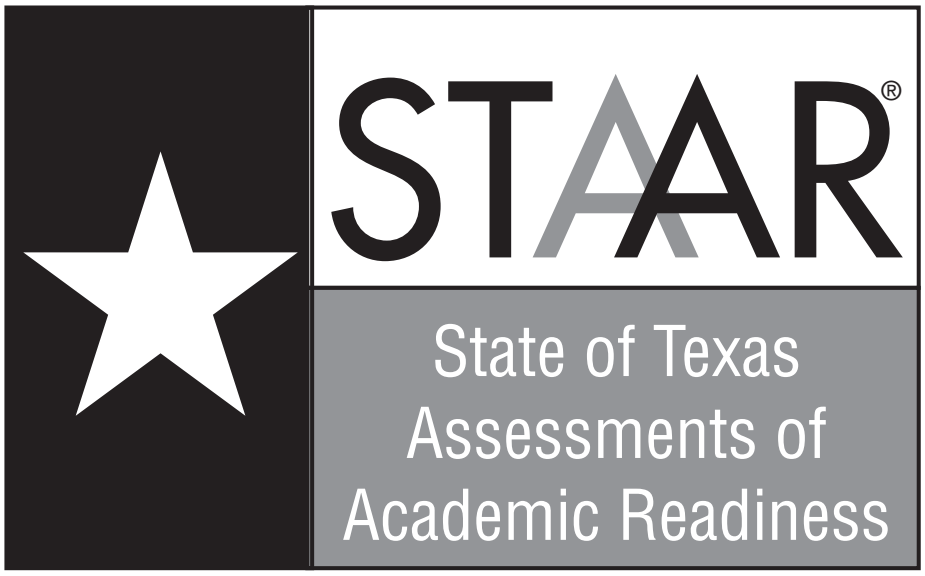


GRADE 8

Science

Administered May 2022

RELEASED

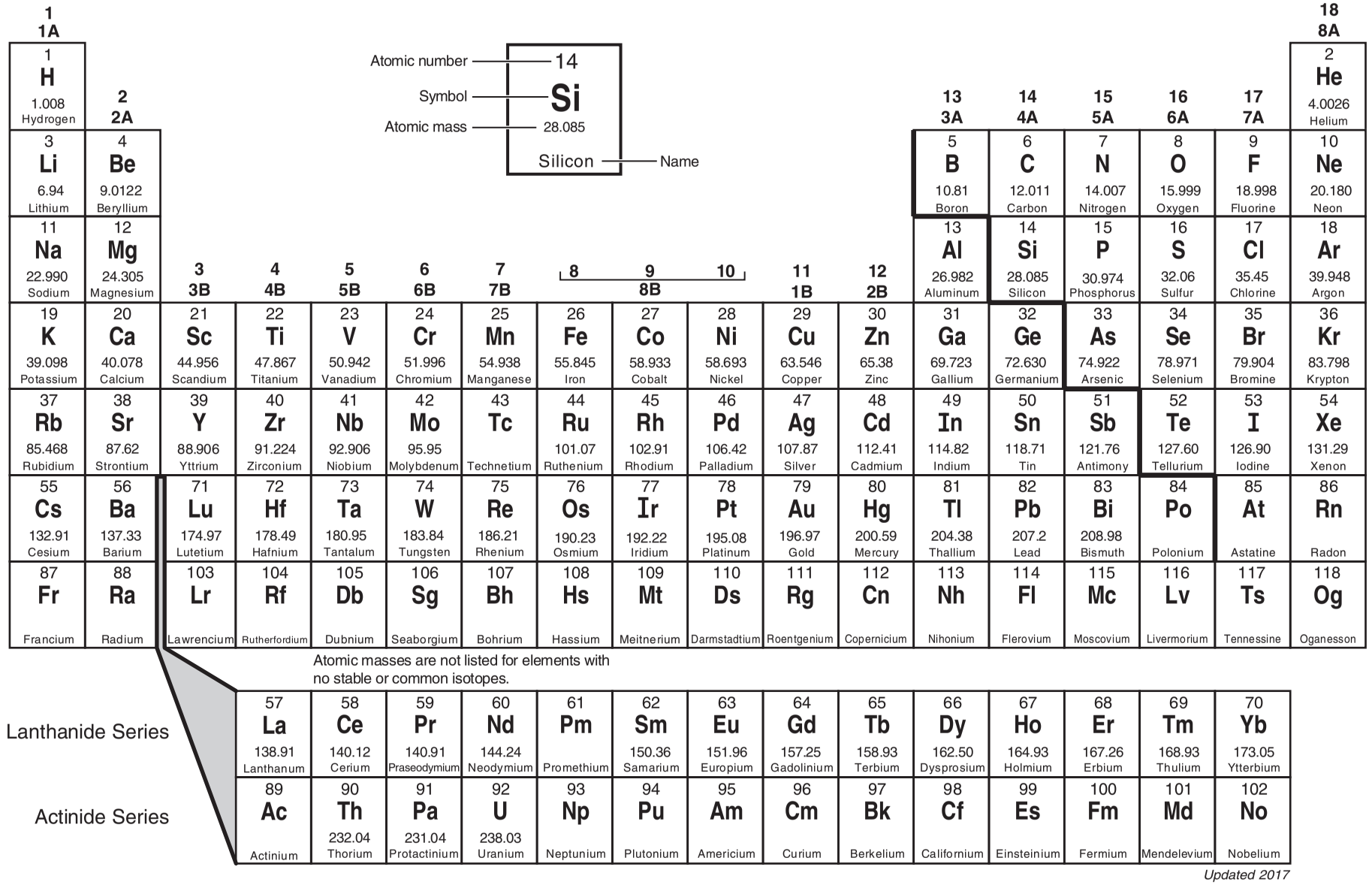
STAAR GRADE 8 SCIENCE REFERENCE MATERIALS

FORMULAS

Density $= \frac{\text{mass}}{\text{volume}}$	$D = \frac{m}{V}$
Average speed $= \frac{\text{total distance}}{\text{total time}}$	$s = \frac{d}{t}$
Net force = (mass)(acceleration)	$F = ma$

STAAR GRADE 8 SCIENCE REFERENCE MATERIALS

PERIODIC TABLE OF THE ELEMENTS



Updated 2017

Source: International Union of Pure and Applied Chemistry

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 A photograph of a litter of six-week-old bulldog puppies shows that the puppies are not identical.

Even though these puppies have the same parents, they do not all look alike because —

A they were produced by asexual cloning

B some of the puppies have genetic material from only one of the parents

C each puppy has a different combination of genetic material as a result of sexual reproduction

D all the puppies developed from the same fertilized egg

2 Sodium and lithium have similar chemical properties. What characteristic of these elements explains why they are chemically similar?

F Their atoms both have one valence electron.

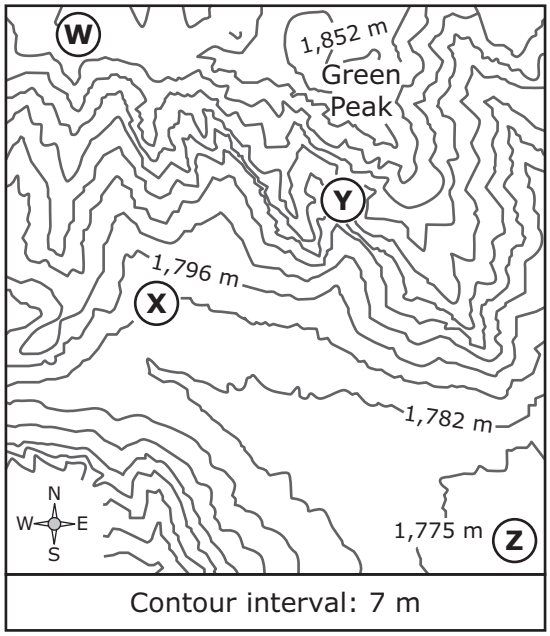
G Their atoms both have more neutrons than protons.

H Their atoms have the same number of energy levels.

J Their atoms contain equal numbers of protons and electrons.

GO ON

3 Hikers look at a topographic map of an area named Green Peak. The Green Peak area is made up of only limestone rock. The map is shown.



Which location around Green Peak is likely to experience the most erosion over time?

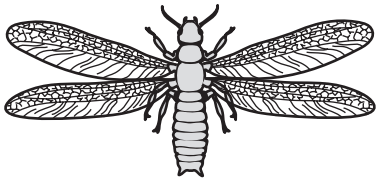
A Location W, because location W has the gentlest slope

B Location X, because location X is near the bottom of a slope

C Location Y, because location Y has the steepest slope

D Location Z, because location Z is the flattest slope

4 A student was given this partial dichotomous key and asked to determine in which of five orders the adult insect shown belongs.



Dichotomous Key

Step	Characteristic	Identification
1a	Does not have wings	Order Siphonaptera
1b	Has wings	Go to 2
2a	Has one pair of wings	Order Diptera
2b	Has two pairs of wings	Go to 3
3a	Wings are triangular	Order Ephemeroptera
3b	Wings are not triangular	Go to 4
4a	Wing pairs have a similar size and shape	Order Isoptera
4b	Wing pairs do not have a similar size and shape	Order Zoraptera

Based on the dichotomous key, in which order does the insect belong?

F Diptera

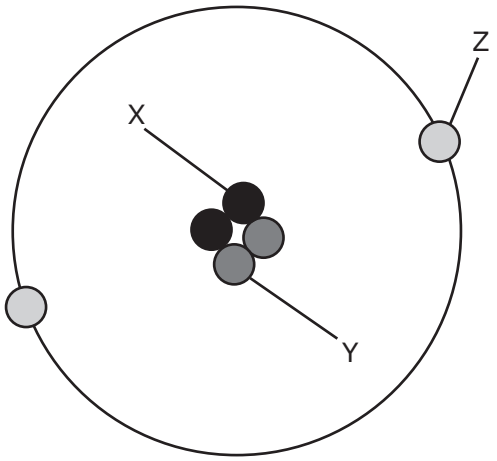
G Isoptera

H Ephemeroptera

J Zoraptera

5 The diagram shows a model of an atom. The model contains three different subatomic particles. Particles X and Y are inside the nucleus, and particle Z is outside of the nucleus.

Model of an Atom



Which statements best describe the charges on the particles in this model?

A Both particles X and Y have a positive charge.

Particle Z has a negative charge.

B Both particles X and Y have a negative charge.

Particle Z has a positive charge.

C Either particle X or particle Y has a positive charge.

Particle Z has a negative charge.

D Either particle X or particle Y has a negative charge.

Particle Z has a positive charge.

6 A photograph of a bird perched on a fence post is shown.

Which description best identifies the action-reaction pair between the bird and the fence post?

F Action: The force of the bird on the wires

Reaction: The force of the wires on the fence post

G Action: The force of the wires on the fence post

Reaction: The force of the fence post on the bird

H Action: The force of the fence post on the bird

Reaction: The force of the bird on the wires

J Action: The force of the bird on the fence post

Reaction: The force of the fence post on the bird

---

7 Farmers can best reduce negative effects on the water quality of nearby streams and lakes by planting crops that —

A produce less oxygen

B produce less carbon dioxide

C need less fertilizer

D need less solar energy

8 Buffelgrass is an invasive species of grass from Africa that outcompetes native Texas grasses for space and water. Which long-term change to a Texas grassland would most likely occur due to the introduction of buffelgrass?

F The population of native grasses will increase.

G The population of native grasses will decrease.

H Buffelgrass offspring will develop traits like those of native grasses.

J Buffelgrass offspring will develop traits like those of other invasive species.

---

9 Two students record the distance they each traveled in 60 seconds in the data table shown.

	Distance (m)	Time (s)
Student 1	40	60
Student 2	20	60

If the students continue at the same speed, which statement describes the total distance traveled after 90 seconds?

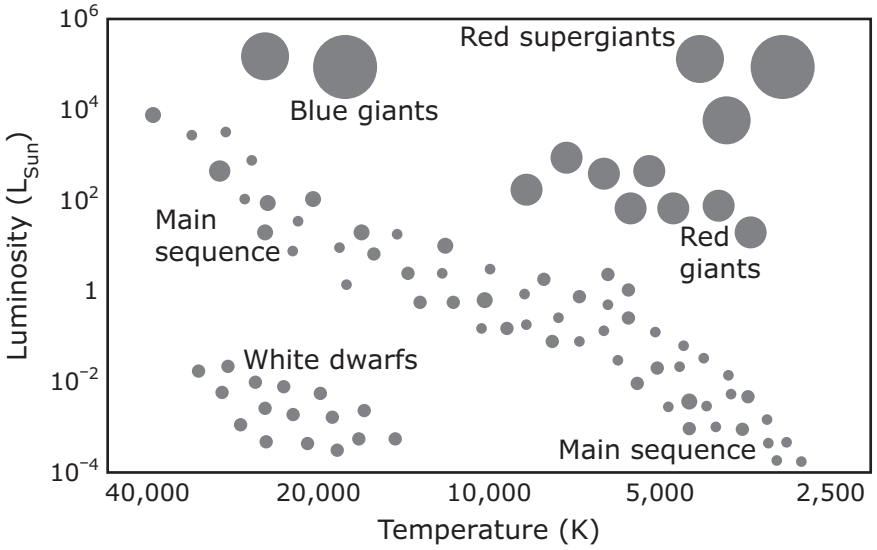
A Student 1 traveled 40 m, and student 2 traveled 20 m.

B Student 1 traveled 50 m, and student 2 traveled 30 m.

C Student 1 traveled 60 m, and student 2 traveled 30 m.

D Student 1 traveled 70 m, and student 2 traveled 25 m.

10 A Hertzsprung-Russell (H-R) diagram is shown.



A star that has a luminosity of 10^{-2} and a temperature of 20,000 K is most likely a —

F Main sequence

G White dwarf

H Blue giant

J Red giant

---

11 A sledgehammer has a mass of 3.5 kilograms. What net force, to the nearest whole newton, will a person need to apply to accelerate the sledgehammer at a rate of 4.0 m/s^2?

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

12 Students collected data on five elements. Their data are shown in the table.

Name	Atomic Number	Average Atomic Mass (amu)	Group	Period
Lithium	3	6.94	1	2
Beryllium	4	9.01	2	2
Sodium	11	22.99	1	3
Magnesium	12	24.31	2	3
Potassium	19	39.1	1	4

Which element has the same number of energy levels as lithium?

F Beryllium

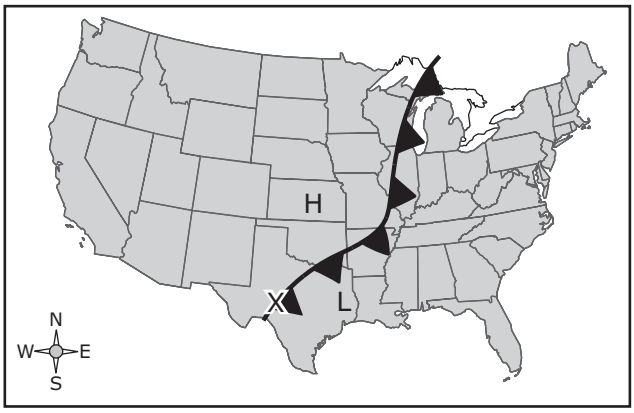
G Sodium

H Magnesium

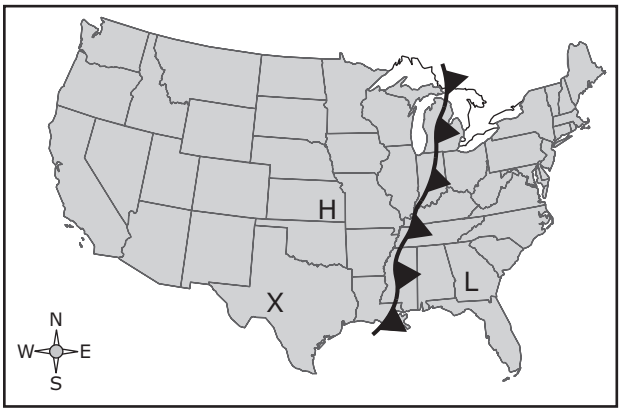
J Potassium

13 Maps of predicted weather conditions are shown.

Day 1



Day 2



Which answer choice best describes the weather at location X on Day 1 and Day 2?

A Day 1: warm and rainy

Day 2: cool with more rain

B Day 1: warm and windy

Day 2: cloudy and cold

C Day 1: clear and cool

Day 2: warm and rainy

D Day 1: cold and rainy

Day 2: clear and sunny

14 Oxygen and oxygen-containing compounds are involved in many different reactions. Which balanced equation represents a reaction that involves 14 atoms of oxygen?

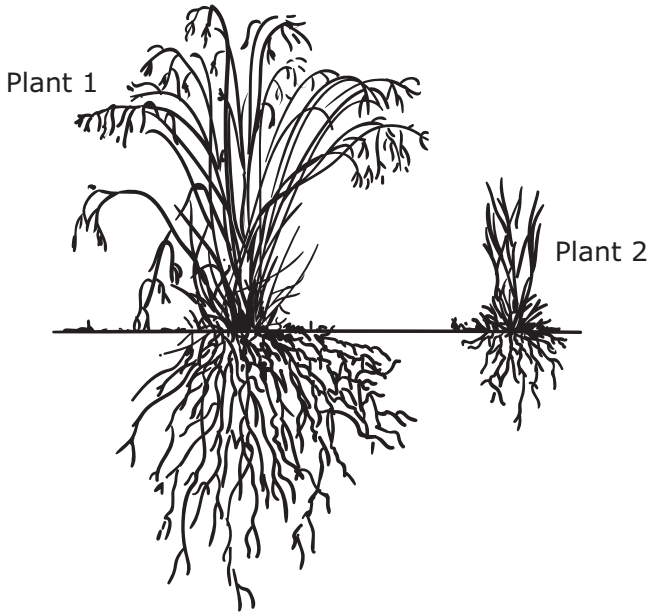
F $NH_4Cl + KOH \rightarrow NH_3 + H_2O + KCl$

G $2Na + 2H_2O \rightarrow 2NaOH + H_2$

H $2C_2H_6 + 7O_2 \rightarrow 4CO_2 + 6H_2O$

J $4Fe + 3O_2 \rightarrow 2Fe_2O_3$

15 Two plant species that grow in the same area are shown.



Which statement best explains a difference between Plant 1 and Plant 2?

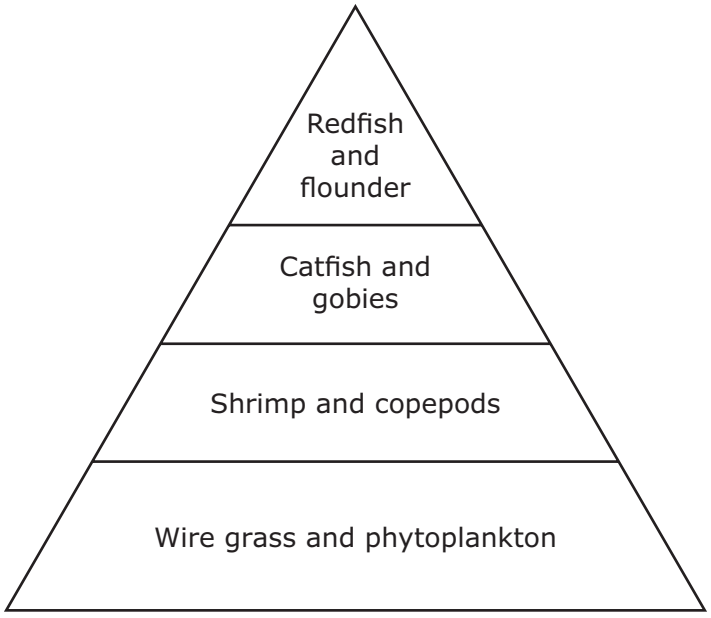
A Plant 1 obtains more water from the soil because of its root surface area and root depth.

B Plant 1 obtains more sunlight because of its root surface area and root depth.

C Plant 2 obtains more water from the soil because of its root surface area and root depth.

D Plant 2 obtains more sunlight because of its root surface area and root depth.

16 A Texas Gulf Coast energy pyramid is shown with representative organisms at each trophic level.



Which statement best describes the flow of energy through this pyramid?

F The trophic level represented by catfish and gobies receives energy directly from the producers.

G The trophic level represented by shrimp and copepods receives energy directly from the tertiary consumers.

H The trophic level represented by redfish and flounder receives energy directly from the secondary consumers.

J The trophic level represented by wire grass and phytoplankton receives energy directly from the primary consumers.

17 A student is building a model of a solar eclipse. Solar eclipses occur only during a new moon phase. Which motion best demonstrates a solar eclipse?

A The moon moves between the sun and Earth, casting a shadow of the moon on Earth.

B The sun moves between the moon and Earth, casting a shadow of the sun on Earth.

C Earth moves between the sun and the moon, casting a shadow of Earth on the moon.

D Earth moves between the sun and the moon, casting a shadow of the moon on the sun.

---

18 What function do both cell membranes and cell walls perform?

F Producing energy for cellular processes

G Allowing water to move into and out of cells

H Synthesizing genetic material

J Directing the reproduction of the cell

---

19 Which of these observations is an indication that a chemical reaction has occurred?

A Steam forms above boiling water.

B A solid forms when a clear solution is frozen.

C A solid forms when two clear solutions are mixed.

D Sugar crystals form on the sides of a boiling pot of sugar water.

20 Which statement best explains why the sun appears brighter to people on Earth than any other star?

F Sunlight reaches Earth's atmosphere at an angle that causes the sun's light rays to intensify.

G Unique chemical reactions in the sun's core produce a high-energy wavelength of light.

H The sun burns at a higher temperature than any other star.

J The sun is closer to Earth than any other star.

21 Students jump rope for one minute to determine changes in heart rate and breathing rate. Their data are shown in the table.

Observation	Heart Rate (beats per minute)	Breathing Rate (breaths per minute)
Before jumping	60	15
After jumping	120	35

Which table explains the functions of the two body systems that the students investigated?

A

Body system	Function
Circulatory system	To add oxygen gas to blood and remove carbon dioxide gas
Skeletal system	To sense and respond to changes in the body and environment

B

Body system	Function
Circulatory system	To pump blood around the body to carry nutrients, oxygen, and wastes
Respiratory system	To add oxygen to and remove carbon dioxide from the blood

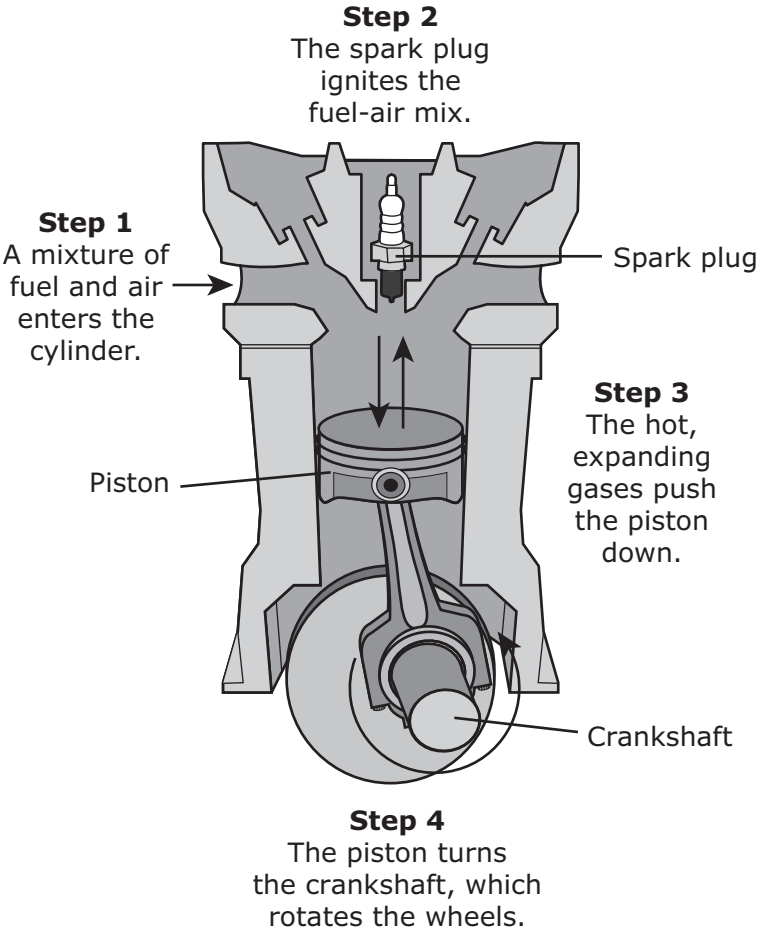
C

Body system	Function
Nervous system	To support the muscles and protect organs
Respiratory system	To pump blood around the body to carry nutrients, oxygen, and wastes

D

Body system	Function
Skeletal system	To protect organs, support body, and attach to muscles for movement
Nervous system	To sense and respond to changes in the body and environment

22 The diagram shows how a cylinder in a car engine causes the car to move.



Which description of the energy conversions in this process is correct?

F The chemical energy in the fuel-air mixture is converted to thermal energy, which is then converted to mechanical energy.

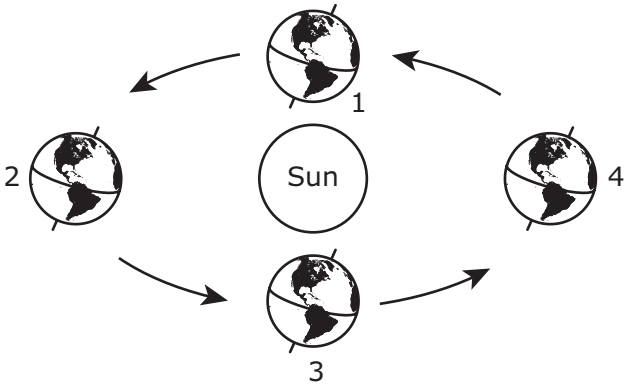
G The mechanical energy in the fuel-air mixture is converted to electrical energy, which is then converted to thermal energy.

H The electrical energy in the fuel-air mixture is converted to mechanical energy, which is then converted to thermal energy.

J The thermal energy in the fuel-air mixture is converted to electrical energy, which is then converted to mechanical energy.

23 The model shows Earth in four different positions in its orbit around the sun.

Orbit of Earth Around the Sun



Note: The drawing is not to scale.

Which statement correctly explains which position of Earth represents summer in the United States?

A Position 1, because the Western Hemisphere is facing the sun

B Position 2, because the Northern Hemisphere tilts toward the sun

C Position 3, because Earth is at its closest point to the sun in its orbit

D Position 4, because Earth is traveling at its fastest rate in its orbit

24 Students observe an unknown species during a field study. They observe that the organism is multicellular, is autotrophic, and can reproduce both sexually and asexually.

Which kingdom does this organism most likely belong to?

F Archaea

G Animalia

H Bacteria

J Plantae

25 A car initially traveling at 8.0 meters per second doubles its speed while traveling in a northeast direction.

Students used a table to record the initial and final conditions for speed and velocity. Which table is correct?

A

Initial and Final Conditions

	Speed	Velocity
Initial	8.0 m/s	8.0 m/s northeast
Final	16.0 m/s	16.0 m/s northeast

B

Initial and Final Conditions

	Speed	Velocity
Initial	8.0 m/s northeast	8.0 m/s
Final	16.0 m/s northeast	16.0 m/s

C

Initial and Final Conditions

	Speed	Velocity
Initial	8.0 m/s	0.0 m/s^2 northeast
Final	16.0 m/s	0.5 m/s^2 northeast

D

Initial and Final Conditions

	Speed	Velocity
Initial	8.0 m/s northeast	8.0 m/s northeast
Final	16.0 m/s northeast	16.0 m/s northeast

GO ON

26 Which element has chemical properties that are most similar to the chemical properties of sulfur, S?

F Silicon, Si

G Chlorine, Cl

H Selenium, Se

J Phosphorus, P

27 Early one morning students observed the moon as it appeared from Earth.

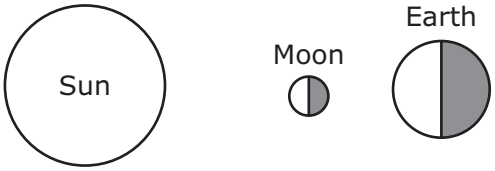
Observed Moon Phase

Which diagram shows the correct relative positions of the sun, the moon, and Earth when the moon was in the observed phase?

A

B

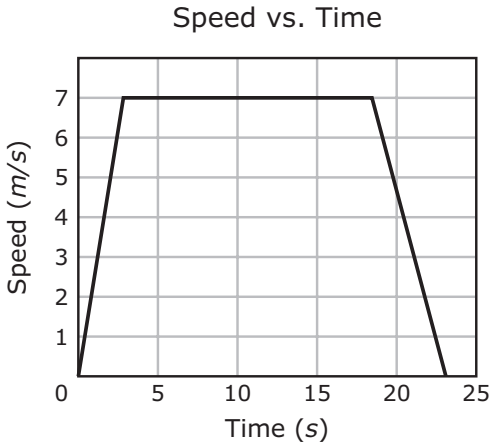
C



D

GO ON

28 The speed of an object over time is shown in the graph.



Which table describes the object's motion?

F

Time Interval (*s*)	Description of the Motion
0–3	The object's speed is increasing.
3–18	The object's speed is constant.
18–23	The object's speed is decreasing.

H

Time Interval (*s*)	Description of the Motion
0–3	The object's speed is increasing.
3–18	The object is at rest.
18–23	The object's speed is decreasing.

G

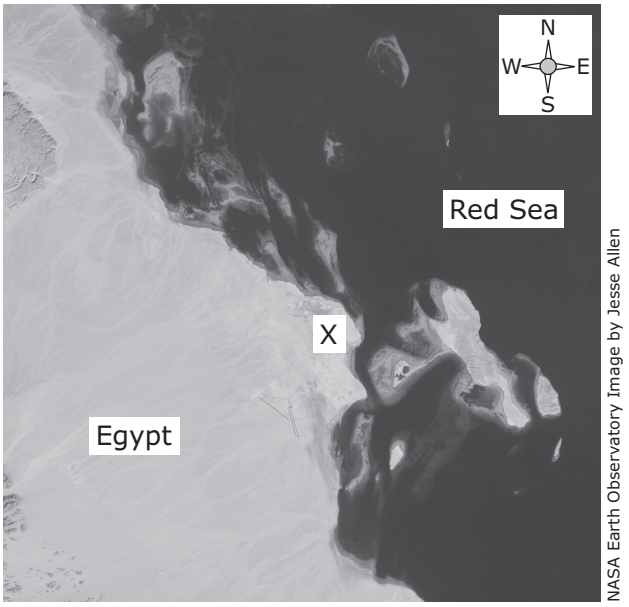
Time Interval (*s*)	Description of the Motion
0–3	The object is moving in a positive direction.
3–18	The object is at rest.
18–23	The object is moving in a negative direction.

J

Time Interval (*s*)	Description of the Motion
0–3	The object is moving at a constant speed.
3–18	The object is at rest.
18–23	The object is moving at a constant speed.

29 The photograph shows a satellite view of the desert coast of Egypt and the Red Sea.

Satellite Photograph



NASA Earth Observatory Image by Jesse Allen

Researchers predict that in the future, the land area of point X will be reduced by erosion.

Which event will cause the most weathering and erosion to the land area at point X?

A Increasing salinity of seawater near the land

B Intense rays from the sun striking the land

C Solids floating in seawater depositing on the land

D Strong storm winds blowing across the land

30 Humans depend upon food that comes from the ocean. Some human activities negatively impact these food supplies.

Which statement provides the best evidence that human activities contribute to this impact?

F Human visitors to coral reef systems break corals growing on rocks.

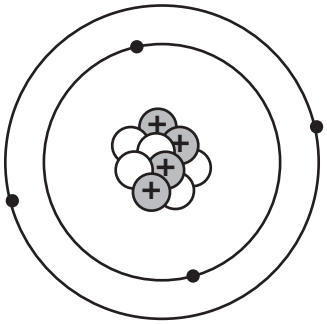
G Humans catch marine fish at a faster rate than the fish are able to reproduce.

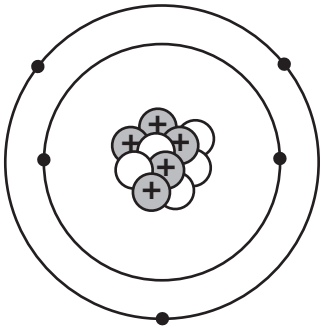
H Humans raise fish in a hatchery for commercial sale.

J Humans construct artificial reefs to attract tourists.

---

31 A student prepared diagrams to model atoms of two elements.





Atoms of which two elements are represented by these models?

A Oxygen, O, and neon, Ne

B Fluorine, F, and neon, Ne

C Silicon, Si, and phosphorus, P

D Beryllium, Be, and boron, B

32 If a fluorine atom has a mass number of 19, how many neutrons are in the atom?

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

---

33 Four students designed and built air propelled rockets that were launched into the air. Their data are recorded in the table.

Data Table

Rocket	Mass (kg)	Net Force (N)
1	0.528	12.0
2	0.426	8.0
3	0.515	12.0
4	0.477	8.0

Which rocket had the greatest acceleration?

A Rocket 1

B Rocket 2

C Rocket 3

D Rocket 4

34 Sea anemones and clown fish live together in the ocean. Which statement best describes one way sea anemones depend on clown fish for an abiotic factor in an ecosystem?

F Clown fish protect sea anemones from predatory fish.

G Clown fish decrease competition among sea anemones.

H Clown fish consume the remains of organisms paralyzed by sea anemones.

J Clown fish move water near sea anemones when dissolved oxygen levels are low.

35 The picture shows a bicyclist increasing speed while riding down a hill during a bicycle race.

Which statements accurately describe the potential and kinetic energy of this bicyclist?

A Kinetic energy increases.

Potential energy decreases.

B Kinetic energy increases.

Potential energy remains constant.

C Kinetic energy remains constant.

Potential energy decreases.

D Kinetic energy remains constant.

Potential energy increases.

36 Trees lose water through transpiration, when water evaporates from leaves. The list describes types of tree leaves that help reduce the amount of transpiration.

Tree Leaves That Reduce Transpiration

- Small leaves
- Needlelike leaves, such as on conifers
- Leaves with hairlike structures
- Leaves with waxy coverings

Which of these is most likely observed in an area experiencing a long-term drought?

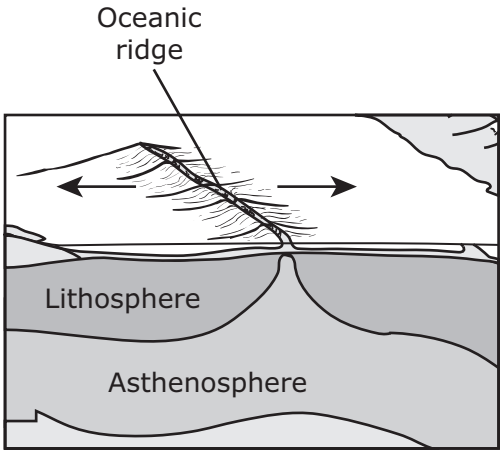
F Trees with broad leaves will be more healthy than trees with needlelike leaves.

G Trees with leaves that have waxy coverings will be more healthy than trees without wax-covered leaves.

H Trees with broad leaves will be more healthy than trees with small, flat leaves.

J Trees with leaves without any hairlike structures will be more healthy than trees with leaves covered by hairlike structures.

37 Two oceanic plates are shown in the image.



Which type of boundary results in the spreading of the oceanic ridge?

A Convergent boundary

B Subduction boundary

C Transform boundary

D Divergent boundary

---

38 When a coin is tossed in the air, it travels upward, gradually slows down, momentarily reaches zero speed, then moves back downward with increasing speed. Which statement best explains this change in the coin's motion?

F The force of gravity causes the coin to change its velocity.

G The coin's inertia decreases on the way up and increases on the way down.

H The action-reaction force pair of gravity and the applied force cancel each other.

J The coin remains in its state of upward motion until the force of friction acts upon it.

39 Alpha Centauri appears as a bright object visible in the Milky Way galaxy. Alpha Centauri is actually a system of three objects. Each object produces light and rotates on its own axis. The system is an average of 4 light-years from Earth.

Based on this information, the three objects that make up the Alpha Centauri system are all —

A asteroids

B comets

C planets

D stars

---

40 Students performed a lab investigation on chemical reactions. The students put on goggles and plastic gloves and then followed these steps.

1. Pour 150 milliliters of vinegar into a beaker.
2. Place a thermometer in the vinegar and record measurements.
3. Add a piece of steel wool to the beaker.
4. Observe and record thermometer measurements.
5. Remove the steel wool from the beaker.
6. Use tweezers to pull strands of the steel wool apart and observe changes.

Which observation would indicate that a chemical reaction occurred?

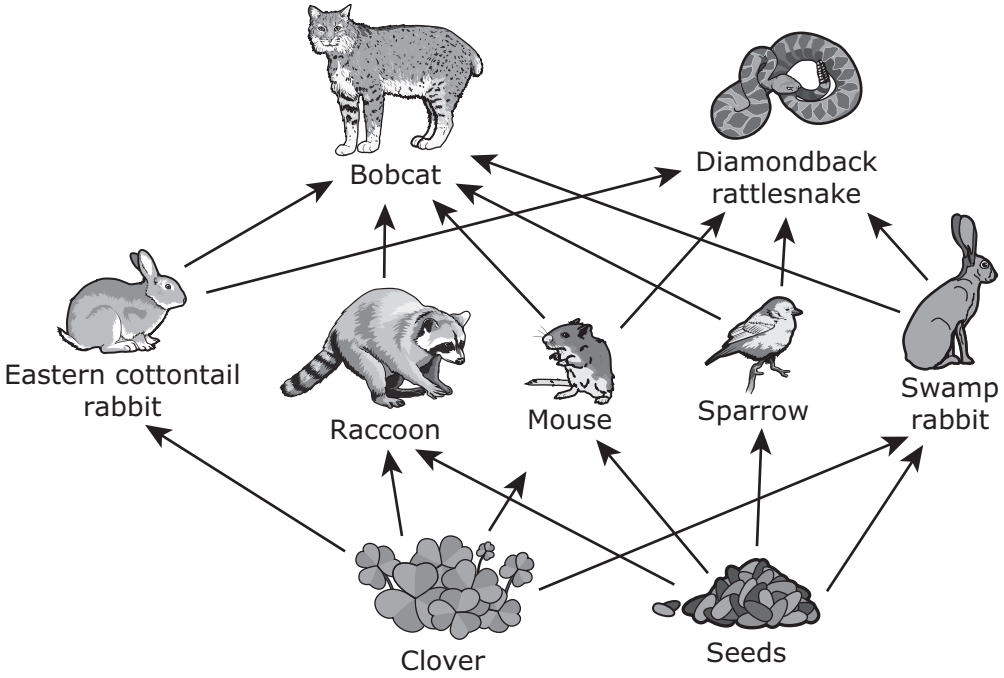
F The vinegar took the shape of the container in step 1.

G The steel wool sank into the vinegar in step 3.

H The temperature of the vinegar increased during step 4.

J The steel wool changed shape during step 6.

41 A Texas Gulf Coast food web is shown.



According to this food web, which organisms would the bobcat and diamondback rattlesnake compete for if the mouse population and swamp rabbit population decreased?

A Raccoon and sparrow

B Raccoon and Eastern cottontail rabbit

C Sparrow and seeds

D Sparrow and Eastern cottontail rabbit

42 The chart shows properties of four elements.

Element Properties

Element	Luster	Conducts Electricity	Conducts Heat	Melting Point
1	Shiny	Yes	Yes	Low
2	Dull	No	No	Low
3	Shiny	Yes	Yes	High
4	Dull	Yes	Yes	High

Based on these properties, which element is most likely a nonmetal?

F Element 1

G Element 2

H Element 3

J Element 4

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

STAAR
GRADE 8
Science
May 2022