

GRADE 8
Science

Administered May 2019

RELEASED

STAAR GRADE 8 SCIENCE REFERENCE MATERIALS



FORMULAS

$$\text{Density} = \frac{\text{mass}}{\text{volume}}$$

$$D = \frac{m}{V}$$

$$\text{Average speed} = \frac{\text{total distance}}{\text{total time}}$$

$$s = \frac{d}{t}$$

$$\text{Net force} = (\text{mass})(\text{acceleration})$$

$$F = ma$$

STAAR GRADE 8 SCIENCE REFERENCE MATERIALS

PERIODIC TABLE OF THE ELEMENTS

1 1A	2 2A	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9	10	11 1B	12 2B	13 3A	14 4A	15 5A	16 6A	17 7A	18 8A														
1 H 1.008 Hydrogen	2 He 4.0026 Helium	3 Li 6.94 Lithium	4 Be 9.0122 Beryllium	5 B 10.81 Boron	6 C 12.011 Carbon	7 N 14.007 Nitrogen	8 O 15.999 Oxygen	9 F 18.998 Fluorine	10 Ne 20.180 Neon	11 Na 22.990 Sodium	12 Mg 24.305 Magnesium	13 Al 26.982 Aluminum	14 Si 28.085 Silicon	15 P 30.974 Phosphorus	16 S 32.06 Sulfur	17 Cl 35.45 Chlorine	18 Ar 39.948 Argon														
19 K 39.098 Potassium	20 Ca 40.078 Calcium	21 Sc 44.956 Scandium	22 Ti 47.867 Titanium	23 V 50.942 Vanadium	24 Cr 51.996 Chromium	25 Mn 54.938 Manganese	26 Fe 55.845 Iron	27 Co 58.933 Cobalt	28 Ni 58.693 Nickel	29 Cu 63.546 Copper	30 Zn 65.38 Zinc	31 Ga 69.723 Gallium	32 Ge 72.630 Germanium	33 As 74.922 Arsenic	34 Se 78.971 Selenium	35 Br 79.904 Bromine	36 Kr 83.798 Krypton														
37 Rb 85.468 Rubidium	38 Sr 87.62 Strontium	39 Y 88.906 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.906 Niobium	42 Mo 95.95 Molybdenum	43 Tc Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.91 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.87 Silver	48 Cd 112.41 Cadmium	49 In 114.82 Indium	50 Sn 118.71 Tin	51 Sb 121.76 Antimony	52 Te 127.60 Tellurium	53 I 126.90 Iodine	54 Xe 131.29 Xenon														
55 Cs 132.91 Cesium	56 Ba 137.33 Barium	57 La 138.91 Lanthanum	58 Ce 140.12 Cerium	59 Pr 140.91 Praseodymium	60 Nd 144.24 Neodymium	61 Pm Promethium	62 Sm 150.36 Samarium	63 Eu 151.96 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.93 Terbium	66 Dy 162.50 Dysprosium	67 Ho 164.93 Holmium	68 Er 167.26 Erbium	69 Tm 168.93 Thulium	70 Yb 173.05 Ytterbium	71 Lu 174.97 Lutetium	72 Hf 178.49 Hafnium														
87 Fr Francium	88 Ra Radium	89 Ac Actinium	90 Th 232.04 Thorium	91 Pa 231.04 Protactinium	92 U 238.03 Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110 Ds Darmstadtium	111 Rg Roentgenium	112 Cn Copernicium	113 Nh Nihonium	114 Fl Flerovium	115 Mc Moscovium	116 Lv Livermorium	117 Ts Tennessine	118 Og Oganesson

Atomic number 14
Symbol Si
Atomic mass 28.085
Name Silicon

Atomic masses are not listed for elements with no stable or common isotopes.

Lanthanide Series		57 La	58 Ce	59 Pr	60 Nd	61 Pm	62 Sm	63 Eu	64 Gd	65 Tb	66 Dy	67 Ho	68 Er	69 Tm	70 Yb
Actinide Series		89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

SCIENCE

DIRECTIONS

Read each question carefully. For a multiple-choice question, determine the best answer to the question from the four answer choices provided. For a griddable question, determine the best answer to the question. Then fill in the answer on your answer document.

- 1 The chart lists organisms in five different categories living near the Texas Gulf Coast.

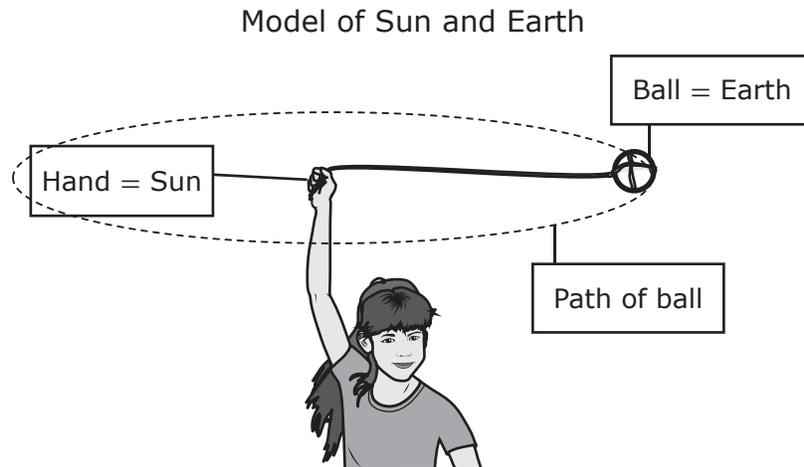
Organisms Living Near the Texas Gulf Coast

Vegetation	Mammals	Invertebrates	Fish	Birds
<ul style="list-style-type: none">• Algae• Willow oaks	<ul style="list-style-type: none">• River otter• Coyotes	<ul style="list-style-type: none">• Shrimp• Mosquitoes	<ul style="list-style-type: none">• Red drum• Pygmy sunfish	<ul style="list-style-type: none">• Laughing gulls• Wood ducks

Based on the chart, which food chain best models a flow of energy in this ecosystem?

- A Sun → Mosquitoes → Shrimp → Coyotes
- B Sun → Algae → Shrimp → Red drum
- C Sun → Pygmy sunfish → Shrimp → Wood ducks
- D Sun → Willow oaks → Algae → River otters

- 2 A student makes a model of the sun-Earth system by swinging a ball around her head. Using this model, the student is trying to explain how Earth stays on a path around the sun.



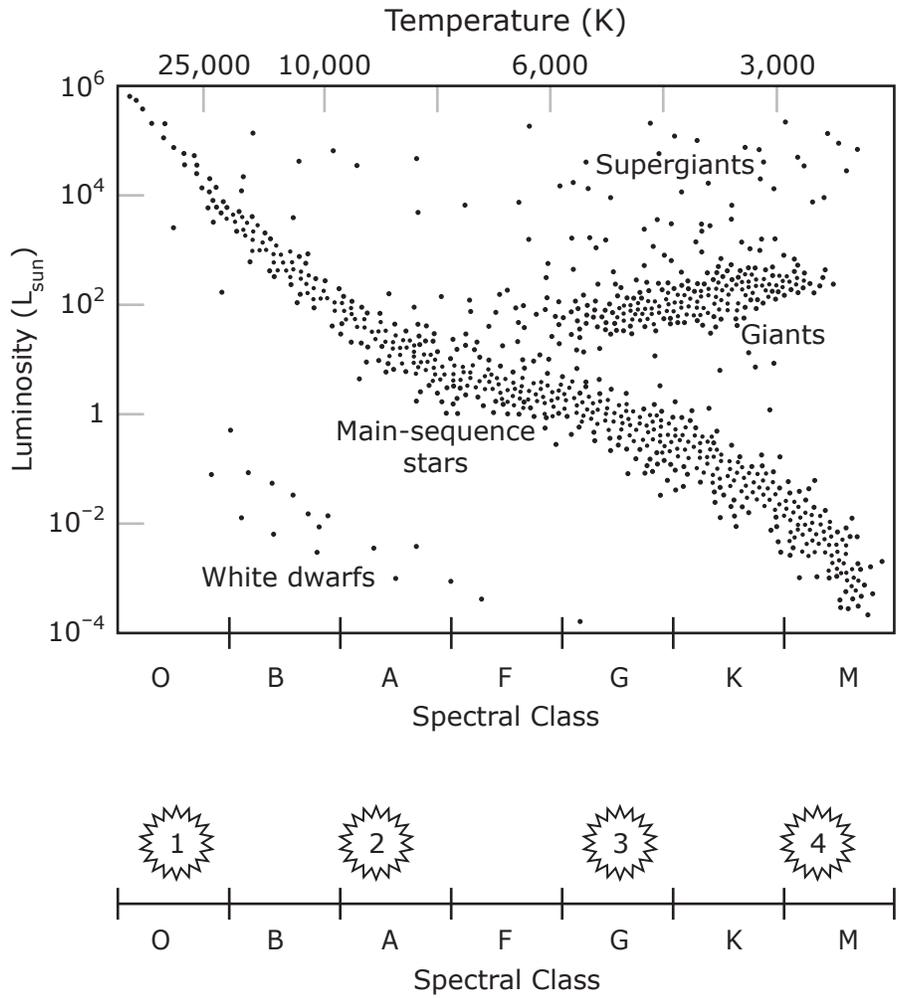
The student explains that this path is the result of —

- F the magnetic attraction between Earth and the sun
 - G potential energy stored in Earth that originated in the sun
 - H the gravitational attraction between the sun and Earth
 - J electromagnetic energy from the sun pulling on Earth
-

- 3 Atoms of which two elements have a combined total of 23 protons?

- A Sodium, Na, and magnesium, Mg
- B Boron, B, and carbon, C
- C Copper, Cu, and zinc, Zn
- D None of these

4 The spectral classes of four stars are shown in comparison with a Hertzsprung-Russell diagram.

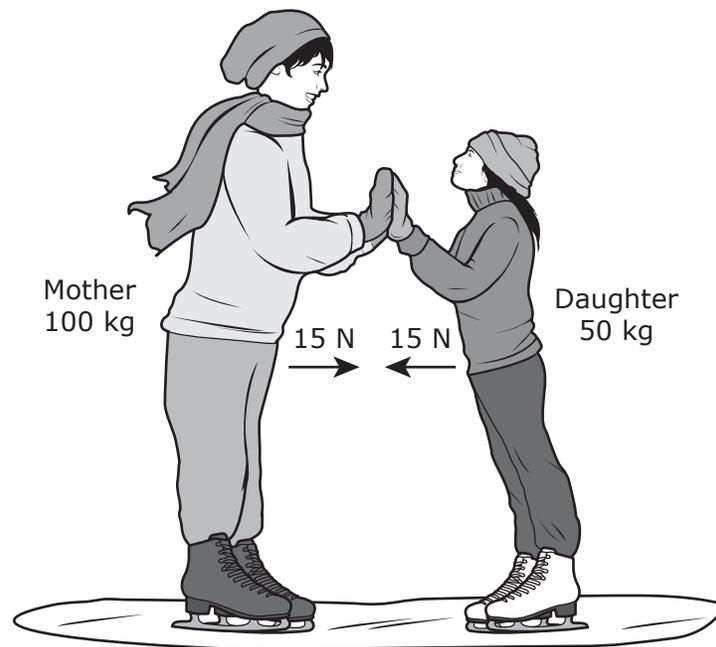


Based on the information, which star is most like the sun?

- F Star 1
- G Star 2
- H Star 3
- J Star 4

- 5 Primary succession occurs when pioneer species move into an area that has no plants. Which organisms are common pioneer species?
- A Conifer trees and tall grasses with roots that loosen the soil
 - B Mosses and lichens that can grow on rocky surfaces
 - C Grasses and weeds that arrive as seeds carried by the wind and then germinate in rich soil
 - D Vines and shrubs that help prevent the erosion of shallow soil
-

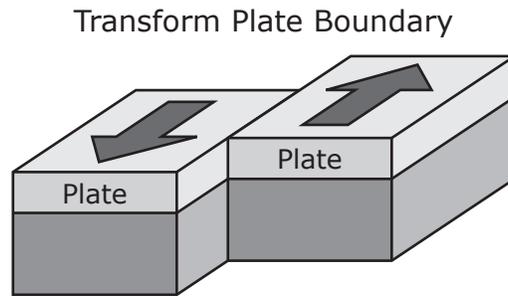
- 6 A mother and daughter press their hands together and then push apart while ice skating.



Immediately after they push away from each other, how does the motion of the mother and daughter change?

- F The mother moves forward, and the daughter moves backward with a greater acceleration.
- G Both move forward, but the mother moves with a greater acceleration.
- H The mother moves backward, and the daughter moves forward with a greater acceleration.
- J Both move backward, but the daughter moves with a greater acceleration.

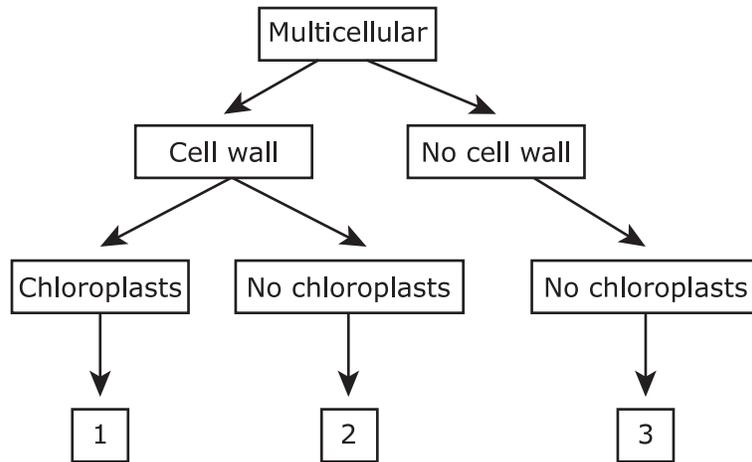
- 7 A teacher asks students to make a model of a transform plate boundary. The students use blocks to represent tectonic plates and slide the blocks past each other in the directions of the arrows as shown.



Which event can the students best demonstrate with their model?

- A An earthquake
 - B A volcanic eruption
 - C Formation of a rift valley
 - D Building up of a mountain
-
- 8 Which statement best describes evidence that a chemical reaction occurs as a cake bakes?
- F The water in the cake batter evaporates.
 - G The cake rises as gas bubbles form in the baking cake.
 - H The cake takes the shape of the container in which it is baked.
 - J The water in the cake batter is used to keep the cake moist as it bakes.

9 A group of students used this diagram to classify three organisms into different kingdoms.



Which table correctly identifies the three kingdoms?

A

Kingdom 1	Plantae
Kingdom 2	Fungi
Kingdom 3	Protista

C

Kingdom 1	Plantae
Kingdom 2	Fungi
Kingdom 3	Animalia

B

Kingdom 1	Fungi
Kingdom 2	Protista
Kingdom 3	Plantae

D

Kingdom 1	Animalia
Kingdom 2	Protista
Kingdom 3	Plantae

10 A student is trying to classify an unidentified, solid gray material as a metal or a nonmetal. Which question will best help the student classify the material?

- F** Is the material malleable or ductile?
- G** Does the material feel hard to the touch?
- H** Will the material float in water?
- J** Does the material feel rough or smooth?

- 11** The net force on a vehicle that is accelerating at a rate of 1.5 m/s^2 is 1,800 newtons. What is the mass of the vehicle to the nearest kilogram?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

- 12** Wild hogs introduced to Texas from Europe became feral after the hogs escaped from the ranches where they lived. Feral hogs are omnivores that feed on native plants, crops, and small animals. Feral hogs can damage an ecosystem by rooting through the soil to look for food and trampling small plants.



Which types of native organisms do feral hogs most likely compete with for food sources?

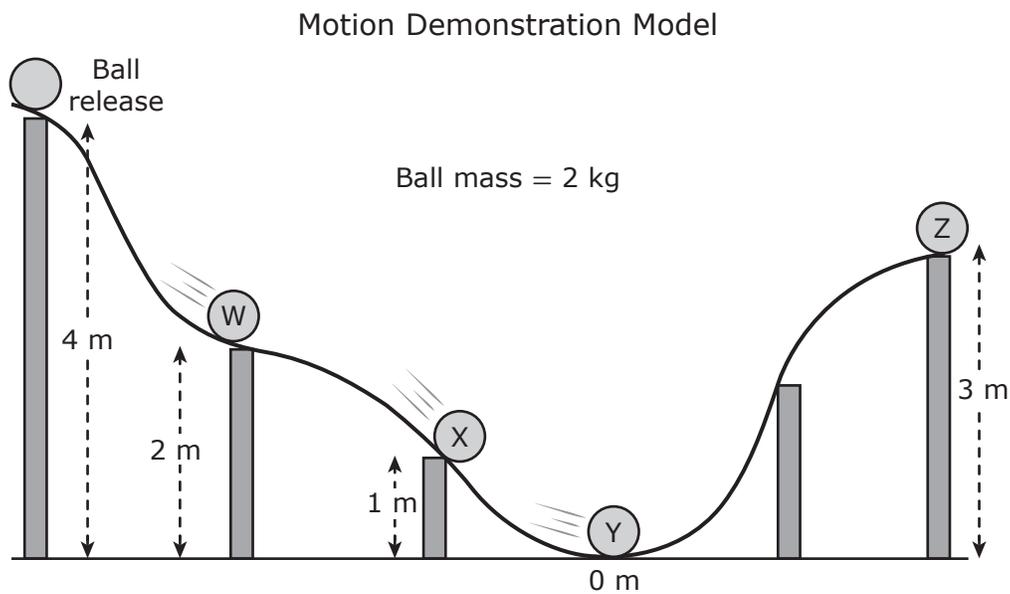
- F** Carnivores and producers
- G** Herbivores and carnivores
- H** Producers and decomposers
- J** Decomposers and herbivores

- 13** A scientist performs tests on a sample of an element. The element is a shiny solid that conducts electricity and heat. The scientist is able to bend and flatten the sample when pressure is applied to it.

Based on this information, the element could NOT be a member of which group on the periodic table?

- A** Group 2
- B** Group 8
- C** Group 12
- D** Group 18

- 14** A demonstration helps students understand a principle of roller coaster design.



Which answer choice correctly describes the ball's kinetic and potential energy?

- F** The ball has more potential energy at position X than at position Z.
- G** The ball has more kinetic energy at position Y than at position W.
- H** The potential energy and kinetic energy of the ball are equal at position X.
- J** The potential energy and kinetic energy of the ball are greatest at position Z.

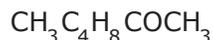
15 What are the main functions of the human skeletal system?

- A** To support the body, protect the organs, produce blood cells, and store calcium
 - B** To regulate the composition of body fluids by removing metabolic wastes and retaining a balance of water, salt, and other nutrients
 - C** To regulate and maintain bodily functions by producing hormones and releasing them into the bloodstream
 - D** To enable the diffusion of oxygen into the bloodstream and the removal of carbon dioxide from the bloodstream
-

16 A large rock is motionless on a flat sidewalk. Which statement best explains why the rock remains motionless?

- F** There are no forces acting on the rock.
 - G** The only force acting on the rock is directed toward the sidewalk.
 - H** The forces acting on the rock are all balanced.
 - J** The sidewalk exerts an unbalanced force on the rock.
-

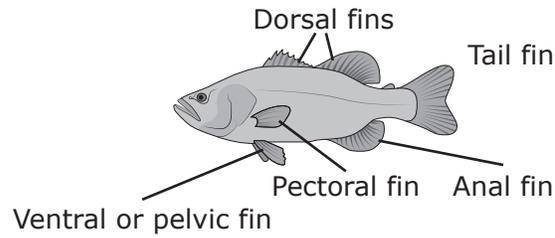
17 A compound secreted by honeybees to paralyze intruders in their hive is known as 2-heptanone. The formula for this compound is shown.



How many atoms of each element are in one molecule of 2-heptanone?

- A** 4 carbon atoms, 11 hydrogen atoms, and 1 oxygen atom
- B** 7 carbon atoms, 14 hydrogen atoms, and 1 oxygen atom
- C** 7 carbon atoms, 11 hydrogen atoms, and 8 oxygen atoms
- D** 6 carbon atoms, 14 hydrogen atoms, and 3 oxygen atoms

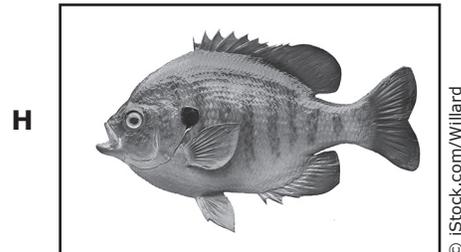
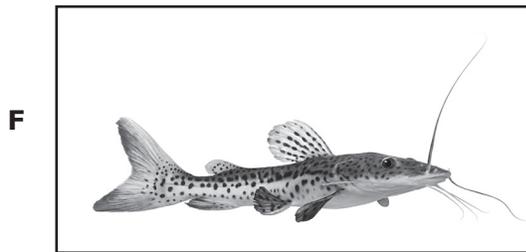
- 18 A student uses this diagram to understand the parts of a fish. The student then uses an identification key to classify different types of fish.



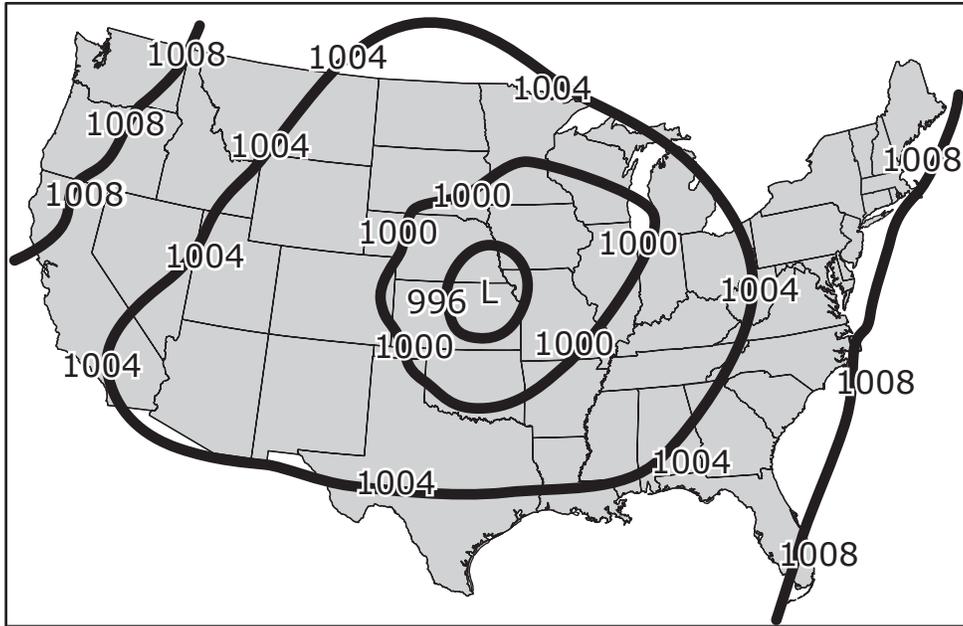
Identification Key

Step	Characteristic	Identification
1a	Whisker-like barbels present on head next to mouth	Go to 2
1b	No whisker-like barbels present on head next to mouth	Go to 3
2a	Tail fin forked	Catfish
2b	Tail fin rounded	Tadpole madtom
3a	Mouth located on ventral (lower) surface of head	Go to 4
3b	Mouth not located on ventral surface of head	Go to 5
4a	Front edge of dorsal fin at least four times as long as back edge	Quillback
4b	Front edge of dorsal fin less than four times as long as back edge	Black redhorse
5a	Body long and thin, more than twice as long as tail	Trout
5b	Body rounded, approximately twice as long as tail	Bluegill

Based on the key, which of these fish is most likely a bluegill?



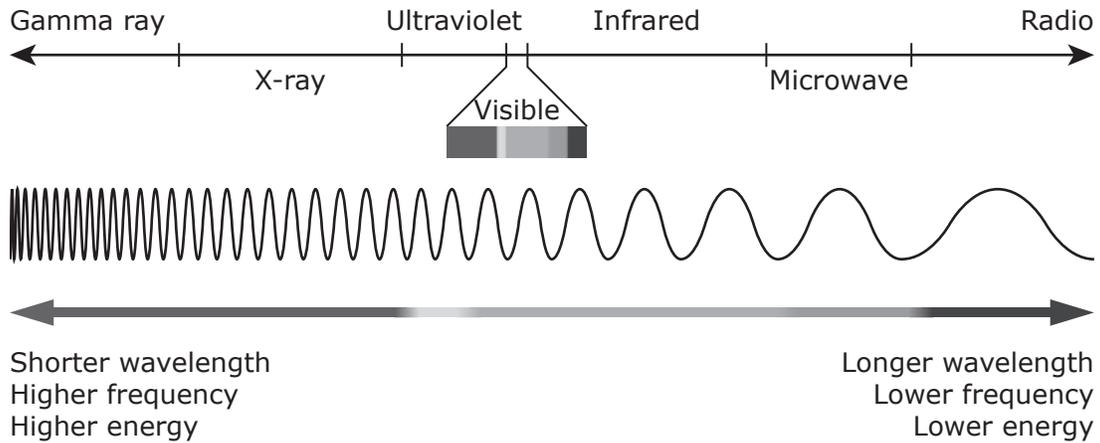
19 The weather map shows air pressures in millibars.



Which set of conditions best describes the weather at the area of lowest air pressure?

- A Bright sun with no wind
- B Partly cloudy with no wind
- C Mostly sunny with light winds
- D Overcast skies with strong winds

20 A diagram of the electromagnetic spectrum is shown.



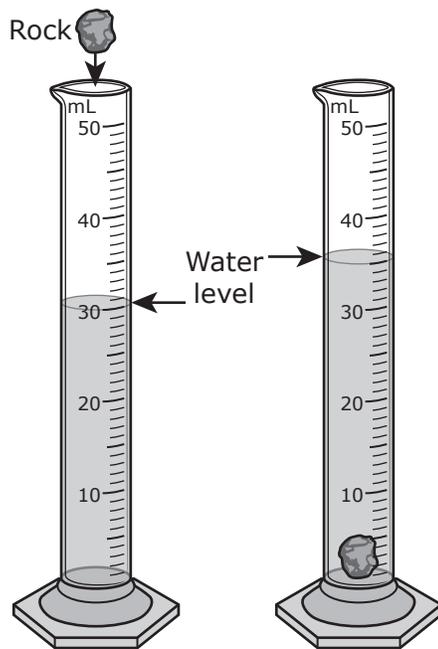
Earth's atmosphere blocks short wavelengths of the electromagnetic spectrum. Which telescopes must be placed in orbit around Earth in order to observe short-wavelength radiation?

- F Gamma-ray telescopes
- G Visible-light telescopes
- H Infrared telescopes
- J Radio telescopes

21 A tiger cub has a pattern of stripes on its fur that is similar to that of its parents. Where are the instructions stored that provide information for a tiger's fur pattern?

- A In cytoplasm inside cells
- B On genes within chromosomes
- C On the cell membrane
- D In the mitochondria

- 22 The mass of an unidentified rock is 15.5 grams. Students determine the volume of the rock by placing the rock in a cylinder with water. The students calculate the density of the rock. They determine the identity of the rock based on the density ranges in the table.



Rock Density Ranges

Rock	Density Range (g/cm ³)
Coal	1.1–1.4
Dolomite	2.8–2.9
Peridotite	3.1–3.4
Sandstone	2.2–2.7

The students most likely have which type of rock?

- F Coal
- G Dolomite
- H Peridotite
- J Sandstone

-
- 23 A student observes several species of plants growing in a drainage ditch. Some species have short roots, while others have long roots. During periods of heavy rain, the ditch fills with fast-moving water, which uproots more plants that have short roots than long roots.

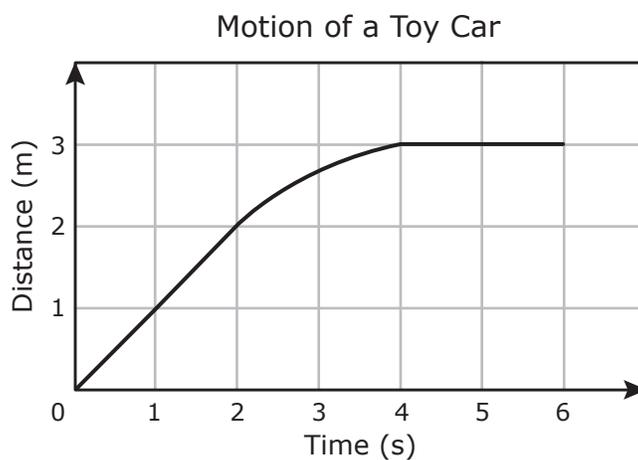
Which short-term effect will most likely result from a year with more heavy rain than normal?

- A Most plants in the ditch will be plants with long roots.
- B Most plants in the ditch will be plants with short roots.
- C There will be no change in the numbers of plants with long roots and short roots.
- D There will be an equal number of plants in the ditch with long roots and short roots.

24 A student viewed the moon through binoculars one week after a new moon. Which image shows the phase of the moon that the student observed?



25 The distance a toy car travels over time is shown in the graph.



Which table best shows the average speed of the toy car at different time intervals?

A

Time (s)	Average Speed (m/s)
0–2	1.0
2–4	0.5
4–6	0

C

Time (s)	Average Speed (m/s)
0–2	2.0
2–4	3.0
4–6	3.0

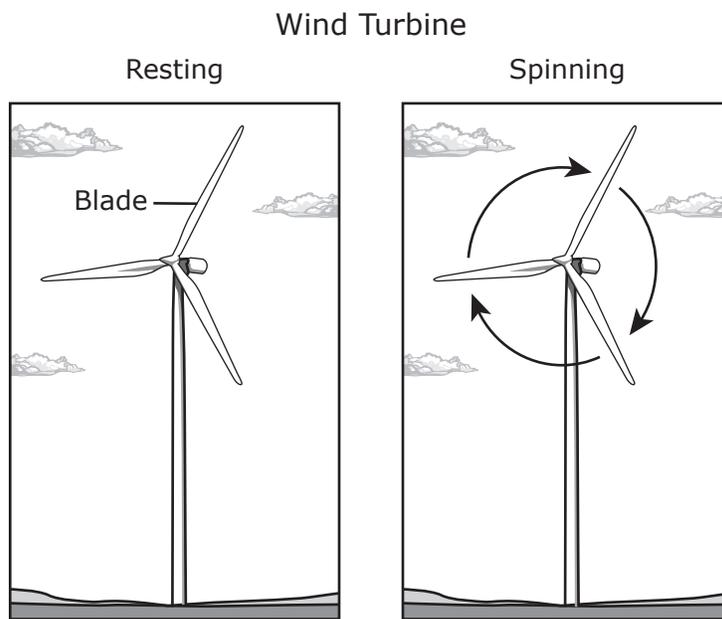
B

Time (s)	Average Speed (m/s)
0–2	2.0
2–4	0.75
4–6	0.75

D

Time (s)	Average Speed (m/s)
0–2	1.0
2–4	0.75
4–6	0

26 The blades of a wind turbine are at rest until the movement of air causes the blades to spin.

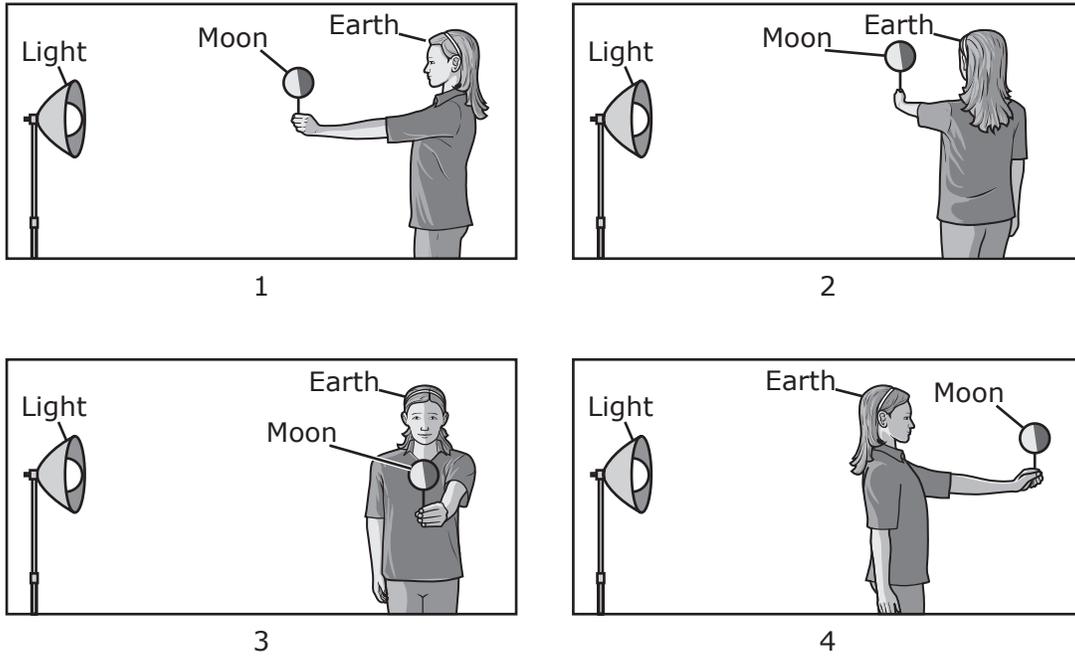


Which energy transformation happens when the blades are spinning as shown?

- F Electrical to mechanical
- G Chemical to electrical
- H Mechanical to electrical
- J Chemical to mechanical

27 A student models moon phases. She holds a foam ball on a stick in front of her body and then stands in front of a light as shown. The student uses herself to represent Earth. She turns her body slowly to represent four different moon phases.

Moon Phases Model

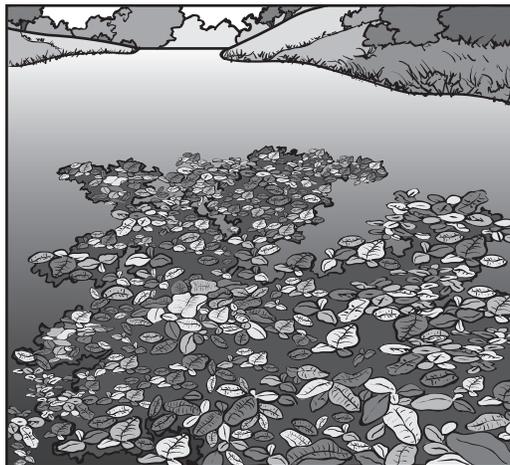


Which numbered diagram represents the student modeling a full moon?

- A** Diagram 1
- B** Diagram 2
- C** Diagram 3
- D** Diagram 4

- 28** Giant salvinia is an aquatic plant that floats on water and reproduces rapidly. When these plants die, decomposition by bacteria affects oxygen levels in the water. As more plants die, less oxygen is available in the water. Students observe a pond covered by giant salvinia.

Giant Salvinia Floating on a Pond



Which statement is the best prediction the students can make about the immediate future of the pond?

- F** The depth of the water in the pond will increase.
- G** Fish populations in the pond will begin to decrease.
- H** The amount of bacteria in the pond will suddenly decrease.
- J** The number of different types of plants around the pond will increase.

29 The atomic number of krypton is 36. If the mass number of a krypton atom is 84, which table shows the number of subatomic particles inside and outside the nucleus of the krypton atom?

A

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
36	36

B

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
36	48

C

Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
84	36

D

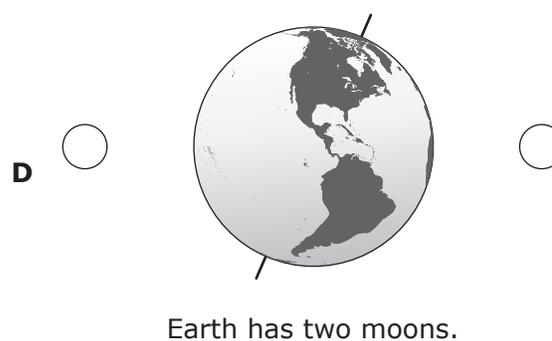
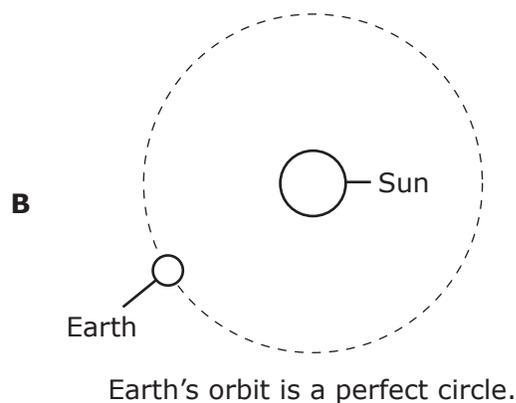
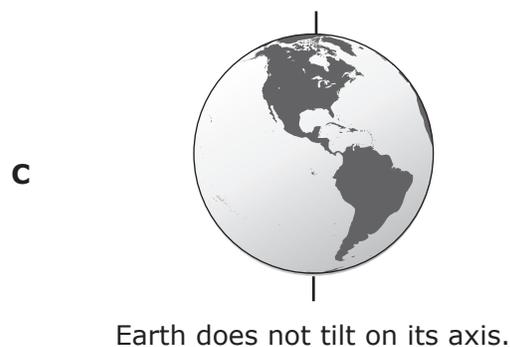
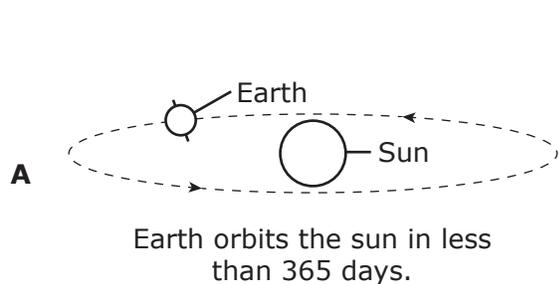
Number of Particles Inside Nucleus	Number of Particles Outside Nucleus
84	48

30 Plants grow in many different shapes and sizes. Much of their shape depends on an internal structure that is composed of carbon-containing molecules such as cellulose and lignin. Plants that have a strong internal structure can grow larger than other plants because their structure can support their size.

Plants obtain the majority of the carbon necessary for building these structural molecules from —

- F** air
- G** microorganisms
- H** soil
- J** water

- 31 Which diagram models a hypothetical situation in which every location on Earth would have 12 hours of daylight and 12 hours of darkness per day?

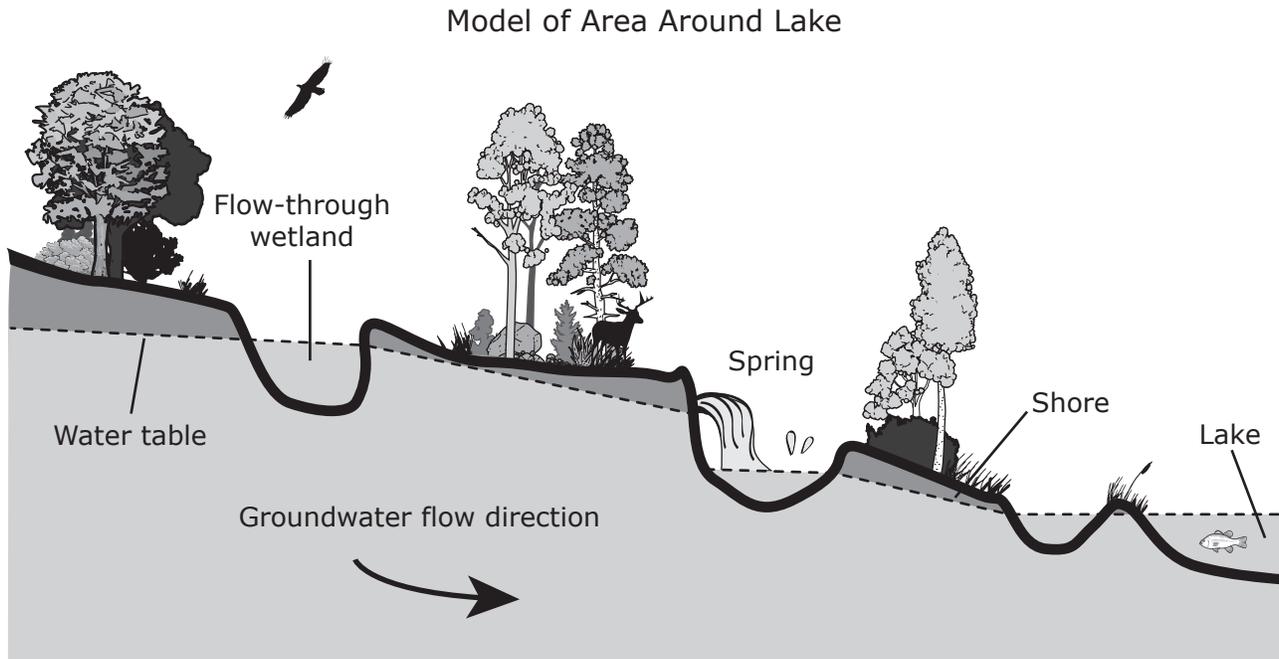


-
- 32 Barium sulfate, BaSO_4 , is a white crystalline solid that is insoluble in water. It is used by doctors to diagnose problems with the digestive system. Barium hydroxide, $\text{Ba}(\text{OH})_2$, is also a white crystalline solid and is used in wastewater treatment.

How many more oxygen atoms are represented in the formula for barium sulfate than in the formula for barium hydroxide?

Record your answer and fill in the bubbles on your answer document. Be sure to use the correct place value.

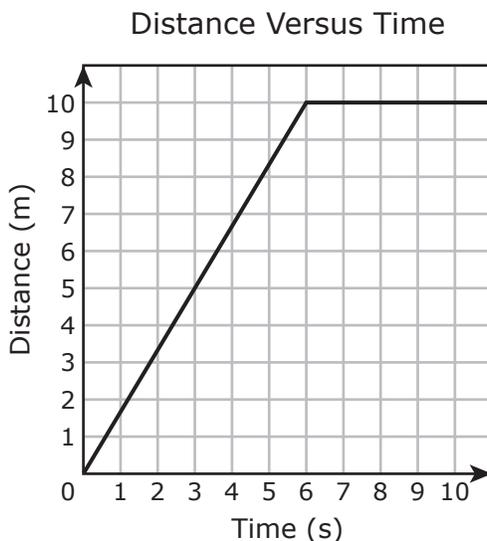
- 33** The model shows an area near a lake. Community leaders are planning new laws to help protect the lake from pollution. One proposed law will make it illegal to dump trash on the shore of the lake, but the law still allows trash to be placed in the area labeled "Flow-through wetland."



Which statement about the proposed law is supported by the model?

- A** The proposed law will protect the lake because plant roots between the wetland and the lake will stop pollution from entering the lake.
- B** The proposed law will not protect the lake because animals that live in or near the lake will add pollution to the lake.
- C** The proposed law will not protect the lake because groundwater will carry pollution from the wetland directly into the lake.
- D** The proposed law will protect the lake because the high elevation of the water table will block pollution from entering the lake.

34 The graph shows the distance an object traveled in 11 seconds.



Which answer choice best describes the movement of the object between the times of 0 and 6 seconds on the graph?

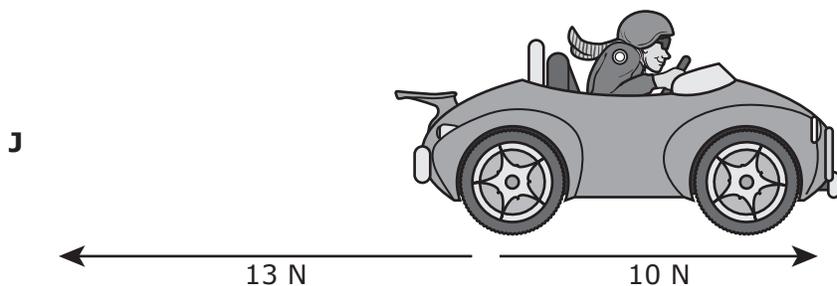
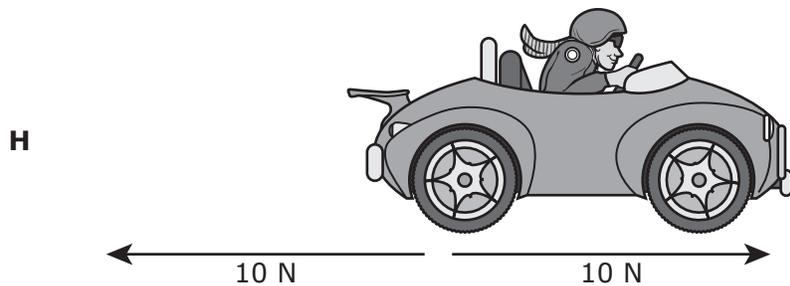
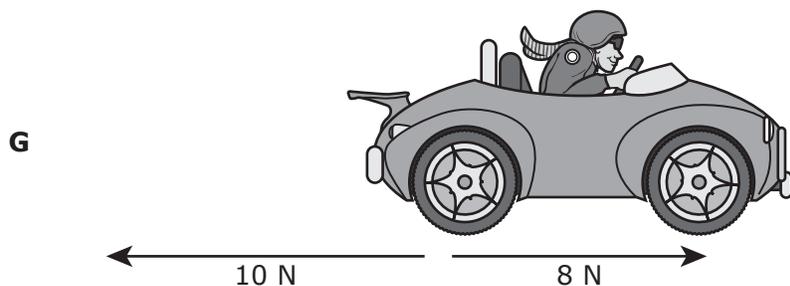
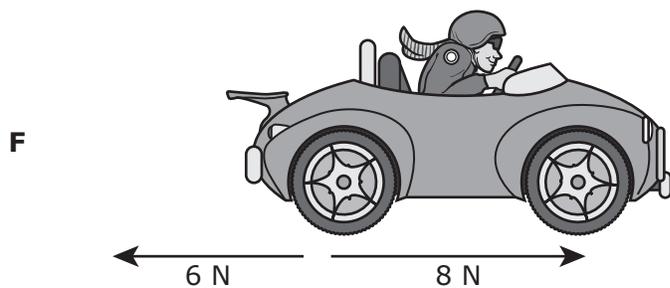
- F** Moving at a constant speed **H** Moving toward the north
- G** Accelerating **J** Stopped

35 Researchers are studying lichens growing on trees in a forest ecosystem. At the beginning of the study, the researchers identified twelve lichen species in the forest. Later, a forest fire happened in the study area. The researchers returned to the area and found only six lichen species.

Which inference is best supported from the researchers' observations?

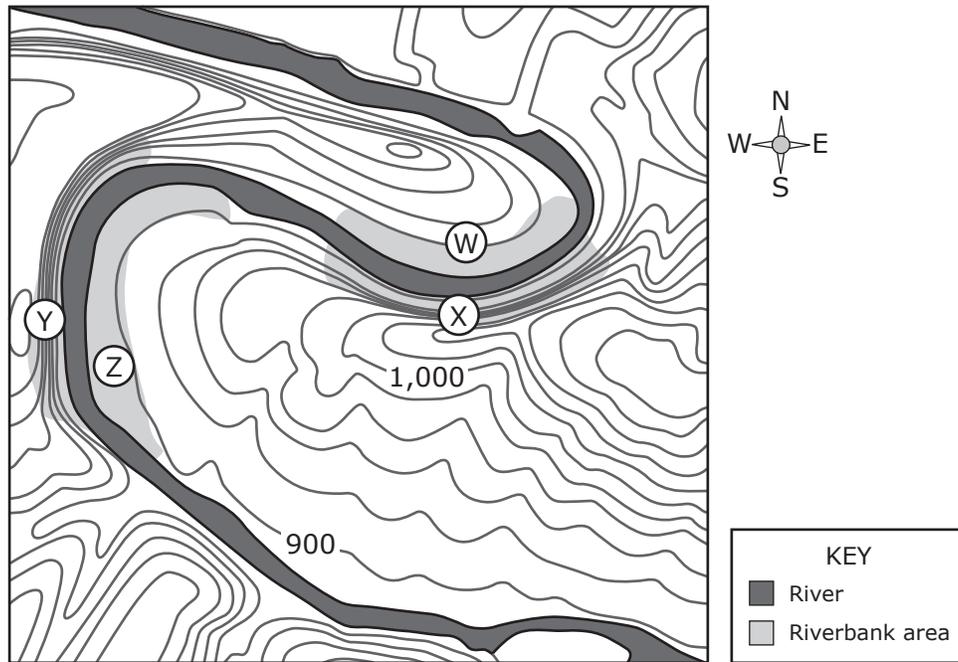
- A** Most lichen species are unaffected by forest fire.
- B** The biodiversity in a forest increases after a fire.
- C** Certain lichen species are better adapted to survive forest fires than others.
- D** Forest fires will permanently remove certain species from the ecosystem.

- 36 The diagrams show forces acting on a toy car as it moves to the right. Which diagram shows the toy car that will most likely accelerate to the right based on these conditions?



37 A river area is shown on the topographic map. Four riverbank areas are labeled on the map.

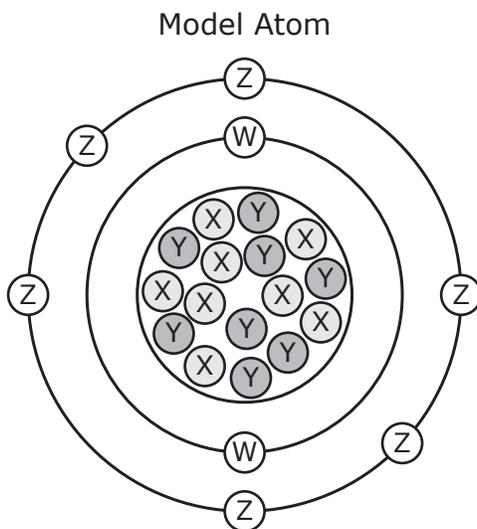
River Area Topographic Map



Which two riverbanks are the steepest?

- A W and X
- B Y and Z
- C X and Y
- D W and Z

- 38** The diagram shows a model of an atom. The model has four different symbols on it. Each symbol represents a different role for one of the particles within the atom.



In this model, which particle determines the reactivity of this atom?

- F** Particle W
 - G** Particle X
 - H** Particle Y
 - J** Particle Z
-
- 39** Which statement best describes a galaxy?
- A** A cloud of gas that is the birthplace of stars
 - B** A system of billions of stars, gas, and dust held together by gravity
 - C** A ball of plasma that experiences nuclear fusion in its core
 - D** A mass of dust and ice that orbits a star in an elliptical pattern

- 40** An environmental change drastically reduced the population of milkweed plants in an area. The milkweed plants provided the only source of food for a nearby population of monarch butterfly caterpillars.

Which statement describes the most likely effect of this environmental change on this population of monarch butterflies?

- F** The number of monarch butterflies will decrease because their caterpillars will not have enough food.
 - G** The number of monarch butterflies will stay the same because butterflies reproduce so rapidly their populations can withstand most food shortages.
 - H** The number of monarch butterflies will stay the same because their caterpillars will begin consuming nectar from different types of flowers.
 - J** The number of monarch butterflies will increase because their reproduction rate will increase to ensure some individuals survive.
-

- 41** A pitcher throws a ball toward a player holding a softball bat. The player uses the bat to hit the ball. The bat applies a 10-newton force to the ball.

Which statement correctly describes the reaction force between the bat and ball?

- A** The reaction force is the force that causes the ball to move toward the bat.
 - B** The reaction force is the force applied to the bat by the player holding the bat.
 - C** The reaction force is the force that pulls the ball toward the ground.
 - D** The reaction force is the force of the ball on the bat.
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- 42** Researchers are investigating processes that happen during digestion. Which answer choice describes only a physical change during digestion?

- F** Hydrochloric acid in the stomach breaks down proteins.
- G** Chewing in the mouth breaks food into small pieces.
- H** Enzymes in saliva start the digestion of starches before food is swallowed.
- J** Bacteria in the intestines convert dietary fiber into fats.



**STAAR
GRADE 8
Science
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