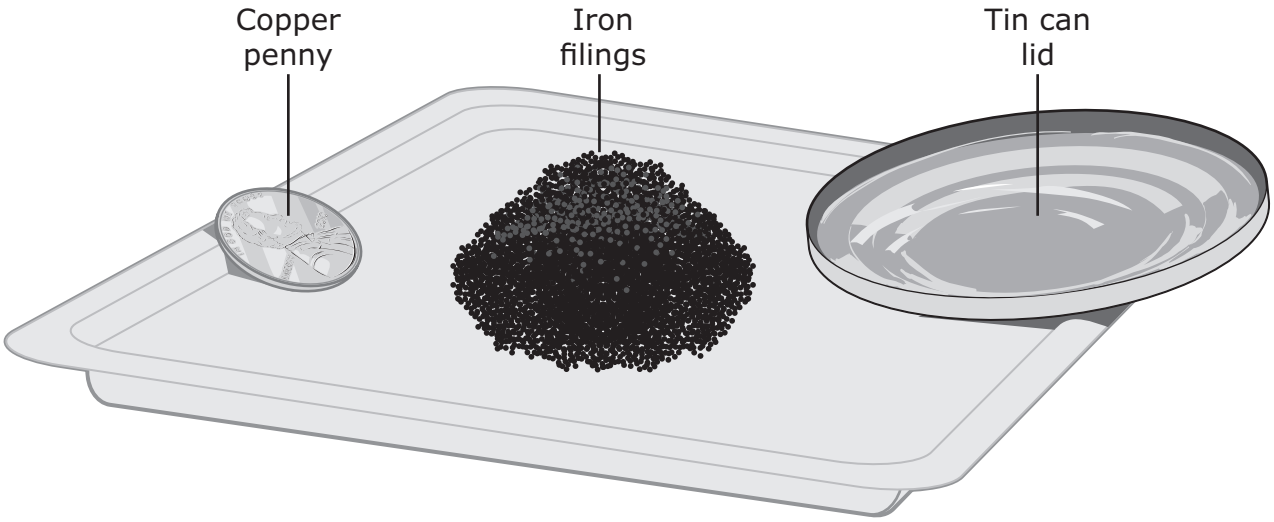
A The car will move away from the wall in the same direction as the air that is leaving the balloon.

B The car will move toward the wall because of the force of the air from the straw.

C The car will move fast because the straw gets light as the air is released.

D The car will not move because the air escapes from the balloon.

34 Students observe some objects on a lab tray. The students will classify the objects based on physical properties common to all of the objects.



Based on their common properties, how should these objects be classified?

F

Insulate thermal energy

Bendable

Attract to magnets

H

Conduct electrical energy

Bendable

Soluble in water

G

Soluble in water

Attract to magnets

Conduct thermal energy

J

Conduct thermal energy

Conduct electrical energy

Not soluble in water

35 Crested floating heart is a non-native plant that now grows in Texas. This plant grows very fast and can spread over the entire surface of a pond or lake.

Which effect will most likely occur when crested floating heart covers a lake?

A Small fish will have fewer places to hide from predators.

B Less sunlight will reach the plants that grow underwater.

C Several new trees will grow along the lake shore.

D Deer will have to find another source of water.

---

36 Students conduct experiments to investigate friction. Which experiment will best test the effect of friction on objects?

F Drop two balls from the same height at the same time

G Roll two marbles on the carpet from the same starting point at the same time and with the same amount of force

H Roll three marbles across three different surfaces from the same starting point at the same time and with the same amount of force

J Release two balls from the top of a ramp at the same time

BE SURE YOU HAVE RECORDED ALL OF YOUR ANSWERS ON THE ANSWER DOCUMENT.

STOP

Item Number	Reporting Category	Readiness or Supporting	Content Student Expectation	Process Student Expectation	Correct Answer
1	2	Readiness	5.6(B)	5.2(D)	B
2	3	Readiness	5.8(C)		J
3	2	Readiness	5.6(C)		B
4	1	Readiness	5.5(A)	5.2(D)	J
5	4	Readiness	5.9(B)		C
6	3	Readiness	5.7(A)	5.2(D)	G
7	2	Readiness	5.6(A)	5.2(A)	D
8	4	Supporting	3.10(B)	5.2(D)	H
9	3	Supporting	3.8(D)	5.3(B)	B
10	4	Readiness	5.10(B)		H
11	3	Supporting	4.8(B)		D
12	4	Readiness	5.9(A)		H
13	2	Readiness	5.6(A)		B
14	3	Readiness	5.7(B)	5.2(D)	F
15	4	Readiness	5.10(A)	5.2(D)	C
16	1	Readiness	5.5(A)	5.2(B)	H
17	4	Readiness	5.9(A)		B
18	1	Supporting	5.5(C)		J
19	2	Readiness	5.6(C)	5.4(A)	C
20	3	Supporting	4.7(C)		F
21	4	Readiness	5.10(A)	5.2(D)	C
22	4	Readiness	5.9(B)		F
23	1	Supporting	5.5(B)	5.4(A)	B
24	2	Readiness	5.6(B)	5.2(B)	F
25	4	Supporting	3.9(A)	5.2(D)	D
26	3	Readiness	5.8(C)	5.3(C)	J
27	4	Supporting	5.9(D)	5.2(D)	B
28	3	Readiness	5.7(B)		F
29	4	Readiness	5.10(B)	5.4(A)	A
30	3	Supporting	4.7(A)	5.2(B)	G
31	1	Readiness	5.5(A)	5.2(D)	A
32	3	Readiness	5.7(A)		F
33	2	Supporting	3.6(B)	5.2(D)	B
34	1	Readiness	5.5(A)	5.2(D)	J
35	4	Supporting	5.9(C)	5.2(D)	B
36	2	Supporting	5.6(D)	5.3(A)	H

Item #	Rationale	
1	Option B is correct	A complete, closed circuit will light the bulb when the switch is closed. A complete circuit is a closed path through which charged electrons (electric current) flow uninterrupted from the negative terminal (-) of a battery through a conductive material, and back again through the positive terminal (+) of the battery. A typical example of a complete circuit includes a source of electrical energy (e.g., battery), a path for the electric current (e.g., copper wire), a device (e.g., a light bulb) to convert the electrical energy to another type of energy such as light energy, and a switch to turn the circuit on (by closing the switch) or off (by opening the switch).
	Option A is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open between the bulb and the switch.
	Option C is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open between the battery and the bulb.
	Option D is incorrect	The circuit will not light the bulb when the switch is closed because the circuit is open—there is no wire between the battery and the switch.

Item #	Rationale	
2	Option J is correct	Earth rotating on its axis every 24 hours makes the sun appear to move across the sky.
	Option F is incorrect	Earth's distance from the sun is not responsible for the sun's apparent movement across the sky.
	Option G is incorrect	Earth's revolution around the sun is responsible for the calendar year.
	Option H is incorrect	The tilt of the Earth on its axis is responsible for the seasons, not the sun's apparent movement across the sky.

Item #	Rationale	
3	Option B is correct	Light travels in a straight line to the student's eye.
	Option A is incorrect	Light is not reflected by the tube in this way.
	Option C is incorrect	The light does not travel along a curved path.
	Option D is incorrect	Light travels through the tube—no light is absorbed by the tubes.

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Item #	Rationale	
4	Option J is correct	The objects that would float are less dense than water.
	Option F is incorrect	A penny is denser than water.
	Option G is incorrect	A metal spoon is denser than water.
	Option H is incorrect	A metal spoon and a penny are denser than water.

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Item #	Rationale	
5	Option C is correct	Grasses are producers, which capture energy from the sun and make food for consumers.
	Option A is incorrect	Grasses do not decompose small organisms.
	Option B is incorrect	Grasses are producers and do not have control over what organisms are in a food chain.
	Option D is incorrect	Grasses are not decomposers, which break down dead material and recycle nutrients.

Item #	Rationale	
6	Option G is correct	Water carrying material to a new location describes erosion, which is the action most likely happening in Section Y. Section Y is located on a vertical slope of a cliff, so it is most susceptible to landslides and other erosion events caused by the force of water flowing downhill.
	Option F is incorrect	Wind and rain cause weathering and erosion, which involves breaking up rocks rather than producing larger pieces.
	Option H is incorrect	The gluing of sediments is most likely to occur in areas where rocks and soil can pile up to form layers. The slope at Section Y is too steep for sediments to build up. This is more likely to occur at or below Section Z, which has less of a slope.
	Option J is incorrect	The pressure resulting from materials piling up is most likely to occur in the area below Section Z. Rocks and other land material would flow down the steep slope at Section Y through Section Z and settle at the bottom of the sea, forming layers over time.

Item #	Rationale	
7	Option D is correct	The fan produces mechanical energy, and the lamp produces thermal energy. Mechanical energy is made up of kinetic energy (or the energy of an object's motion) and potential energy (or the energy of an object's position). Thermal energy is the energy an object has based on the movement of its particles.
	Option A is incorrect	Only the lamp produces light energy. Both objects use electrical energy. Light is a type of electromagnetic energy that is visible. Electrical energy results from the movement of charged atomic particles.
	Option B is incorrect	Only the fan produces mechanical energy. Both objects use electrical energy.
	Option C is incorrect	The lamp produces both light energy and thermal energy.

Item #	Rationale	
8	Option H is correct	Cucumbers are ready for harvest in 55–65 days (about 2 months) and watermelons are ready for harvest in 80–100 days (about 3 and a half months).
	Option F is incorrect	Although pumpkins have the greatest number of days until ready to harvest, they do not take the most time to sprout.
	Option G is incorrect	Information about seed size is not provided in the data table.
	Option J is incorrect	Information about fruit size is not provided in the data table.

Item #	Rationale	
9	Option B is correct	Neptune is an outer planet, and it is the farthest planet from the sun.
	Option A is incorrect	Although Jupiter is an outer planet, it is not the farthest planet from the sun.
	Option C is incorrect	Mercury is an inner, smaller planet that is closest to the sun.
	Option D is incorrect	Although Saturn is an outer planet, it is not the farthest planet from the sun.

Item #	Rationale	
10	Option H is correct	The gerbil had to learn to obtain water from a metal tube.
	Option F is incorrect	Twitching whiskers is an instinctual behavior.
	Option G is incorrect	Burrowing is an instinctual behavior.
	Option J is incorrect	Walking on four legs is an instinctual behavior.

Item #	Rationale	
11	Option D is correct	Water vapor (a gas) forming droplets as it cools describes the process of condensation.
	Option A is incorrect	Water flowing downhill describes runoff or water moving within a stream or river, not condensation.
	Option B is incorrect	Liquid water turning into water vapor describes evaporation, not condensation.
	Option C is incorrect	Polar ice turning into liquid water describes melting, not condensation.

Item #	Rationale	
12	Option H is correct	Barracudas are predators of other fish, which are other living elements of the environment.
	Option F is incorrect	Surface ocean currents are nonliving elements of the environment.
	Option G is incorrect	Oil rigs and jetties are nonliving elements of the environment.
	Option J is incorrect	Warm waters are nonliving elements of the environment.

Item #	Rationale	
13	Option B is correct	Spinning wind turbines, a hammer hitting a nail, and a wrecking ball breaking down a building all use mechanical energy in the form of motion to perform their functions. Mechanical energy is made up of kinetic energy (or the energy of an object's motion) and potential energy (or the energy of an object's position).
	Option A is incorrect	A campfire burning does not use mechanical energy.
	Option C is incorrect	A campfire burning does not use mechanical energy, while spinning wind turbines do use mechanical energy.
	Option D is incorrect	While a hammer hitting a nail and a wrecking ball breaking down a building use mechanical energy to perform their functions, spinning wind turbines also use mechanical energy.

Item #	Rationale	
14	Option F is correct	Water freezing and then thawing within a small space in the rock would cause the space to grow until it resulted in a large crack in the rock.
	Option G is incorrect	Wind blowing particles against the rock would cause abrasions to the rock but not the large crack in the rock.
	Option H is incorrect	Water moving and dropping the rock may be responsible for the location of the rock but not the large crack in the rock.
	Option J is incorrect	A glacier scraping over the rock would cause scratches or gouges called striations but not the large crack in the rock.

Item #	Rationale	
15	Option C is correct	The difference in foot shape between a hawk and a chicken is due to the way that they obtain food: the hawk grasps live prey, and the chicken eats grain from the ground.
	Option A is incorrect	The difference in foot shape between a hawk and a chicken is not due to the predators that hunt them. Hawks are top predators.
	Option B is incorrect	The difference in foot shape between a hawk and a chicken is not due to the climate in which they live. Both chickens and hawks can live in similar climates.
	Option D is incorrect	The difference in foot shape between a hawk and a chicken is not due to the distance that they can fly. Flight distance is most influenced by wing characteristics.

Item #	Rationale	
16	Option H is correct	Metals conduct thermal energy.
	Option F is incorrect	The mass of an object would not provide evidence that it is a metal.
	Option G is incorrect	All matter can exist in different physical states.
	Option J is incorrect	Metals do not dissolve in water.

Item #	Rationale	
17	Option B is correct	Strawberries and earthworms are living parts of the environment.
	Option A is incorrect	Climbing onto a rock and walking on the ground are actions done on nonliving parts of the environment.
	Option C is incorrect	The pond is made up of water, which is a nonliving part of the environment.
	Option D is incorrect	Digging a hole in the sand and climbing onto a rock are actions done on nonliving parts of the environment.

Item #	Rationale	
18	Option J is correct	Sugar dissolves in water to form a solution. A solution is a mixture of two or more substances (called solutes) that are uniformly (or evenly) distributed in another substance (called a solvent).
	Option F is incorrect	Sugar does not break down to form a new substance in water.
	Option G is incorrect	Sugar does not change water into a new substance when combined in solution.
	Option H is incorrect	Sugar does not float on the surface of water.

Item #	Rationale	
19	Option C is correct	Light is refracted when it passes through the lenses of the microscope.
	Option A is incorrect	Light changes direction when it passes through the lenses of the microscope.
	Option B is incorrect	While light does move in straight lines, this does not cause the light to increase in brightness.
	Option D is incorrect	Moving in straight lines does not prevent light from being reflected.

Item #	Rationale	
20	Option F is correct	Wind and water power are renewable resources. They can be replenished or replaced by nature.
	Option G is incorrect	Coal and natural gas are nonrenewable resources.
	Option H is incorrect	Coal and petroleum are nonrenewable resources.
	Option J is incorrect	Coal, natural gas, and petroleum are nonrenewable resources.

Item #	Rationale	
21	Option C is correct	Both butterflies and hummingbirds eat the same food (nectar) from flowers.
	Option A is incorrect	Migration does not influence tongue length.
	Option B is incorrect	Long tongues are not necessary for brightly colored flowers.
	Option D is incorrect	Tongue length has no connection to predators.

Item #	Rationale	
22	Option F is correct	Food webs provide descriptions of feeding relationships among organisms in a community. An organism identified at the base of an arrow is an organism that is eaten (the food source), while the organism at the point of an arrow is the consumer of that organism. In this food web, both the hawks and snakes eat mice.
	Option G is incorrect	The lizards eat grasshoppers and rabbits eat grasses.
	Option H is incorrect	The mice eat grasses, and the snakes eat mice.
	Option J is incorrect	The grasshoppers eat grasses, and the lizards eat grasshoppers.

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Item #	Rationale	
23	Option B is correct	Iron is attracted to magnets.
	Option A is incorrect	Sugar is not attracted to magnets.
	Option C is incorrect	Salt is not attracted to magnets.
	Option D is incorrect	Wheat is not attracted to magnets.

Item #	Rationale	
24	Option F is correct	A power source is needed at Position X to sound the buzzer when Switch K is closed.
	Option G is incorrect	Although insulated wire is a safe way to move electricity from one place to another, a power source is necessary to generate electricity to power the buzzer.
	Option H is incorrect	Adding another bulb will not enable the buzzer to sound when Switch K is closed.
	Option J is incorrect	Another switch is not necessary to sound the buzzer when Switch K is closed.

Item #	Rationale	
25	Option D is correct	Neither the alligator nor the heron is well-adapted to survive for long periods in an extremely cold, dry environment, such as the tundra.
	Option A is incorrect	The reindeer and the arctic fox have the characteristics, such as fur for warmth, needed to survive the extreme cold conditions of the tundra.
	Option B is incorrect	The musk ox has thick fur, and the arctic owl has thick plumage and a rounded body that help them survive the extreme cold conditions of the tundra.
	Option C is incorrect	The polar bear and the arctic hare have thick fur that helps them survive the extreme cold conditions of the tundra.

Item #	Rationale	
26	Option J is correct	Spinning Earth in a circle once models one 24-hour day/night rotation of Earth.
	Option F is incorrect	Moving the moon around Earth once models the lunar cycle, not the 24-hour day/night rotation of Earth.
	Option G is incorrect	Spinning the sun in a circle once does not model the 24-hour day/night rotation of Earth.
	Option H is incorrect	To move Earth around the sun once models the calendar year, not the 24-hour day/night rotation of Earth.

Item #	Rationale	
27	Option B is correct	The palm plant grows in a warm, tropical climate, so the fossil provides evidence that this area in Alaska was once warmer than it is now.
	Option A is incorrect	The palm plant is not an aquatic plant, so the fossil does not provide evidence that this area in Alaska was once covered with an ocean.
	Option C is incorrect	The palm plant does not grow in an arctic climate that would support polar bears, so the fossil does not provide evidence that this area in Alaska was once populated by polar bears.
	Option D is incorrect	The palm plant fossil does not provide evidence that this area in Alaska was changed by earthquakes.

Item #	Rationale	
28	Option F is correct	A canyon is formed by a river.
	Option G is incorrect	A sand dune is not formed by an earthquake; it typically forms because of blowing wind.
	Option H is incorrect	A delta is not formed by the wind; it is formed by water depositing sediment at the mouth of a river.
	Option J is incorrect	A rock formation with layers is formed by cycles of erosion, deposition, compaction, and cementation.

Item #	Rationale	
29	Option A is correct	A fly's missing antenna is not likely an inherited trait that is determined by genes; it is most likely the result of an injury.
	Option B is incorrect	A butterfly's black and yellow stripes are an inherited trait that is determined by genes.
	Option C is incorrect	A dragonfly's two sets of wings are an inherited trait that is determined by genes.
	Option D is incorrect	A beetle's green spots are an inherited trait that is determined by genes.

Item #	Rationale	
30	Option G is correct	Of the four soil types, sand and gravel allow the most water to pass through over time. Based on the information provided, the desert plants survive best in water that drains away easily.
	Option F is incorrect	Clay does not allow the water to drain away as well as gravel does to meet the needs of the desert plants.
	Option H is incorrect	Silt does not allow water to drain away as well as sand does to meet the needs of the desert plants.
	Option J is incorrect	Neither silt nor clay allow the water to drain away as well as sand and gravel do to meet the needs of the desert plants.

Item #	Rationale	
31	Option A is correct	Cooking oil is less dense than water, so the cooking oil floats on the water in the jar.
	Option B is incorrect	Water is denser than cooking oil, sinking to the bottom of the jar.
	Option C is incorrect	Water does not dissolve in cooking oil. The water and oil remain separate in the jar.
	Option D is incorrect	Cooking oil does not dissolve in water.

Item #	Rationale	
32	Option F is correct	Oil fields are formed by dead animals and plants that have been buried for millions of years.
	Option G is incorrect	Oil fields cannot simply be created from the fossilized remains of plants eaten by consumers. The remains must be buried in a low-oxygen environment for millions of years for oil to form.
	Option H is incorrect	Oil fields are not formed by heat causing underground rocks to undergo chemical changes. Oil requires the transformation of organic material to form.
	Option J is incorrect	Oil fields do not form by rocks at the surface of the Earth melting and then solidifying. Oil requires the transformation of organic material to form.

Item #	Rationale	
33	Option B is correct	The car will move toward the wall due to the force of the air leaving the balloon through the straw.
	Option A is incorrect	The car will move in the opposite direction toward the wall, as the air leaves the balloon through the straw.
	Option C is incorrect	The car will not move fast due to the straw getting lighter. The mass of the straw stays the same as air is released from the balloon.
	Option D is incorrect	The car will move due to the air escaping from the balloon.

Item #	Rationale	
34	Option J is correct	Copper, iron, and tin are metals. Metals conduct thermal energy and electrical energy. They are not soluble in water.
	Option F is incorrect	Copper, iron, and tin are metals. Metals conduct thermal energy. Iron is highly magnetic, and therefore would attract to magnets. Tin has very weak magnetic properties and copper is nonmagnetic.
	Option G is incorrect	Copper, iron, and tin are metals. Metals are not soluble in water. Iron is highly magnetic, and therefore would attract to magnets. Tin has very weak magnetic properties and copper is nonmagnetic.
	Option H is incorrect	Copper, iron, and tin are metals. Metals are <u>not</u> soluble in water.

Item #	Rationale	
35	Option B is correct	When crested floating heart covers a lake, less sunlight will reach the plants that grow underwater.
	Option A is incorrect	When crested floating heart covers a lake, small fish will have more places to hide from predators.
	Option C is incorrect	When crested floating heart covers a lake, it is not certain that there will be an increase in another plant type—for example, new trees along the lake shore.
	Option D is incorrect	The growth of crested floating heart will not result in the use of all available water.

Item #	Rationale	
36	Option H is correct	This experiment tests three surfaces at the same time and with the same force. This is an example of a controlled experiment. One variable (surface texture) is being manipulated (or changed) by the students; this is called the independent variable. The variable being tested or measured is the friction on each of the surfaces; this is called the dependent variable. All other variables in the experiment are kept constant or the same (e.g., the marbles, the starting time, and the force applied to each of the marbles).
	Option F is incorrect	This experiment fails to test for friction by not varying the surface. The students may have confused friction with gravity, as they drop the balls from the same height.
	Option G is incorrect	This experiment fails to test for friction by keeping everything the same and not varying the surface.
	Option J is incorrect	This experiment fails to test for friction by not varying the surface and testing on one ramp only.