

Do NOT Affix Student ID Label Here

A

Student Name

School Name

LEA Number



Grade 8
MISA

Practice Test
Large Print

School Use Only

F

SASID

0	0	0	0	0	0	0	0	0	0
1	1	1	1	1	1	1	1	1	1
2	2	2	2	2	2	2	2	2	2
3	3	3	3	3	3	3	3	3	3
4	4	4	4	4	4	4	4	4	4
5	5	5	5	5	5	5	5	5	5
6	6	6	6	6	6	6	6	6	6
7	7	7	7	7	7	7	7	7	7
8	8	8	8	8	8	8	8	8	8
9	9	9	9	9	9	9	9	9	9

C

Place the
Student ID Label Here

D

Gender

☐ Female

☐ Male

☐ Non-Binary

E

Date of Birth

Day	Month	Year
0	0	<div><input type="radio"/> Jan</div>
1	1	<div><div>1</div><div><input type="radio"/> Feb</div></div>
2	2	<div><div>2</div><div><input type="radio"/> Mar</div></div>
3	3	<div><div><input type="radio"/> Apr</div></div>
4	4	<div><div><input type="radio"/> May</div></div>
5	5	<div><div><input type="radio"/> Jun</div></div>
6	6	<div><div><input type="radio"/> Jul</div></div>
7	7	<div><div><input type="radio"/> Aug</div></div>
8	8	<div><div><input type="radio"/> Sep</div></div>
9	9	<div><div><div>9</div><div><input type="radio"/> Oct</div></div></div>
		<div><div><input type="radio"/> Nov</div></div>
		<div><div><input type="radio"/> Dec</div></div>

Section 1

Directions:

Today, you will take Section 1 of the MISA Practice Test.

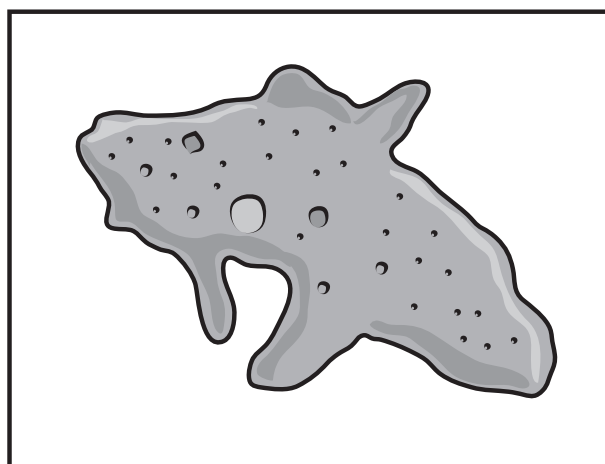
Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your test book. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

Some of the questions will ask you to write a response. Write your response in the space provided in your test book. Be sure to keep your response within the space provided. Only responses written within the space provided will be scored.

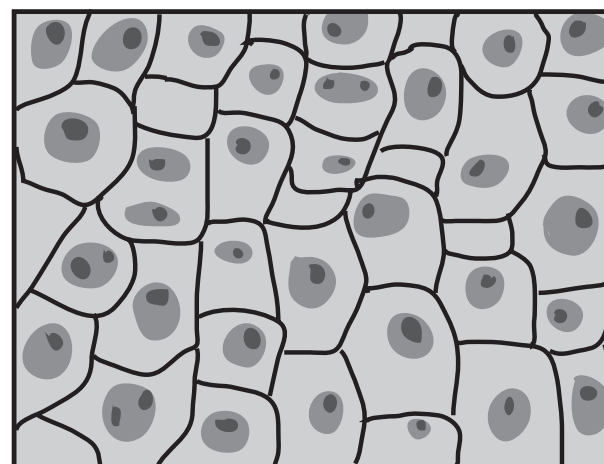
If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

Read all of the information. Use the information to answer the questions.

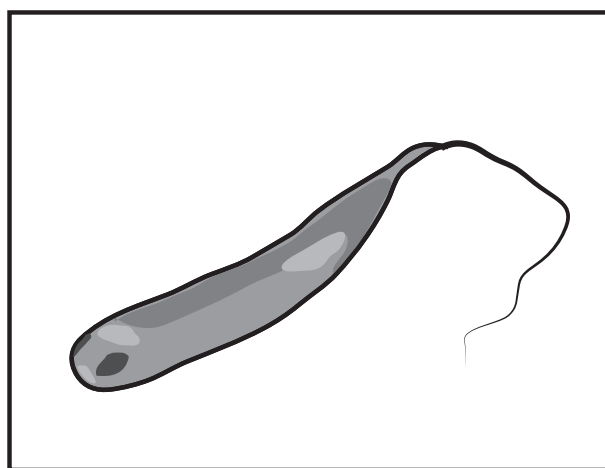
During a class investigation on cells, students observed different cell types using a compound light microscope and prepared slides. The following diagrams show some of the cells the students observed.



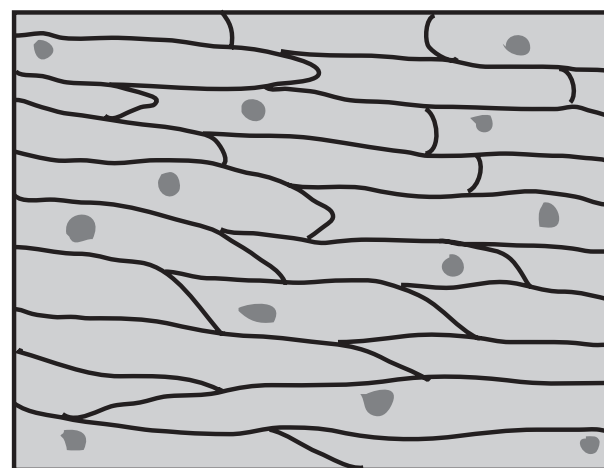
Amoeba



Human Skin



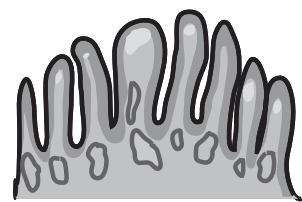
Euglena



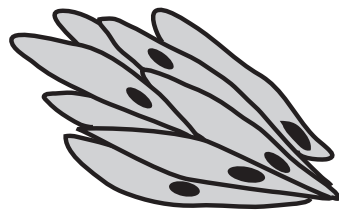
Onion

After examining the cells using a microscope, the students researched some of the cells observed. The students found that each individual amoeba is able to carry out all the functions necessary for life. The amoeba moves by changing the position of its cytoplasm. The amoeba uses cellular respiration to convert food into energy. Another organism that is similar to the amoeba is the euglena. Each individual euglena is able to carry out all necessary functions for life. One of the ways the euglena differs from the amoeba is that the euglena uses photosynthesis to produce the energy needed for its survival. Another way the euglena differs from the amoeba is in movement. The euglena has a tail, called a flagella, that propels the euglena.

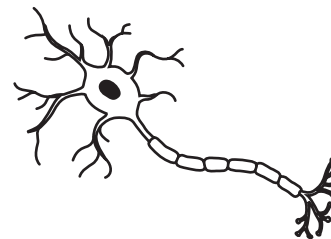
As the students continued their research, they found evidence that indicated that humans and other complex organisms have many cells that are found in only one system of an organism's body. Their research also stated that it is estimated that on average 37.2 trillion cells compose a human body. Some of these cells are intestinal cells, heart muscle cells, and nerve cells. These cell types are shown in the following diagram.



Intestinal
Cell



Heart
Muscle Cell



Nerve Cell

The students also found that researchers are trying to determine the number of different cell types there are in the human body. Until recently, scientific evidence supported the claim that the human body has approximately 200 cell types, each with a unique function. Researchers are now analyzing the different cell types and have found that there are many more types than previously thought.

- 1 During the microscope investigation, the students observed the amoeba and euglena.**

The observations on the amoeba and euglena provide evidence that

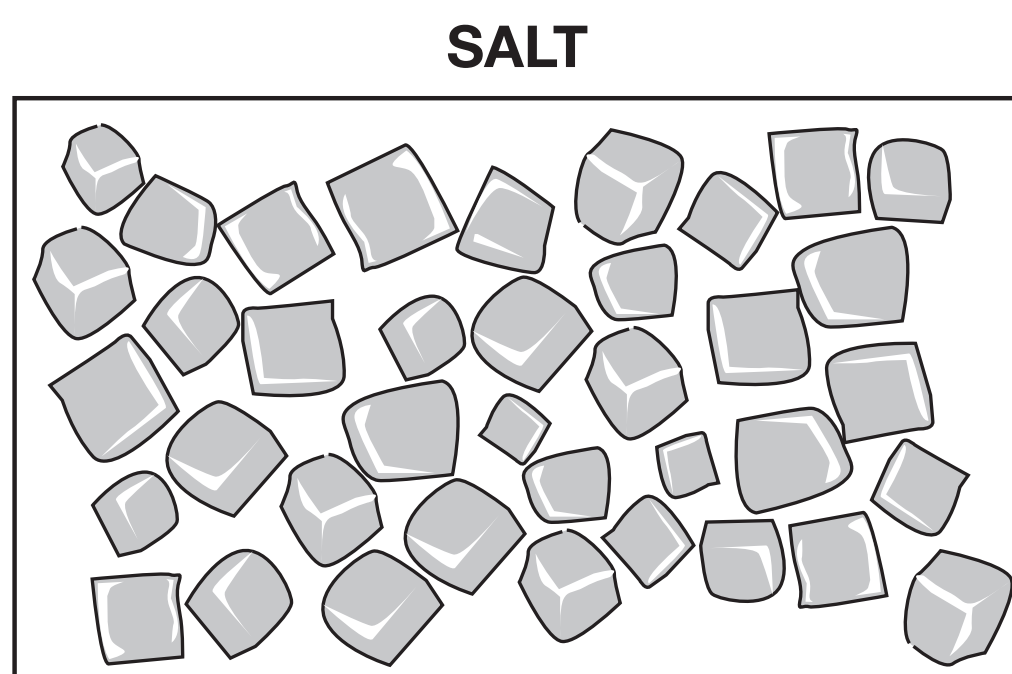
- Ⓐ cells are a part of tissues.
- Ⓑ cells rely on other cells for survival.
- Ⓒ living things can be composed of one cell.
- Ⓓ water and oxygen are used by the cell to produce energy.

- 2 During the microscope investigation, the students observed cells.**

Evidence from the investigation supports the classification of humans and onions as

- Ⓐ unicellular organisms that have cells for different tissues.
- Ⓑ unicellular organisms that have cells that work independently.
- Ⓒ multicellular organisms that have different types of cells with specialized functions.
- Ⓓ multicellular organisms that have cells that use the same organelle for protection and structure.

- 3 The students continued using the microscope and compared table salt to the onion cells they previously observed. A diagram of the table salt is shown.**



Using observations from their investigation, the students classified the salt as

- Ⓐ living, because the salt has cells.
 - Ⓑ living, because the salt has atoms.
 - Ⓒ nonliving, because the salt lacks cells.
 - Ⓓ nonliving, because the salt lacks atoms.
- 4 The students' research indicated that heart muscle cells are only one type of cell in the circulatory system and that the circulatory system is composed of several organs working together.**

Which other circulatory system organ works directly with the heart to ensure other body tissues receive oxygen?

- Ⓐ brain
- Ⓑ kidneys
- Ⓒ lung nodules
- Ⓓ blood vessels

5 The students’ research indicated that the human body is composed of cells.

Which table lists each body structure in order of least complex organization to most complex organization?

Ⓐ

Least Complex Organization	→	→	→	Most Complex Organization
body	organs	cells	tissues	organ systems

Ⓑ

Least Complex Organization	→	→	→	Most Complex Organization
cells	tissues	organs	organ systems	body

Ⓒ

Least Complex Organization	→	→	→	Most Complex Organization
tissues	organs	cells	organ systems	body

Ⓓ

Least Complex Organization	→	→	→	Most Complex Organization
organs	cells	tissues	body	organ systems

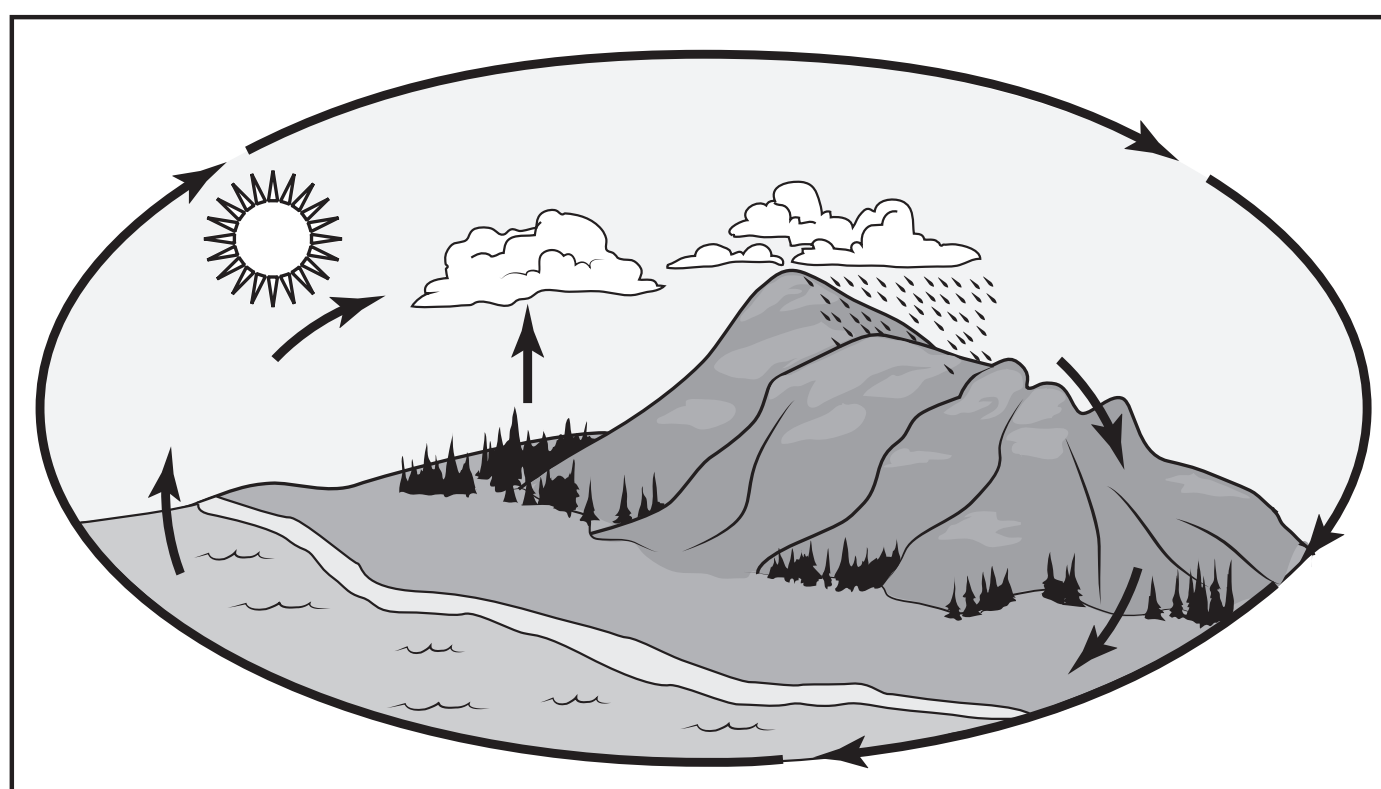
Use evidence to explain how the intestinal cells help the intestines work within the digestive system. In your explanation, be sure to include

- **the role of the intestines in the digestive system**
- **the interacting components in the intestines**

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

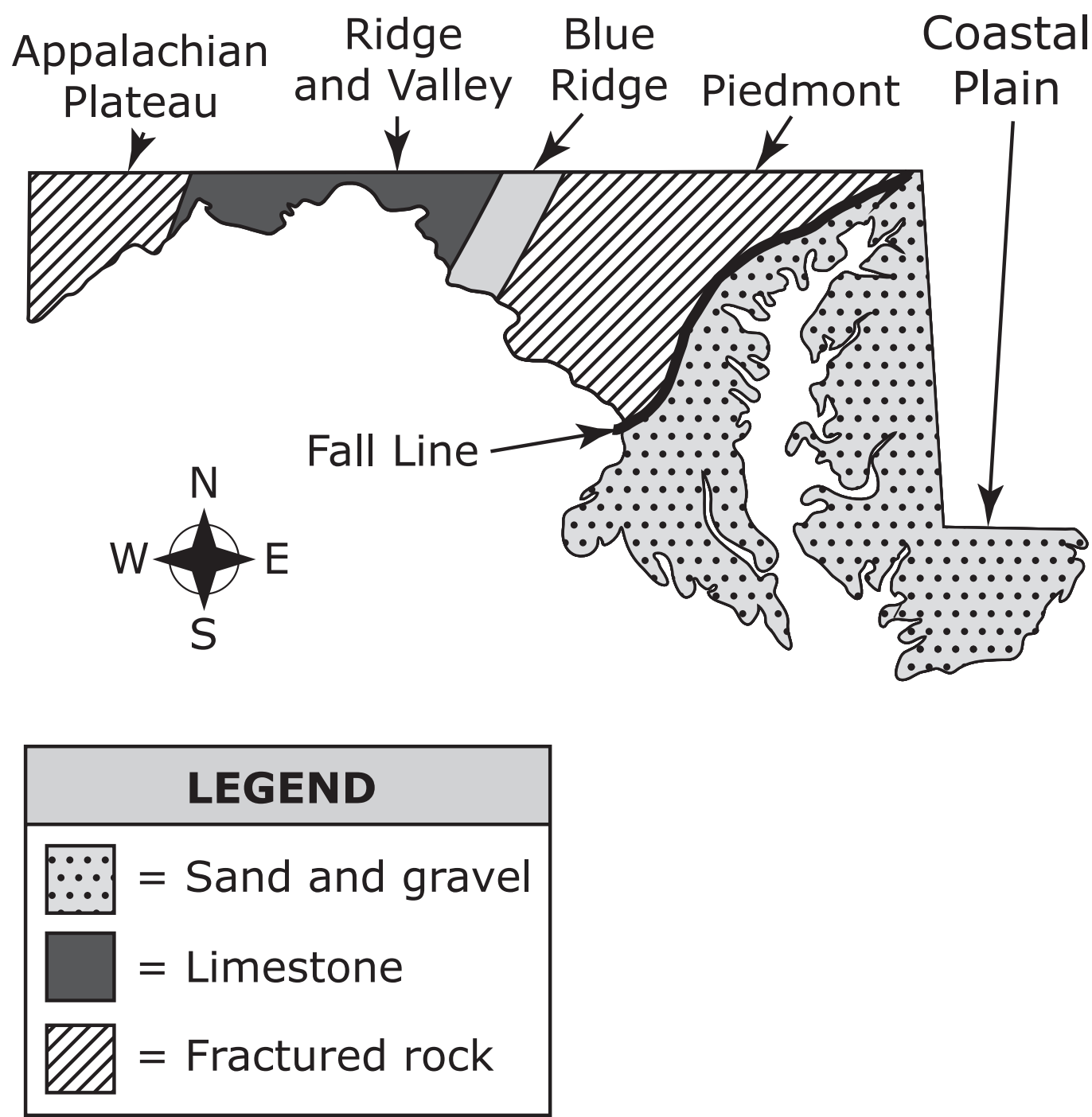
Read all of the information. Use the information to answer the questions.

After reading about a drought in other states, a class of students began to research renewable and nonrenewable resources. One group of students focused their research on water. The research stated that 97.5% of the water on Earth is salt water that is located mainly in the oceans. Only 2.5% of water on Earth is fresh water, which is found in glaciers, ice caps, groundwater, lakes, rivers, streams, the atmosphere, and other locations where surface water is found. To better understand how water moves through the water cycle and where it can be stored, the group constructed a model of the water cycle, similar to the one shown.



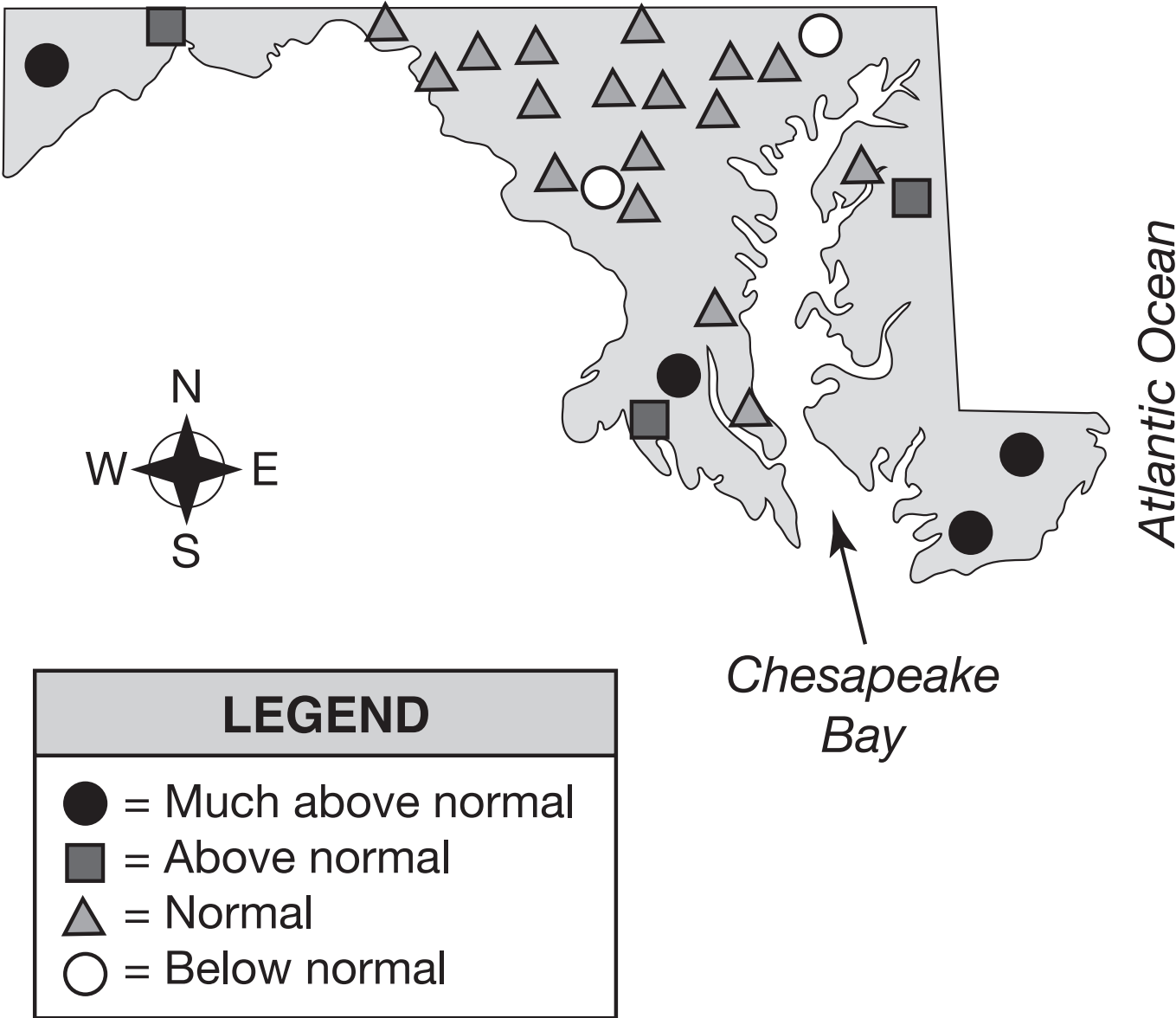
The research stated that groundwater makes up about 30% of the fresh water found on Earth. One of the primary sources of groundwater is water that soaks into the ground after rain falls and snow melts. Another source is water that seeps deep into the ground from the bottoms of rivers and lakes. Once the water has moved into the ground, it will stay in crevices in fractured rock or pool in wells and aquifers. In Maryland, the type of rock found in a given region determines how the groundwater is stored. West of the fall line shown on the following map, water is found primarily in wells that form in rock fractures. East of the fall line, groundwater is found in aquifers, wells, and sediment.

LOCATIONS OF MARYLAND ROCK TYPES



The research stated that groundwater is a primary water source for humans. Over 50% of the people in the United States use groundwater for drinking and other daily uses. The amount of groundwater for an area is affected by the geographic location. The figures on the map illustrate the varying levels of groundwater at each location shown.

MARYLAND GROUNDWATER LEVELS, MAY 2016



7 The students used their model to better understand how water moves through the water cycle.

Which phenomenon causes precipitation to reach Earth?

- Ⓐ solar energy
- Ⓑ magnetic force
- Ⓒ potential energy
- Ⓓ gravitational force

8 Part A

The students reviewed a list of materials and began to classify them as renewable or nonrenewable resources.

Which materials can be classified as renewable resources?

Select three.

- Ⓐ coal
- Ⓑ metal
- Ⓒ oil
- Ⓓ sunlight
- Ⓔ trees
- Ⓕ water

Part B

The difference between renewable and nonrenewable resources is that nonrenewable resources require

- Ⓐ less material to make than renewable resources.
- Ⓑ more material to make than renewable resources.
- Ⓒ less time to naturally occur than renewable resources.
- Ⓓ more time to naturally occur than renewable resources.

- 9 After constructing their model, the students found that water is stored in many different water systems.**

Which water systems store liquid water after it falls as precipitation?

Select three.

- Ⓐ aquifers
- Ⓑ atmosphere
- Ⓒ clouds
- Ⓓ lakes
- Ⓔ wells

- 10 The students found that in Maryland some aquifers exist beneath the Ridge and Valley region.**

Aquifers form in this region of the state because limestone is

- Ⓐ porous and composed of sediment.
- Ⓑ volcanic and composed of cooled magma.
- Ⓒ nonporous and composed of folded metamorphic rock.
- Ⓓ sedimentary and composed of crystallized igneous rock.

- 11 Some of the fractured rock that makes up naturally occurring wells in the Appalachian Plateau region of Maryland is composed of sandstone. This type of rock was formed through**

- Ⓐ volcanic activity.
- Ⓑ sediments compacting over time.
- Ⓒ folding and squeezing of rock layers.
- Ⓓ extreme pressure on and heating of rock layers.

12 The students found that some of the locations on the Maryland groundwater map currently have above normal water levels. However, these locations have also experienced periods of drought in the past five years.

Use evidence to explain how water can be depleted and refilled in such a short period of time.





You have come to the end of Section 1 of the test. Review your answers from Section 1 only.



Section 2

Directions:

Today, you will take Section 2 of the MISA Practice Test.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your test book. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

Some of the questions will ask you to write a response. Write your response in the space provided in your test book. Be sure to keep your response within the space provided. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

Read all of the information. Use the information to answer the questions.

While studying phase changes in common substances in their science class, a group of students investigated how water (H₂O) and table sugar (C₁₂H₂₂O₁₁) respond to temperature changes. The students exposed beakers containing the substances to three different temperatures.

Sugar and Water Investigation

- Place 50 milliliters (mL) of each substance into separate beakers.
- Place each beaker in a freezer until each substance reaches 0 degrees Celsius (°C).
- Record observations of the appearance of the substances.
- Place the beakers on a table.
- After several hours, record observations of the appearance of the substances at room temperature (20°C).
- The teacher used a hot plate to heat the beakers to 100°C.
- Record observations of the appearance of the substances.

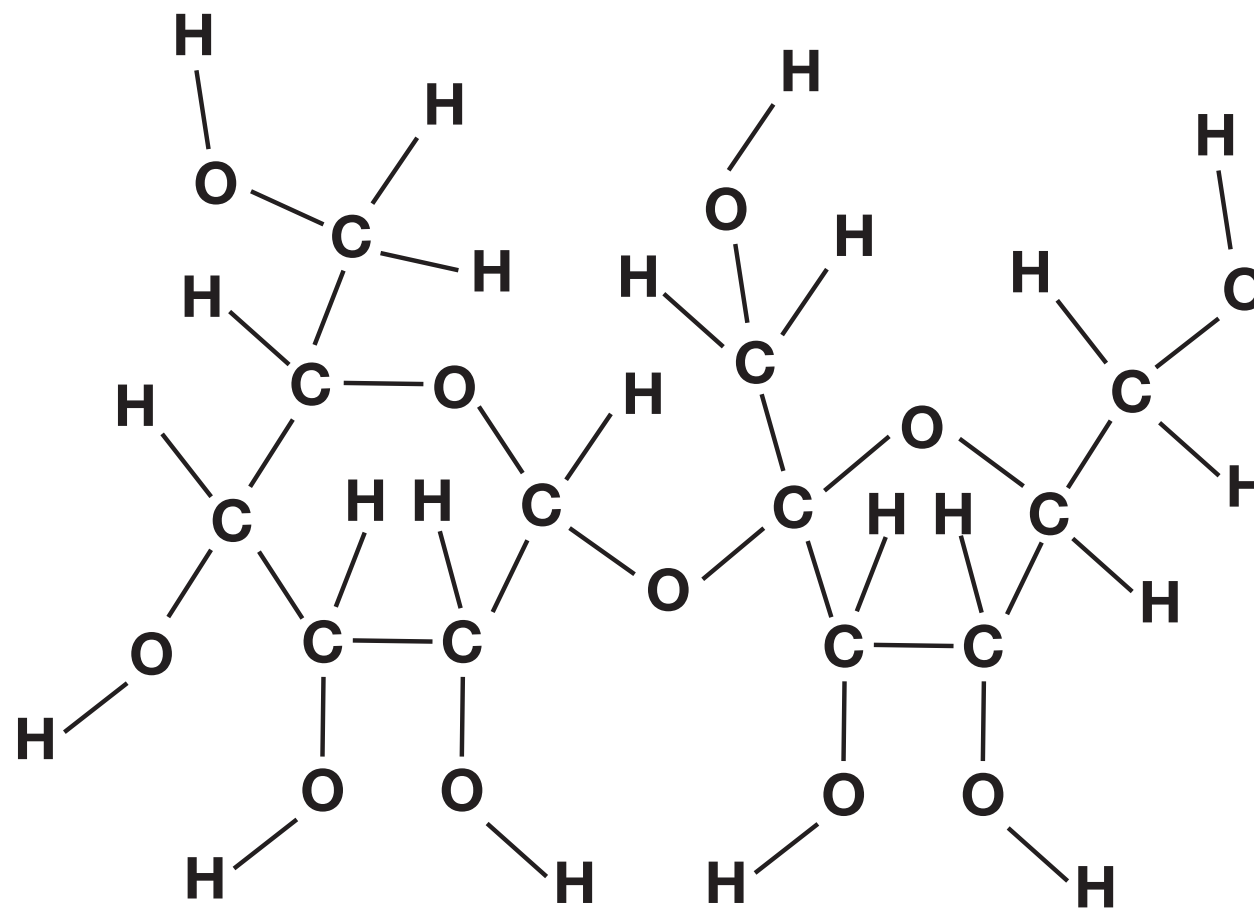
After completing the investigation, the students organized their data into the following table.

SUGAR AND WATER DATA TABLE

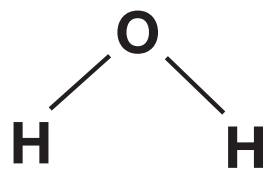
Substance	0°C	20°C	100°C
Table Sugar (C ₁₂ H ₂₂ O ₁₁)	<ul style="list-style-type: none">• solid• volume is 50 mL	<ul style="list-style-type: none">• solid• volume is 50 mL	<ul style="list-style-type: none">• solid• volume is 50 mL
Water (H ₂ O)	<ul style="list-style-type: none">• solid• volume is greater than 50 mL	<ul style="list-style-type: none">• liquid• volume is 50 mL	<ul style="list-style-type: none">• substance is boiling, steam rises from beaker• volume is less than 50 mL

After reviewing data from the investigation, the students constructed models of a table sugar molecule and a water molecule.

TABLE SUGAR MOLECULE

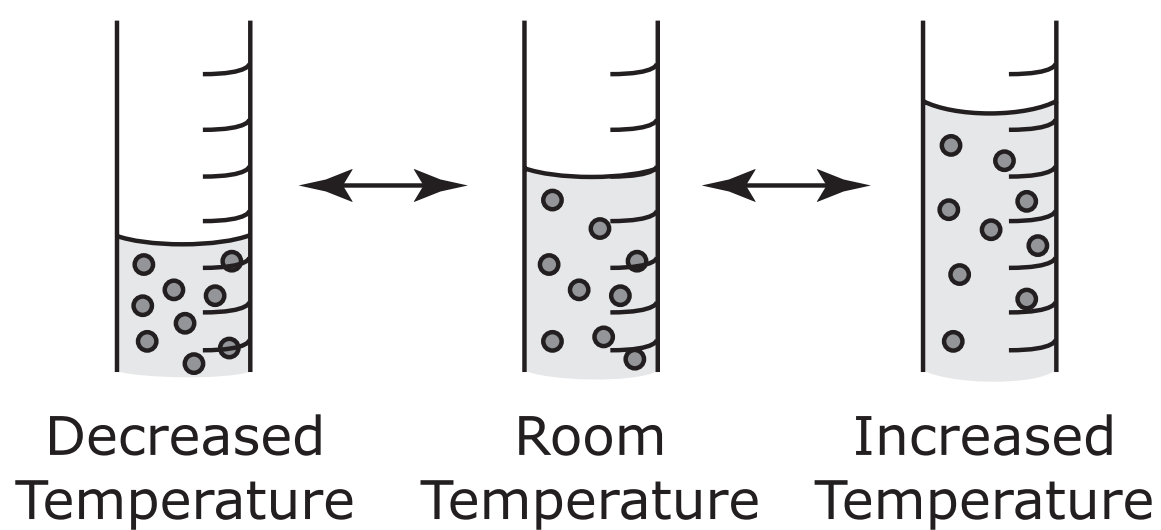


WATER MOLECULE

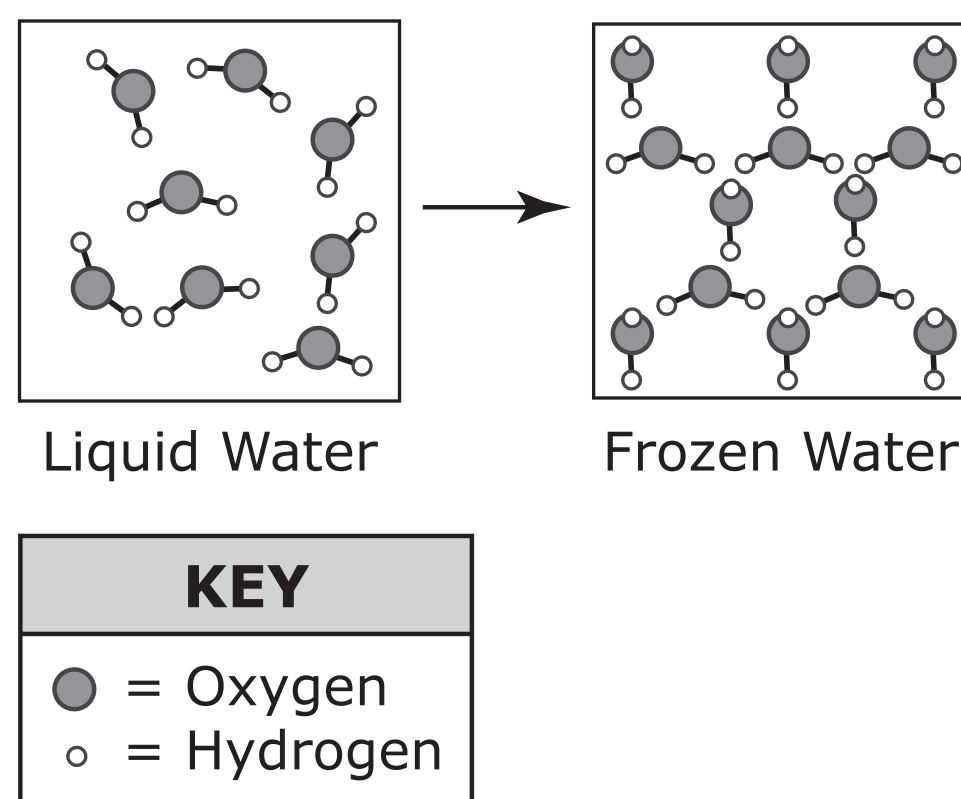


In the sugar and water investigation, the students observed that the liquid inside the thermometers moved when exposed to different temperatures. They researched thermometers and found that most are filled with alcohol (C_2H_6O). When a thermometer is exposed to warmer temperatures, the liquid inside expands. A thermometer's glass tube is not flexible, so the liquid expands vertically and rises up the tube. The students constructed the following model to illustrate how molecules of liquid in a thermometer move.

ALCOHOL THERMOMETER MODEL



- 1 The students found that the volume of water increased when it froze. They constructed the following model of liquid and frozen water to illustrate how phase affects water molecule arrangement.



The volume of water increases when water freezes because

- Ⓐ water molecules have a low density.
- Ⓑ the components of a water molecule increase in mass.
- Ⓒ the arrangement of the molecules in the water changes.
- Ⓓ water molecules are composed of atoms from different elements.

- 2 The students used the models to better understand the structure of table sugar.

Table sugar is composed of

- Ⓐ carbon dioxide (CO_2) and water (H_2O) atoms.
- Ⓑ carbon (C), hydrogen (H), and oxygen (O) atoms.
- Ⓒ carbon dioxide (CO_2) and water (H_2O) molecules.
- Ⓓ carbon (C), hydrogen (H), and oxygen (O) molecules.

- 3 The students used the model of a water molecule to better understand its structure.**

Water is classified as a molecule because it

- Ⓐ is composed of multiple atoms that are chemically bonded.
- Ⓑ changes phases when exposed to thermal energy.
- Ⓒ is composed of elements that are gases.
- Ⓓ has mass and takes up space.

- 4 The students compared the models of a table sugar molecule and a water molecule.**

How do table sugar molecules differ from water molecules?

- Ⓐ A table sugar molecule is a mixture.
- Ⓑ A water molecule is a pure substance.
- Ⓒ Water molecules may repeat to form extended structures.
- Ⓓ Table sugar molecules may repeat to form extended structures.

5 In the thermometer model, the liquid expanded because

- Ⓐ the chemical energy of a liquid's molecules changes proportionally to the change in phase.
- Ⓑ the potential energy of a liquid's molecules changes proportionally to the change in volume.
- Ⓒ the potential energy of a liquid's molecules changes proportionally to the change in temperature.
- Ⓓ the average kinetic energy of a liquid's molecules changes proportionally to the change in temperature.

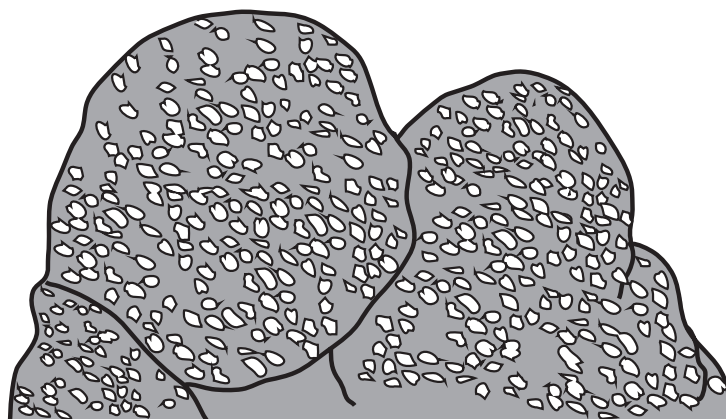
- **the transfer of energy**
- **the molecular structure**

[illegible]

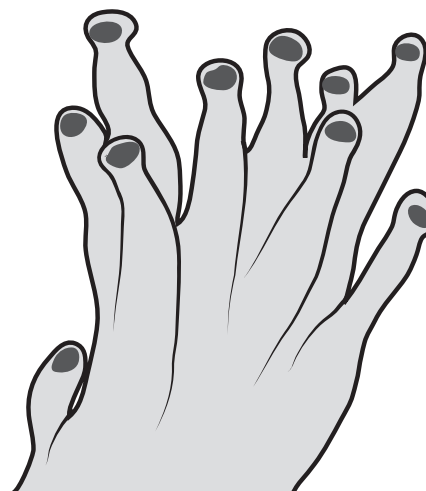
Read all of the information. Use the information to answer the questions.

After a school trip to an aquarium, students from a science class researched some of the organisms that live in coral reef ecosystems. The students' research indicated that coral reefs are made up of small organisms called corals and each individual coral is called a polyp. Corals secrete calcium carbonate to form an exoskeleton, and as the corals die off, these exoskeletons build up and form a limestone foundation. New corals attach themselves to the limestone foundation and slowly form coral reefs. The following diagram shows a colony of corals and a coral polyp.

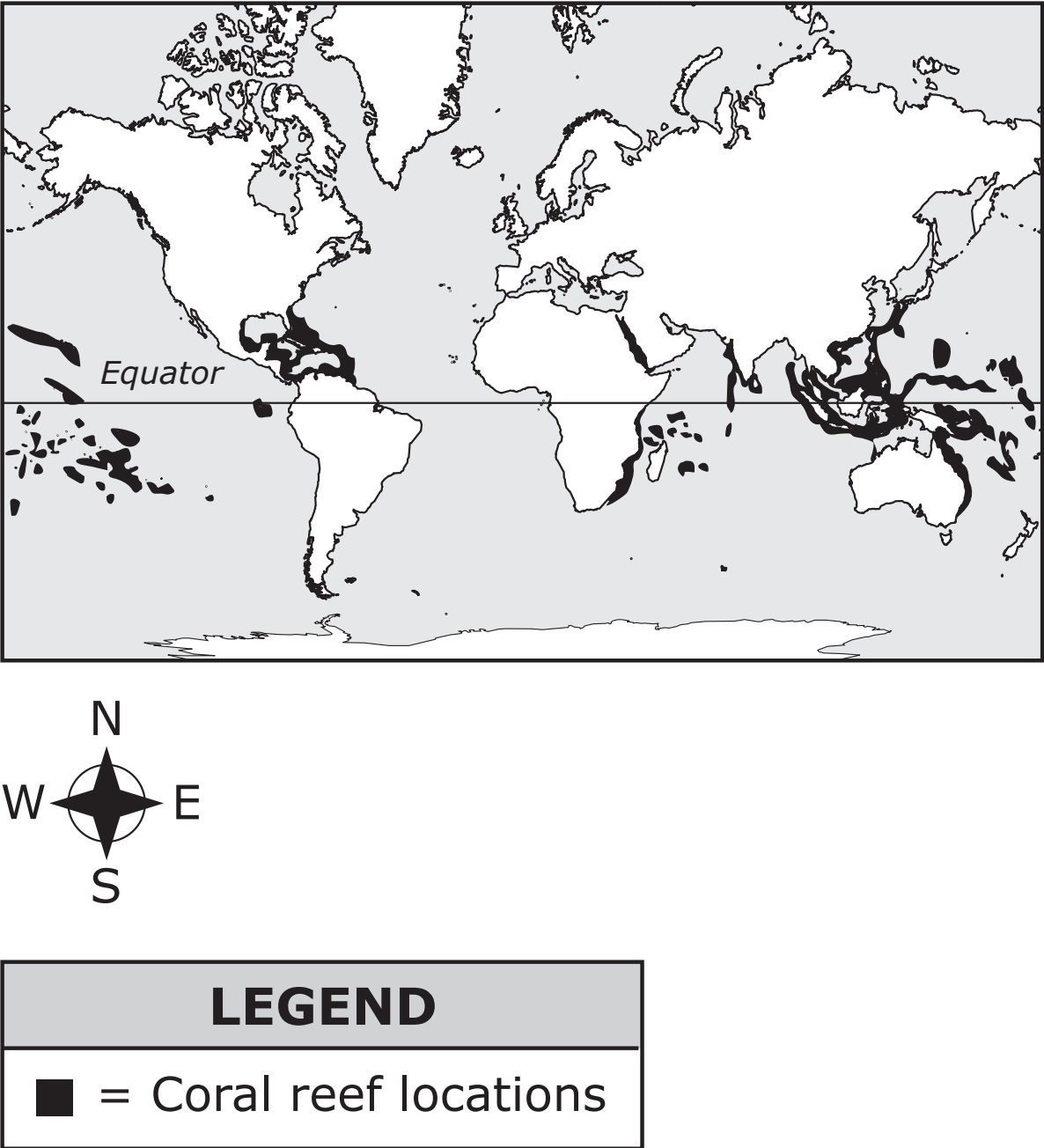
Coral Colony



Coral Polyp

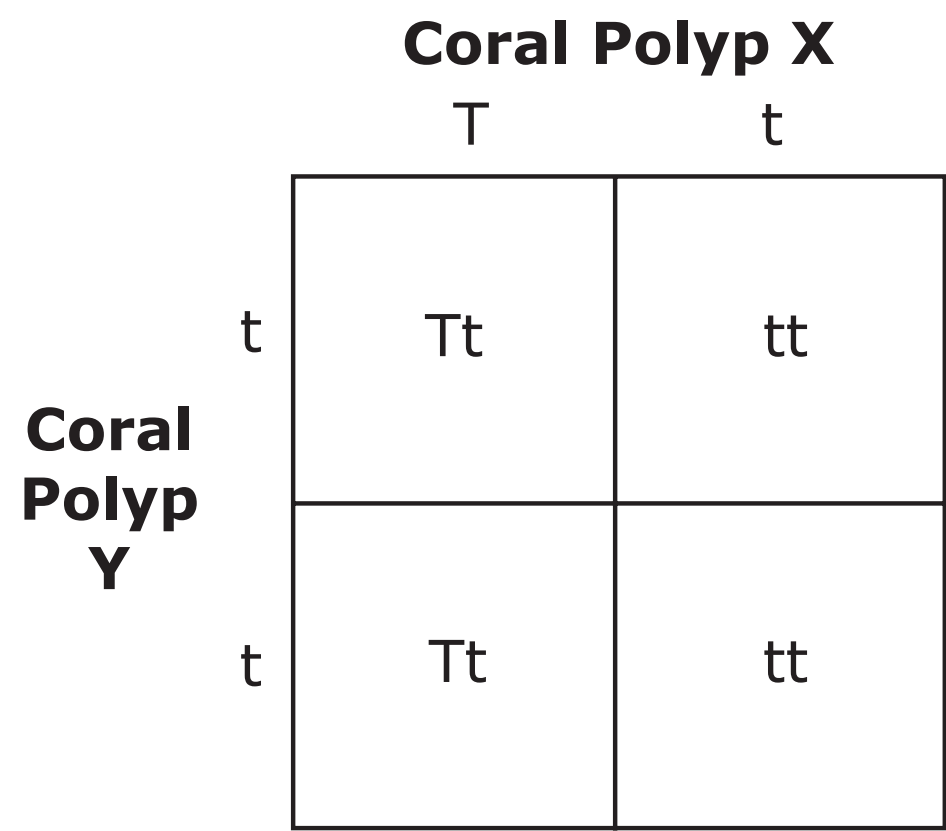


The students’ research indicated that corals are animals that consume a variety of other small organisms. Corals are able to reproduce both sexually and asexually. The corals use asexual reproduction to expand colonies and use sexual reproduction to form new colonies that can be far away from the parents. Stony corals and other coral species that build reefs prefer to live in warm, shallow water that is 20–29 degrees Celsius (°C). The following map shows where coral reefs are located on Earth.



The students' research indicated that climate change is causing ocean temperatures to rise. These rising temperatures are making the ocean unlivable for coral reefs. Corals are sensitive to water temperature, and when water temperatures change beyond a livable range, the corals become stressed. This stress causes the corals to shed photosynthetic algae and other microorganisms that live on the corals. This shedding of organisms causes the corals to turn white in an event known as bleaching. When water temperatures return to a livable range, many coral reefs have been destroyed by the bleaching and do not recover. A recent study stated that corals that are able to store larger energy reserves in the form of fat in their cells and are able to partner with multiple species of algae have a greater likelihood of recovering from bleaching events. Certain coral species are able to store more energy in their cells than other species, but even corals of the same species vary in their ability to store energy.

7 The students constructed a Punnett square for corals that illustrates the transmission of the trait that allows the corals to live in warm water.



KEY
T = Dominant t = Recessive

Coral polyps X and Y are

- Ⓐ the parents and have identical allele pairs.
- Ⓑ the parents and have different allele pairs.
- Ⓒ the offspring and have identical allele pairs.
- Ⓓ the offspring and have different allele pairs.

8 The students’ research indicated that one species of coral has 28 chromosomes.

Which table best describes the most likely number of chromosomes in coral parents and offspring during sexual reproduction?

Ⓐ

Number of Chromosomes in Each Parent	Number of Chromosomes Provided by Parent 1	Number of Chromosomes Provided by Parent 2	Number of Chromosomes in Each Offspring
28	28	28	28

Ⓑ

Number of Chromosomes in Each Parent	Number of Chromosomes Provided by Parent 1	Number of Chromosomes Provided by Parent 2	Number of Chromosomes in Each Offspring
56	28	28	56

Ⓒ

Number of Chromosomes in Each Parent	Number of Chromosomes Provided by Parent 1	Number of Chromosomes Provided by Parent 2	Number of Chromosomes in Each Offspring
28	14	14	28

Ⓓ

Number of Chromosomes in Each Parent	Number of Chromosomes Provided by Parent 1	Number of Chromosomes Provided by Parent 2	Number of Chromosomes in Each Offspring
7	14	14	28

Section 2

- 9 The students continued their research to determine how different coral colonies interact with one another.**

What method of reproduction do corals use when different colonies reproduce with one another?

- Ⓐ asexual reproduction, which will most likely cause a decrease in potential traits
- Ⓑ sexual reproduction, which will most likely cause an increase in genetic variation
- Ⓒ asexual reproduction, which will most likely cause a decrease in stress from bleaching
- Ⓓ sexual reproduction, which will most likely cause an increase in temperature sensitivity

- 10 The students' research indicated that corals that can survive in water over 31 degrees Celsius (°C) have a greater likelihood of surviving bleaching events.**

If coral polyps only breed with corals that carry this temperature trait, the offspring they produce will most likely have

- Ⓐ an increased likelihood of carrying the temperature trait.
- Ⓑ a decreased likelihood of passing on the temperature trait.
- Ⓒ a decreased likelihood of surviving future bleaching events.
- Ⓓ an increased likelihood of experiencing future bleaching events.

11 Part A

The research indicated that there are coral species that live much deeper in the ocean and prefer to live in cool water below 19 degrees Celsius ($^{\circ}\text{C}$).

If a cool-water coral species were moved to a shallow reef near the equator, the corals would most likely

- Ⓐ survive in the warmer water.
- Ⓑ adapt to the warmer water.
- Ⓒ reproduce in the warmer water.
- Ⓓ become bleached in the warmer water.

Part B

According to the students' research, which are the most likely effects to coral populations if ocean temperatures continue to increase?

Select three.

- Ⓐ a population increase
- Ⓑ a population decrease
- Ⓒ a lower chance of survival
- Ⓓ a greater chance of survival
- Ⓔ a decrease in genetic variation
- Ⓕ an increase in genetic variation

12 The students modified an existing model they had made to predict how breeding between coral polyps with a trait that allows the corals to live in warm water would be transmitted.

GENERATION 1

	T	t
t	Tt	tt
t	Tt	tt

GENERATION 2

	T	t
T	TT	Tt
t	Tt	tt

KEY
T = Dominant
t = Recessive

Section 2

Use evidence to explain why corals use this method of reproduction to produce offspring to form new reef colonies.





You have come to the end of Section 2 of the test. Review your answers from Section 2 only.



Section 3

Directions:

Today, you will take Section 3 of the MISA Practice Test.

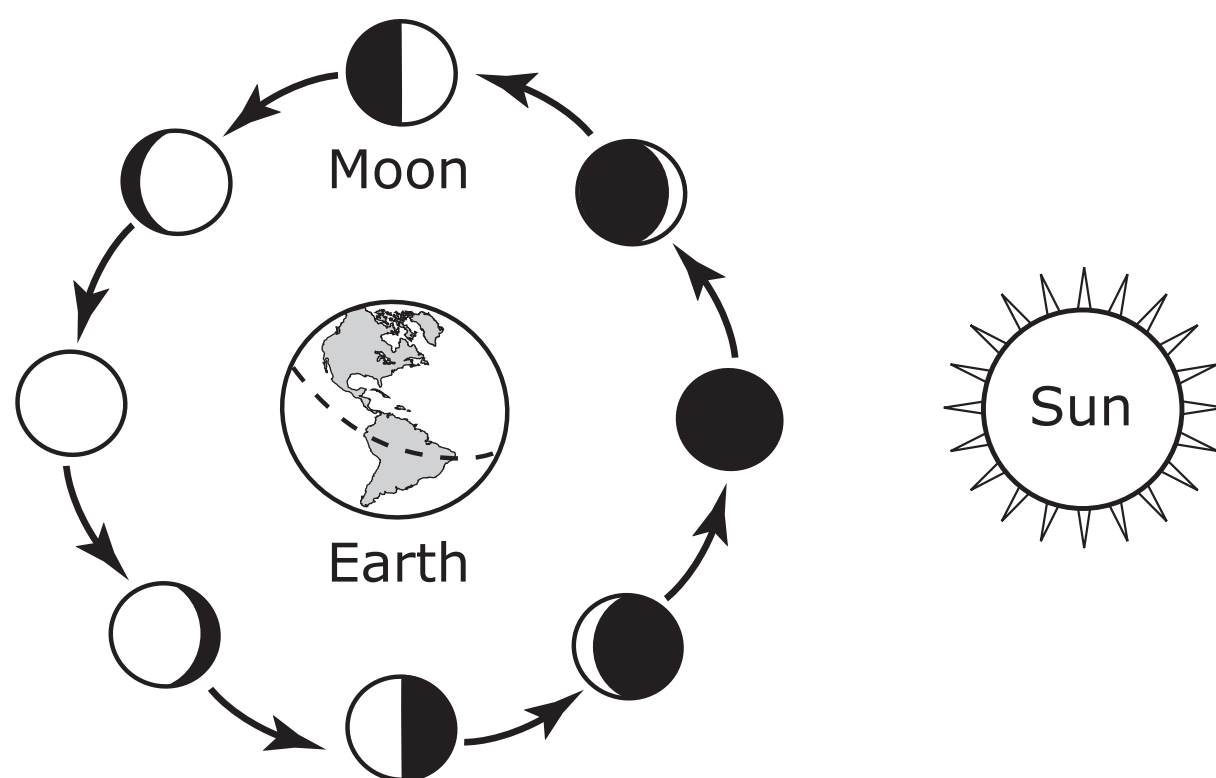
Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your test book. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

Some of the questions will ask you to write a response. Write your response in the space provided in your test book. Be sure to keep your response within the space provided. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

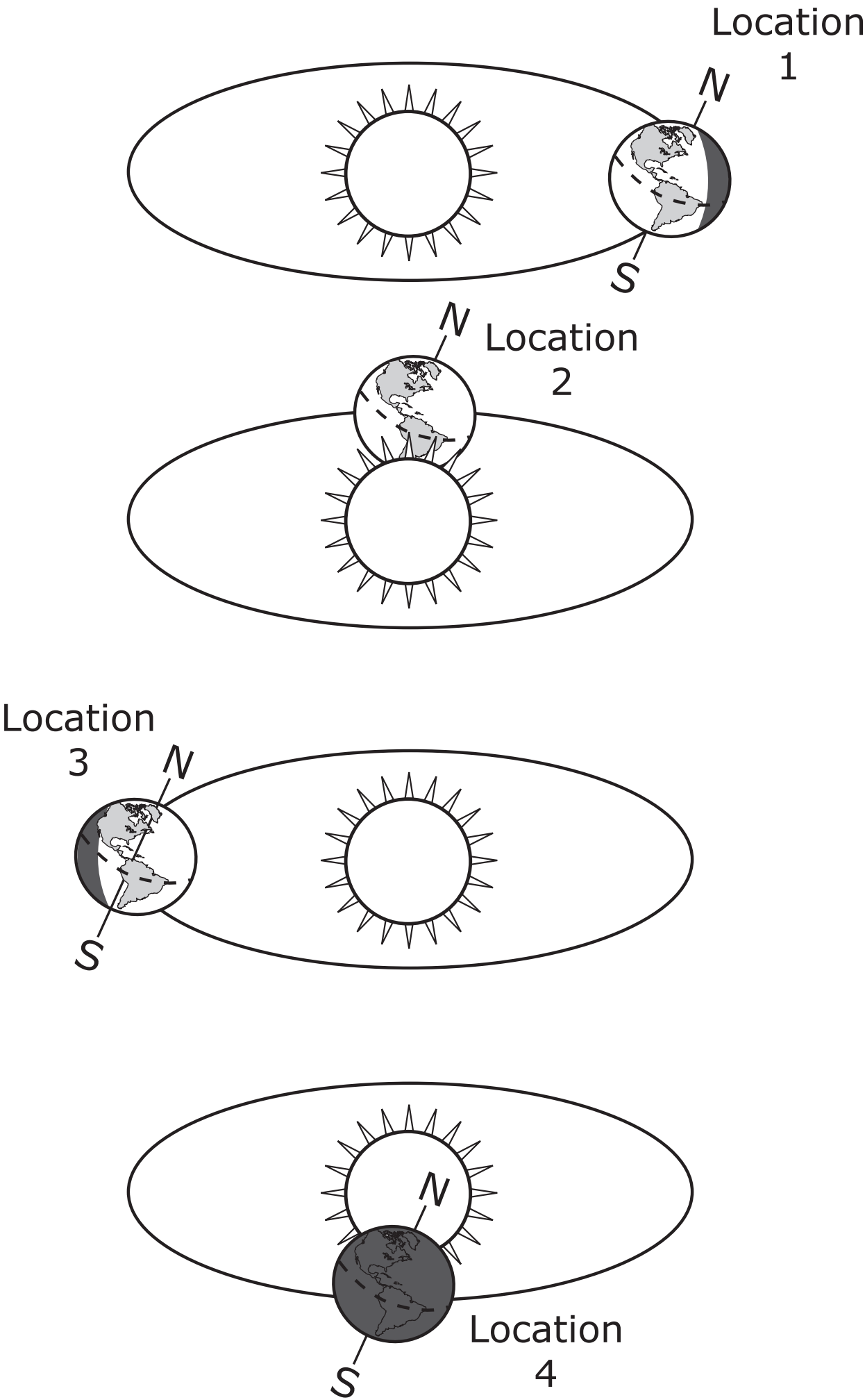
Read all of the information. Use the information to answer the questions.

While studying the solar system, students investigated the phases of the moon. They developed a model to demonstrate the phases of the moon. In the model, a golf ball represented the moon, a basketball represented Earth, and a lamp represented the sun. The golf ball was moved in different positions around the basketball, and the students observed how the shadow on the golf ball changed. The students used their observations to construct the following diagram.



The students then researched the effect the sun has on Earth at different times of the year. The students drew the following diagrams showing Earth in four different locations.

DIAGRAM OF SEASONS



The students continued to research facts about Earth and other celestial objects in the solar system. The students constructed a table to display the data.

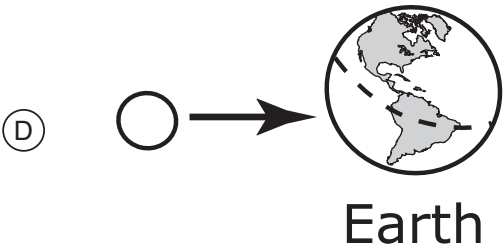
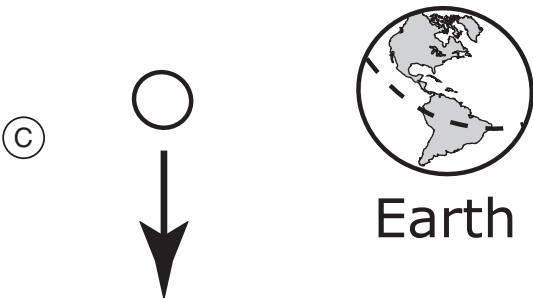
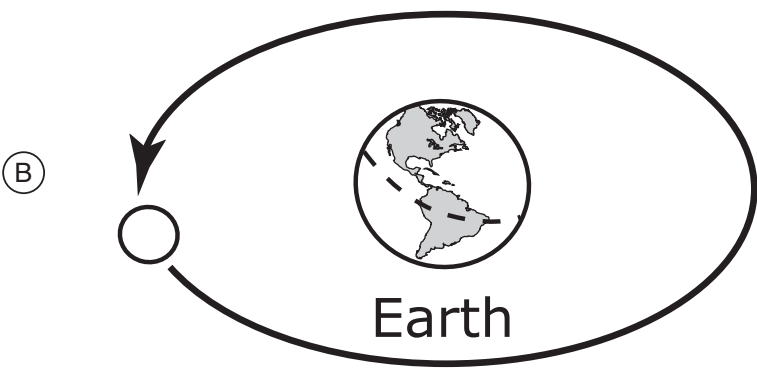
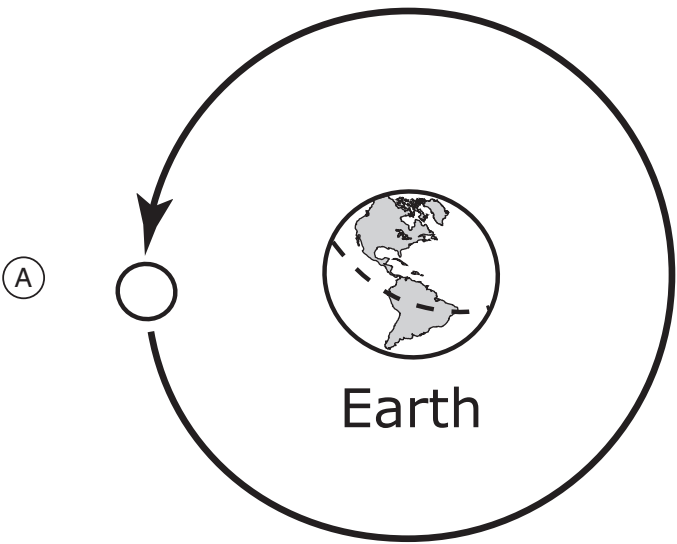
SUN AND PLANET DATA

Object	Actual Diameter (km)	Distance from Sun (Earth = 1)
Sun	1,391,900	—
Mercury	4,878	0.39
Venus	12,104	0.72
Earth	12,756	1.00
Mars	6,794	1.52
Jupiter	143,884	5.20
Saturn	120,536	9.54
Uranus	51,118	19.18
Neptune	49,528	30.06

Object	Relative Mass (Earth = 1)	Average Density (g/cm ³)
Sun	—	—
Mercury	0.06	5.4
Venus	0.82	5.2
Earth	1.00	5.5
Mars	0.11	3.9
Jupiter	317.87	1.3
Saturn	95.14	0.7
Uranus	14.54	1.3
Neptune	17.08	1.6

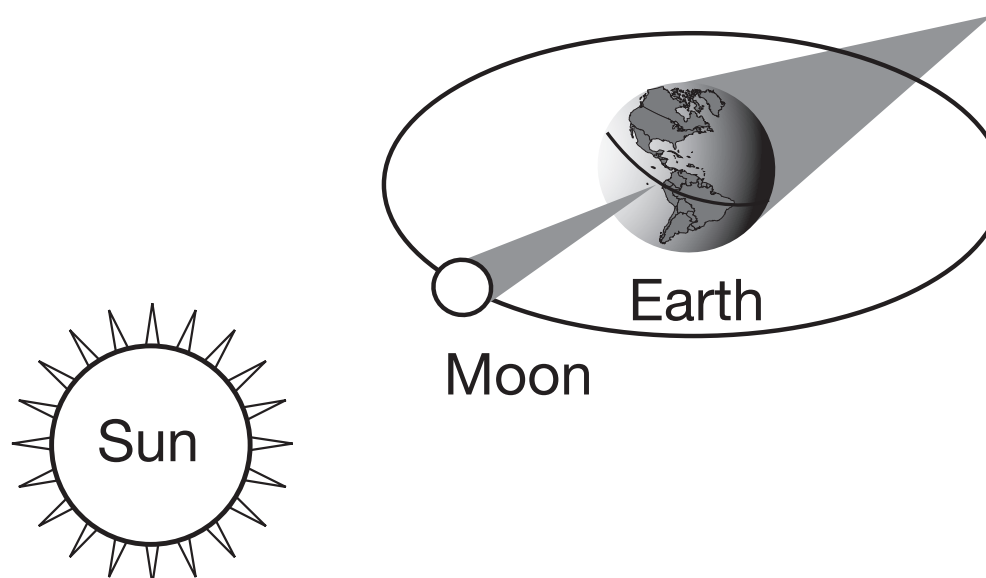
1 The students were asked to predict what would happen if the gravitational pull of Earth diminished.

Use the students' model to identify the most likely motion of the moon if the gravitational pull of Earth diminishes.



- 2 A student extended the moon phase activity by placing the golf ball and basketball into the positions the objects would occupy during a solar eclipse. The student's observations are shown in the following diagram.

DIAGRAM OF SOLAR ECLIPSE



As part of the moon phase investigation, the students made predictions about the positions of Earth, the moon, and the sun during a solar eclipse.

Which predictions would the students most likely make about a solar eclipse?

Select two.

- Ⓐ A solar eclipse occurs once a month.
- Ⓑ A solar eclipse affects only areas near the equator.
- Ⓒ A solar eclipse is only visible in certain areas on Earth.
- Ⓓ A solar eclipse is caused by the moon blocking sunlight.
- Ⓔ A solar eclipse occurs when Earth is between the sun and the moon.

3 Which season is occurring in Maryland when Earth is at Location 1 in the Diagram of Seasons?

- Ⓐ fall
- Ⓑ winter
- Ⓒ spring
- Ⓓ summer

4 When the students researched the planets in the solar system, one student learned that Jupiter has 67 moons.

Jupiter most likely has 67 moons because Jupiter

- Ⓐ is the gaseous planet closest to the sun.
- Ⓑ is the largest celestial object in the solar system.
- Ⓒ has less density and produces a weak gravitational force.
- Ⓓ has a large mass that produces a strong gravitational force.

5 The students constructed another model of the solar system using round objects of various sizes.

If the students chose a volleyball, which is 25.6 centimeters in diameter, as the sun, then the round object the students need for Earth would be approximately

- Ⓐ half the diameter of the volleyball.
- Ⓑ twice the diameter of the volleyball.
- Ⓒ 100 times less than the diameter of the volleyball.
- Ⓓ 100 times more than the diameter of the volleyball.

Use evidence from the data tables to compare the inner and outer planets.

This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

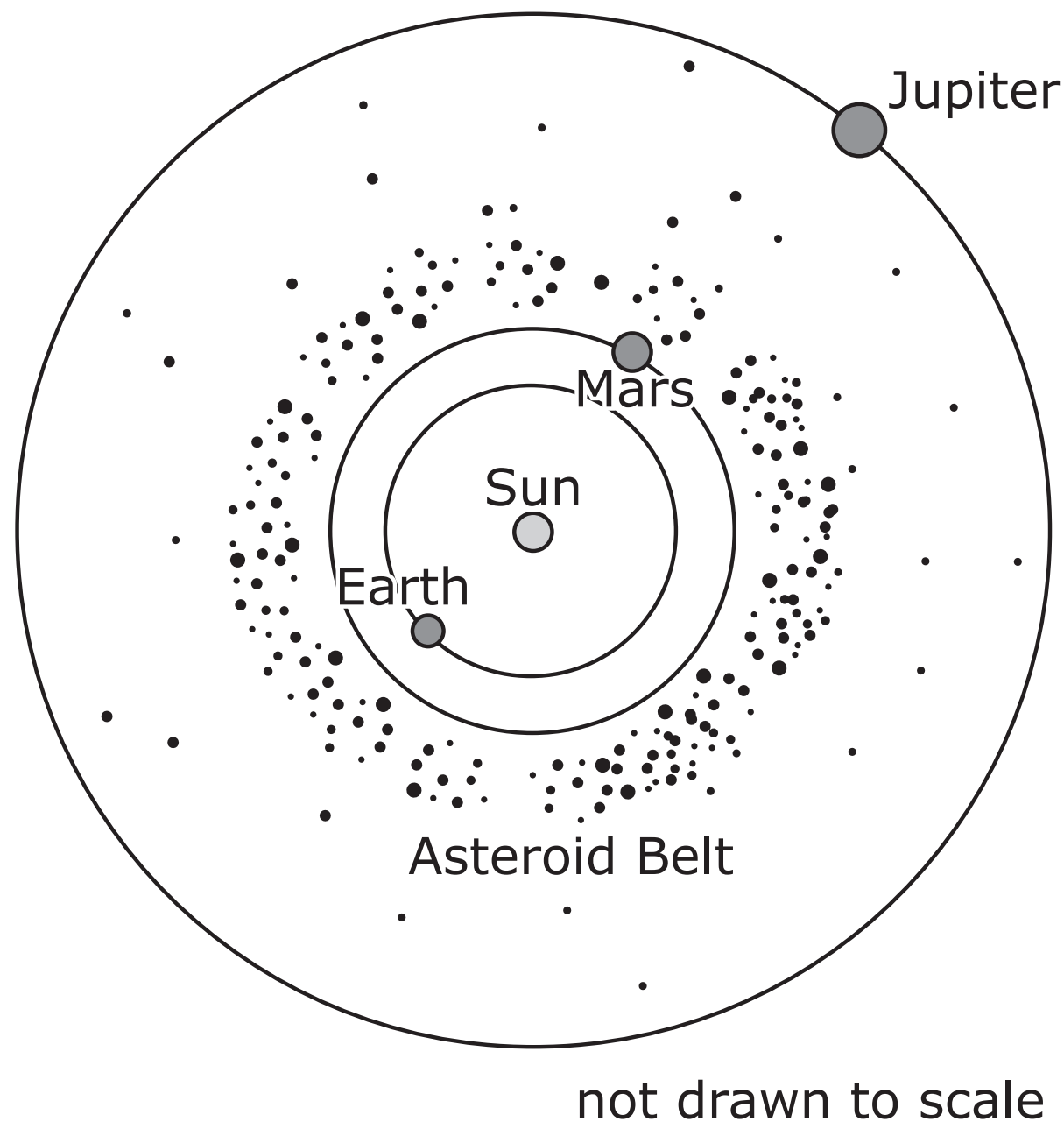
Read all of the information. Use the information to answer the questions.

While researching information for a science project, several students found a news article from the National Aeronautics and Space Administration (NASA) regarding the Asteroid Redirect Mission (ARM). The focus of this mission is to develop a first-ever robotic mission to visit a large near-Earth asteroid, collect a multi-ton boulder from its surface, and redirect the boulder into a stable orbit around the moon.

The students continued to research these asteroids and found the following data.

- **Asteroids are pieces of rock or metal floating through space.**
- **In our solar system, there is a large concentration of asteroids in the asteroid belt, an area between Mars and Jupiter.**
- **Scientists estimate that millions of asteroids are found in this area.**
- **Some of these asteroids are large, but many are small.**
- **Scientists think that many asteroids were formed by collisions between other asteroids, moons, and planets.**

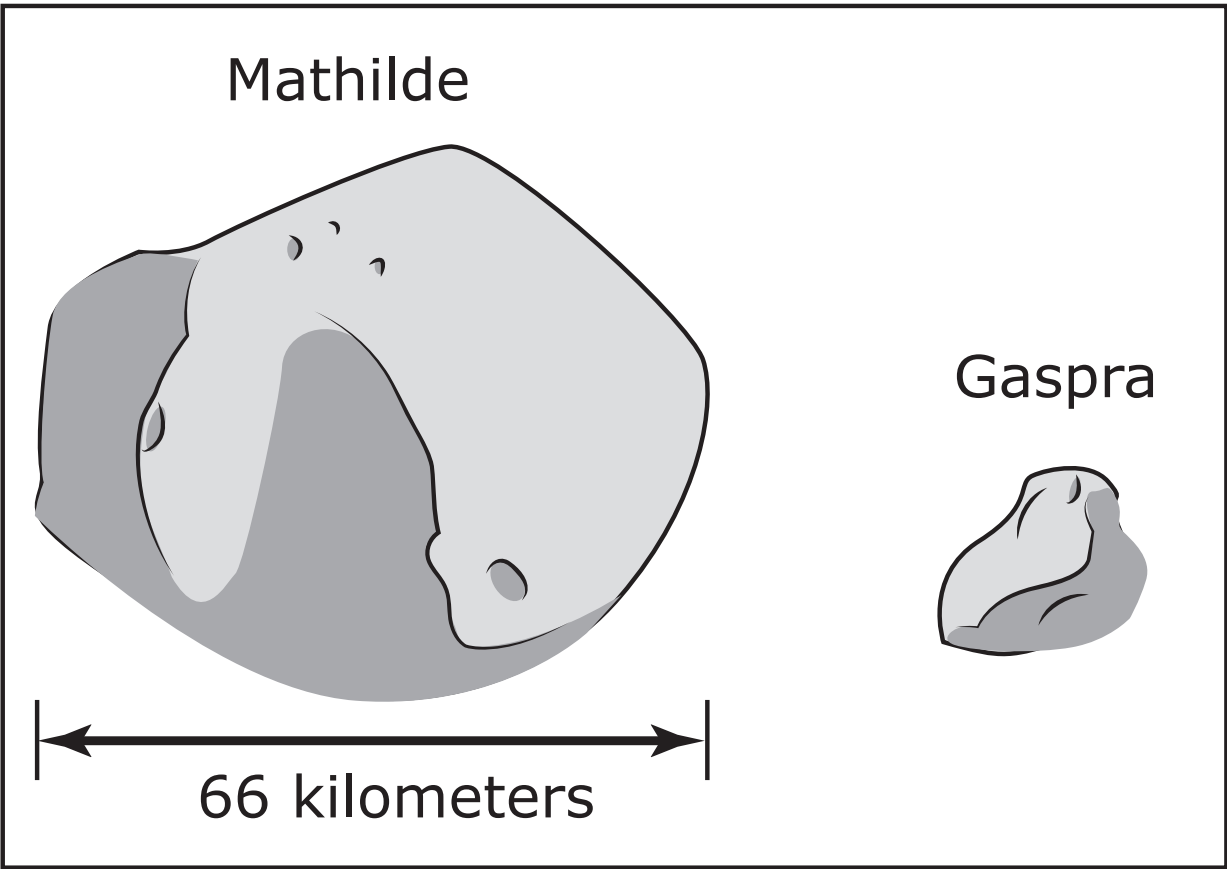
The asteroid belt in our solar system is shown in the following diagram.



Additionally, the research indicated the following:

- Asteroids in our solar system orbit the sun.
- Asteroids can orbit a planet or larger asteroid.
- Smaller asteroids do not have enough gravity to pull themselves into a round shape.
- More massive asteroids have a more circular shape.
- It is possible for the orbits of asteroids and planets to cross, resulting in the chance of a collision.
- Scientists have studied past asteroid collisions with Earth and continue to monitor the orbits of asteroids in our solar system.

The research indicated that asteroids range in size from small rocks to massive boulders that may be hundreds of kilometers wide. The diagram shows two asteroids from our solar system. The table displays data on several other asteroids in the asteroid belt.



ASTEROIDS IN THE ASTEROID BELT

Asteroid Number	Asteroid Name	Diameter (kilometers)	Mass (10 ¹⁵ kilograms)
3	Juno	234	20,000
4	Vesta	569	259,000
45	Eugenia	215	6,100
253	Mathilde	66	103.3
951	Gaspra	19	10
4979	Otawara	5.5	0.2
6489	Golevka	1.4	0.00021
25143	Itokawa	0.05	0.000035

A Force with the Power to Move an Asteroid

Could a large asteroid hit Earth? Scientists do not believe that will happen anytime soon, but a new discovery will help them be more certain.

Using powerful radar, scientists tracked the path of an asteroid named 6489 Golevka.

Most asteroids in our solar system travel between the orbits of Mars and Jupiter. Sometimes an asteroid will leave that path and move closer to Earth. Golevka is a near-Earth asteroid, which means that it comes within 121 million miles (195 million kilometers) of the sun.

Using radar, scientists found that Golevka's path moved 9.4 miles (15 kilometers) in the last 12 years. That distance may seem small compared with the billions of miles the asteroid traveled during that time, but Steven Chesley, a NASA scientist and leader of a new asteroid study, believes that those ten miles are important.

"Over tens of millions of years that [change] can have a big effect," he explained.

But what caused asteroid Golevka's path to change?

Scientists say that a force called the Yarkovsky effect moved the asteroid. The effect happens when the sun heats one part of an asteroid's surface more than other parts. The uneven heating causes a force that pushes an asteroid out of its normal path.

"We measured a force of about one ounce (28 grams)¹ acting on an asteroid that weighs 460 billion pounds (208 billion kilograms)," Chesley explained. That means that a force equal to about the weight of a strawberry can change the course of an asteroid that is longer than five football fields!

While no large asteroids appear on track to hit Earth, the Yarkovsky effect's ability to predict asteroids' paths could help scientists be more certain and give them some of the information necessary to stop a collision.

"A Force with the Power to Move an Asteroid" – Sarah Ives, © 2004, nationalgeographic.com

¹**(28 grams)**—approximately 0.27 newton

7 After researching the orbits of asteroids in the solar system, students explained that in order for asteroids in the asteroid belt to remain in orbit,

- Ⓐ Earth must exert a strong gravitational force toward the center of the solar system.
- Ⓑ the sun must exert a strong gravitational force toward the center of the solar system.
- Ⓒ Earth must exert a strong gravitational force away from the center of the solar system.
- Ⓓ the sun must exert a strong gravitational force away from the center of the solar system.

8 The students used evidence to present an argument that scientists should launch an unmanned spacecraft to prevent a collision between an asteroid and Earth's moon.

In order for the spacecraft to prevent the asteroid from colliding with the moon, the spacecraft would most likely

- Ⓐ have a smaller mass than the mass of the asteroid.
- Ⓑ have enough force to knock the asteroid off course.
- Ⓒ reduce its speed to match the speed of the asteroid.
- Ⓓ spin in a forward direction to alter the orbit of the asteroid.

9 Evidence indicates that some asteroids have moons that are held in orbit by a gravitational attraction between the moon and the asteroid.

Which table correctly sequences the asteroids in order of the gravitational attraction exerted by each asteroid?

- (A)

Weakest Gravitational Attraction	→	→	→	Strongest Gravitational Attraction
Eugenia	Gaspra	Juno	Mathilde	Otawara
- (B)

Weakest Gravitational Attraction	→	→	→	Strongest Gravitational Attraction
Otawara	Mathilde	Juno	Gaspra	Eugenia
- (C)

Weakest Gravitational Attraction	→	→	→	Strongest Gravitational Attraction
Juno	Eugenia	Gaspra	Otawara	Mathilde
- (D)

Weakest Gravitational Attraction	→	→	→	Strongest Gravitational Attraction
Otawara	Gaspra	Mathilde	Eugenia	Juno

10 Part A

Data from the students' research indicated that some asteroids are orbited by other asteroids.

Which asteroid would most likely be orbited by other asteroids?

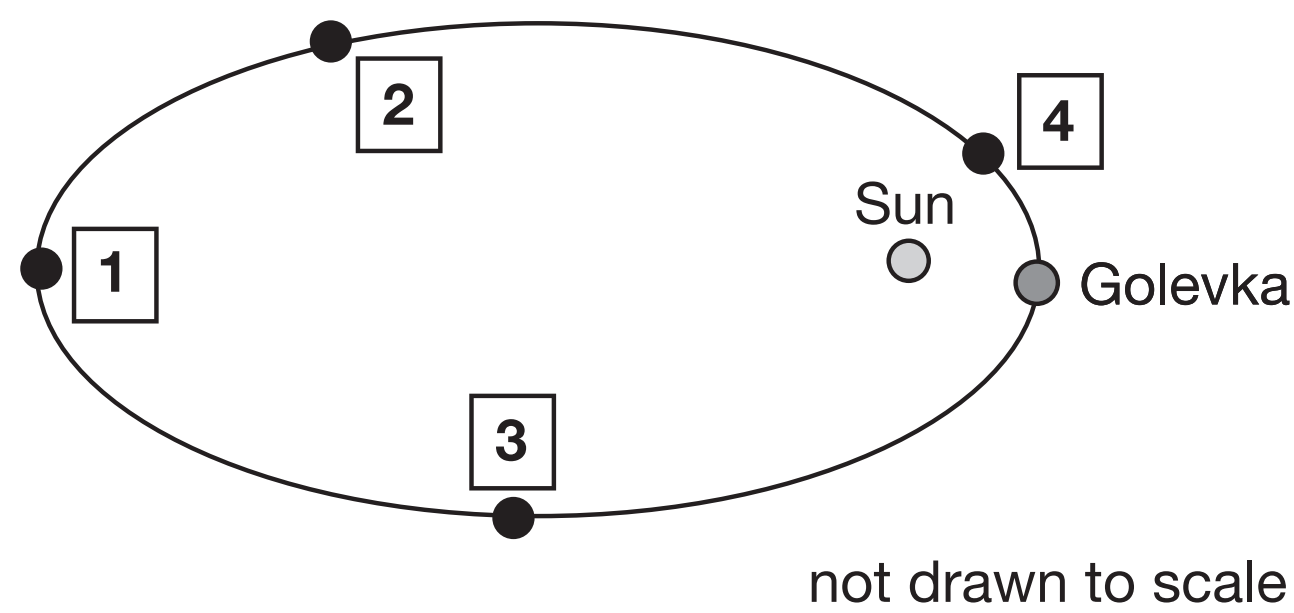
- Ⓐ Itokawa
- Ⓑ Juno
- Ⓒ Mathilde
- Ⓓ Vesta

Part B

The explanation that best describes why one asteroid would orbit another asteroid is that the asteroid being orbited has a large

- Ⓐ mass, which results in a strong gravitational force.
- Ⓑ metallic core, which results in a strong magnetic field.
- Ⓒ diameter, which results in a strong gravitational force.
- Ⓓ amount of iron, which results in a strong magnetic field.

11 Based on the evidence from the research, at which point in Golevka’s orbit would the Yarkovsky effect be the weakest?



- Ⓐ 1
- Ⓑ 2
- Ⓒ 3
- Ⓓ 4

12 Asteroids orbit other asteroids similarly to moons orbiting a planet. The following table identifies the mass of Earth and Jupiter and the number of moons for each planet.

MASS OF CELESTIAL OBJECTS

Celestial Object	Mass (10 ²⁴ kilograms)	Number of Moons
Earth	5.97	1
Jupiter	1898.00	67

Use evidence to explain why there is a difference in the number of moons between Earth and Jupiter.





You have come to the end of Section 3 of the test. Review your answers from Section 3 only.



Section 4

Directions:

Today, you will take Section 4 of the MISA Practice Test.

Read each question. Then, follow the directions to answer each question. Mark your answers by completely filling in the circles in your test book. Do not make any pencil marks outside of the circles. If you need to change an answer, be sure to erase your first answer completely.

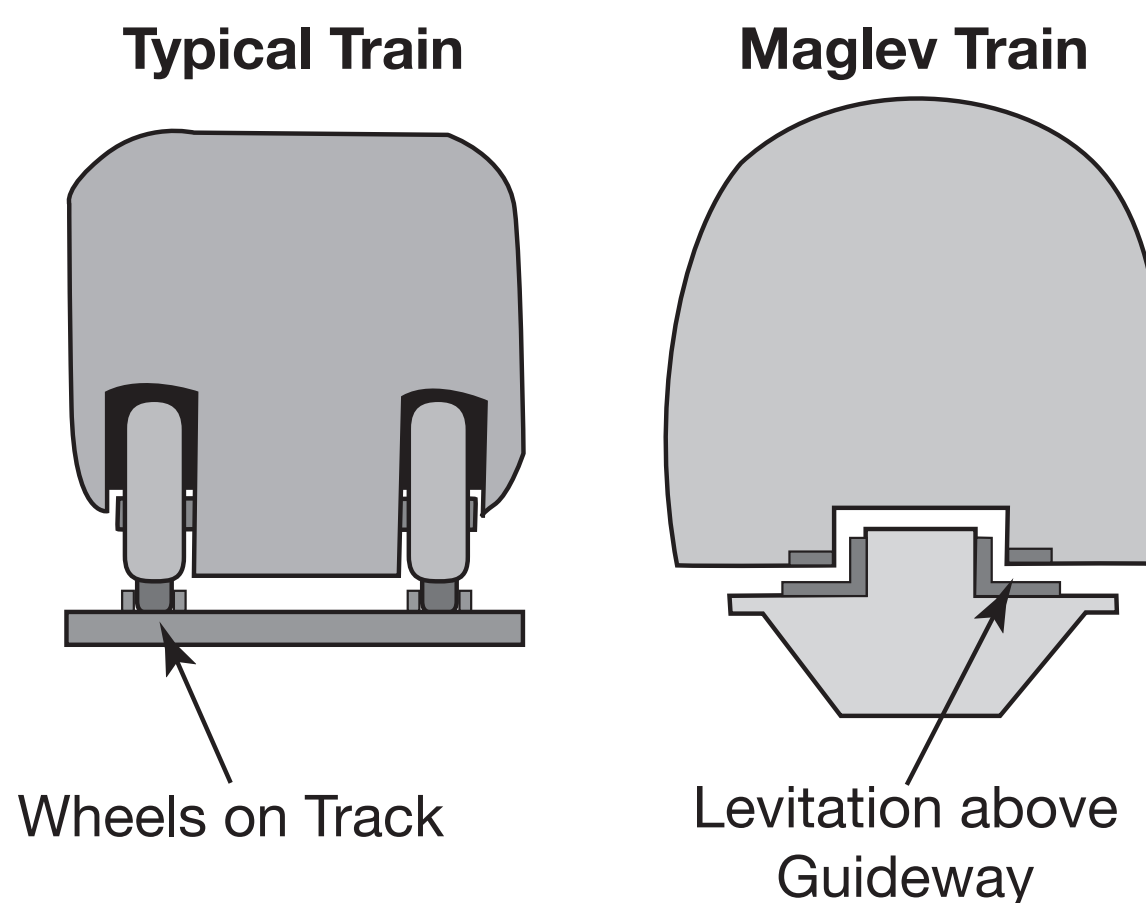
Some of the questions will ask you to write a response. Write your response in the space provided in your test book. Be sure to keep your response within the space provided. Only responses written within the space provided will be scored.

If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section ONLY. Do not go past the stop sign.

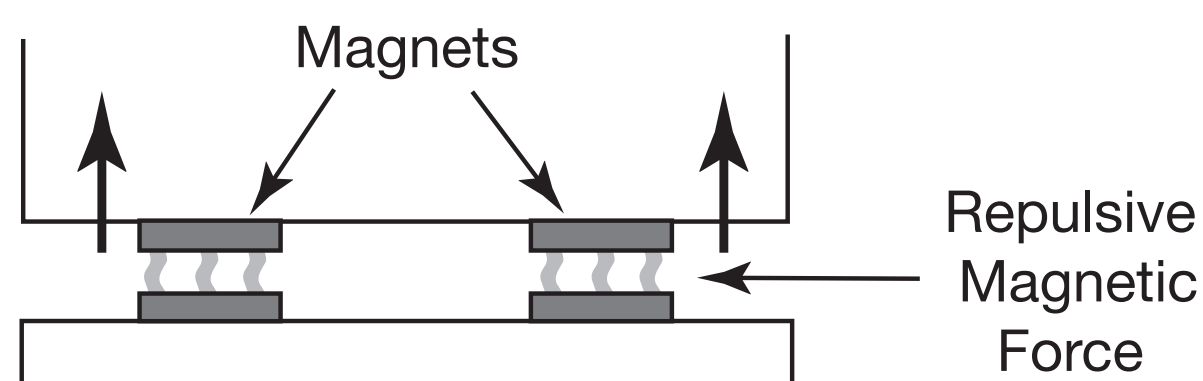
Read all of the information. Use the information to answer the questions.

A student began researching trains after riding a high-speed train called the Acela Express. While conducting research, the student read about magnetic levitating trains, which are referred to as “maglev trains.”

Maglev trains do not have wheels like typical trains do. Instead, the train cars levitate or float above a track called a guideway, which acts as the track for the train. The diagram shows a comparison of a typical train on a track and a maglev train on a guideway.

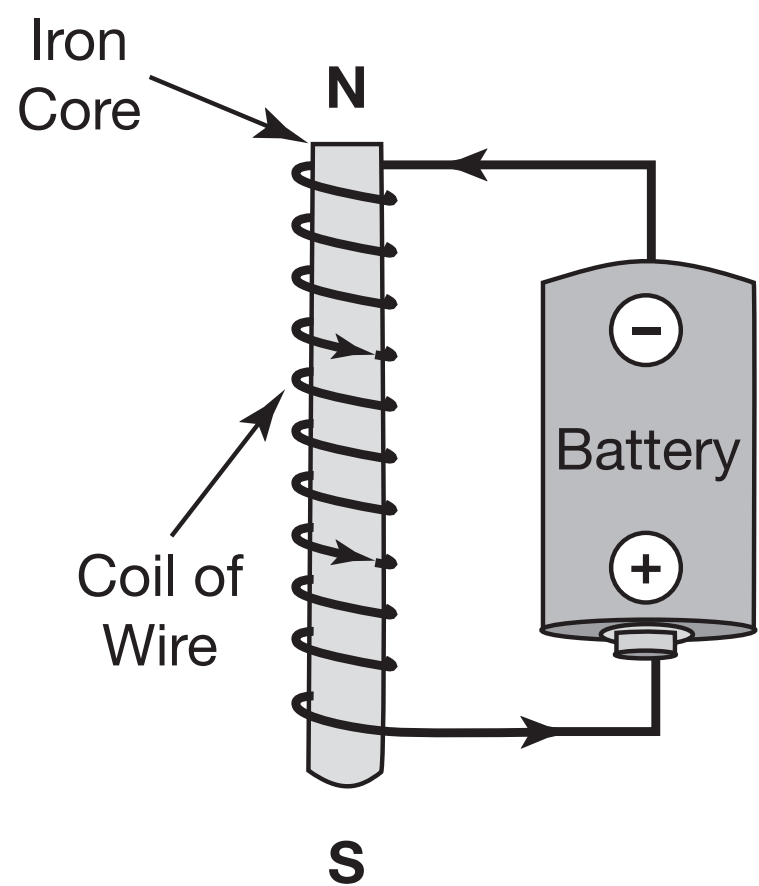


Maglev trains rely on three functions to move: levitation, propulsion, and guidance. Levitation is the train floating above the guideway. Propulsion is the force needed for the train to move and is provided by a magnetic force: A generated magnetic field is sent down the guideway, and that force propels the train. The guidance function for these trains also relies on magnetic forces. Repulsive magnets keep the train from moving too far off the guideway. The following diagram shows how repulsive magnetic force is used.



Currently, research is being conducted to perfect this mode of transportation. Only four commercial maglev trains currently exist. They are operated in China, Japan, and Korea.

To better understand how maglev trains function, the student constructed a small electromagnet and investigated how the electromagnet generates a magnetic field. The following diagram shows the student's electromagnet.



During the investigation, the student noticed that a paper clip moved toward the electromagnet when the electromagnet was placed near the paper clip. The student decided to change the number of coils of wire around the iron core of the electromagnet and recorded the results in the following table.

NUMBER OF COILS AND PAPER CLIPS ATTRACTED

Number of Coils	Number of Paper Clips Attracted
0	0
20	8
40	18
60	31
80	46

After completing the initial investigation, the student decided to see how changing the core material affected the electromagnet. The student tested steel, iron, brass, and air as cores for the electromagnet. The student did not vary the number of coils while testing the different core materials. The results for this investigation are shown in the following table.

MATERIAL AND NUMBER OF PAPER CLIPS ATTRACTED

Material	Number of Paper Clips Attracted
Steel	59
Iron	36
Brass	0
Air	0

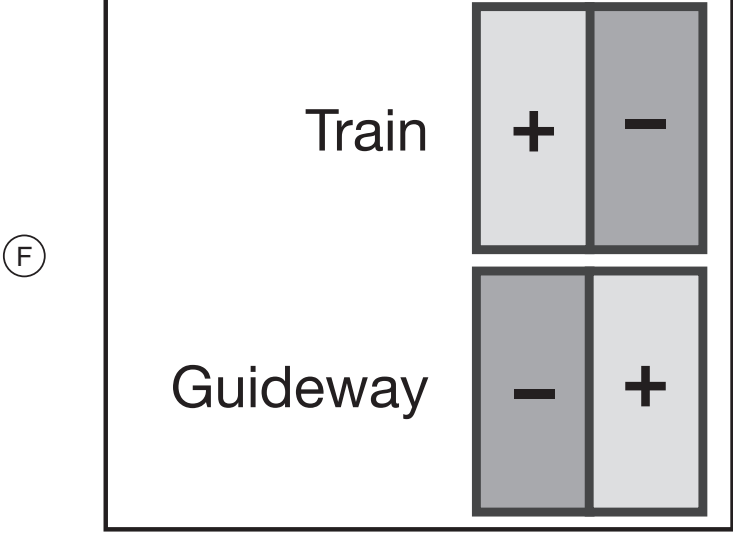
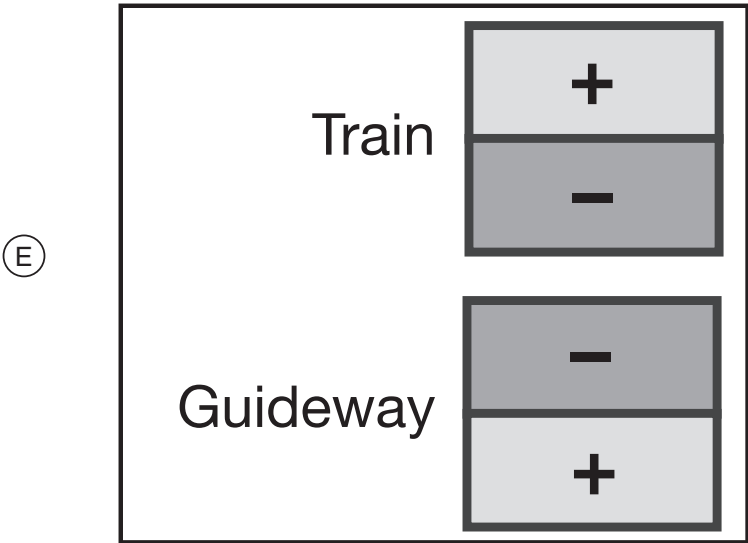
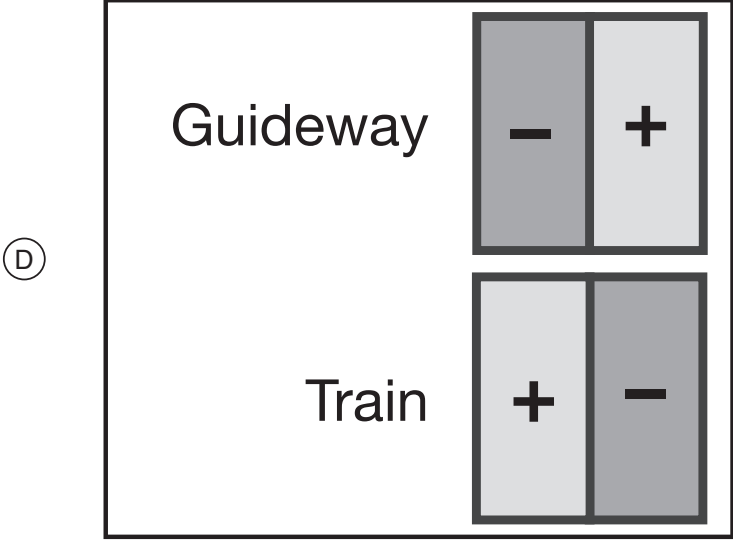
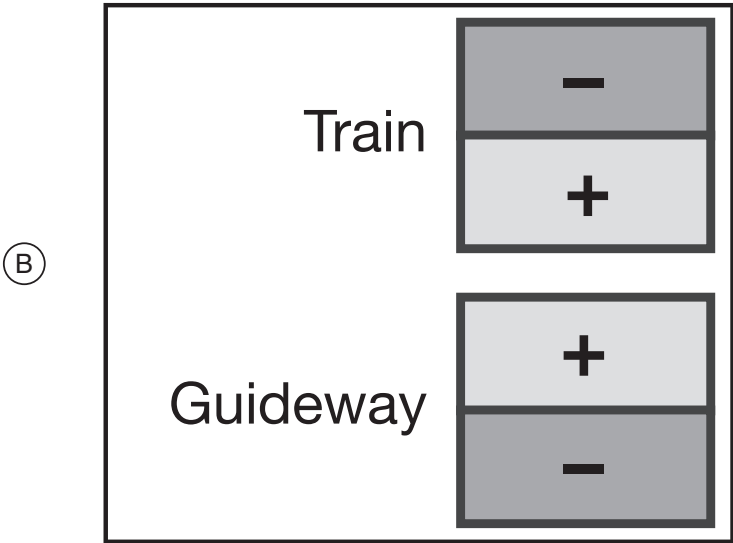
- 1 The student’s research indicated that a magnetic force keeps the maglev train above the guideway.**

This magnetic force is produced by

- Ⓐ magnets on the guideway attracting magnets attached to the bottom of the train.
- Ⓑ magnets on the guideway repelling magnets attached to the bottom of the train.
- Ⓒ a magnetic field that the metal of the train emits as it moves over the guideway.
- Ⓓ a magnetic field that Earth emits as the train moves over the guideway.

2 The student wanted to arrange sets of magnets in the same way that magnets are used to guide maglev trains.

Select the magnet arrangements that would keep the train floating above the guideway.



- 3 The student's investigation of electromagnets allowed the student to directly observe and manipulate an electromagnet.**

During the initial investigation, the student changed the number of wire coils wrapped around the iron core to determine

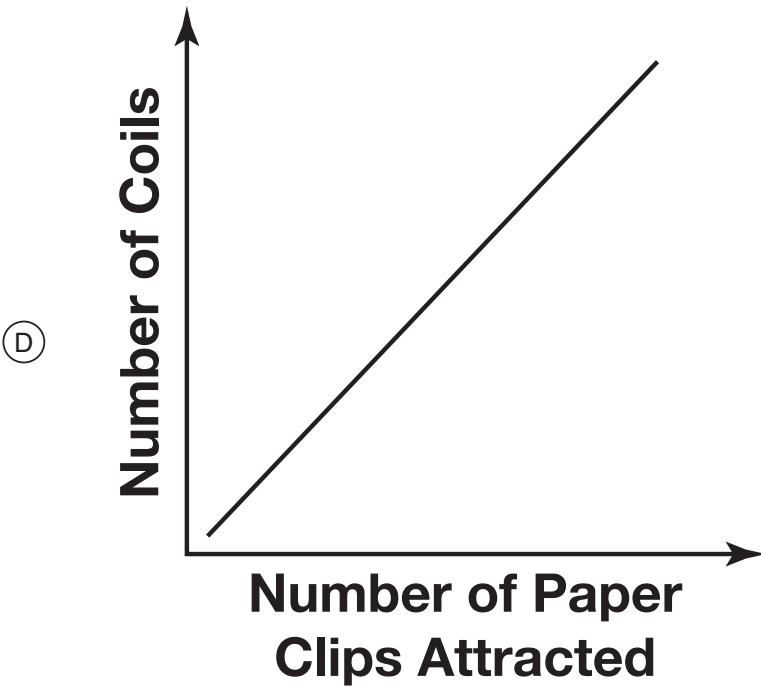
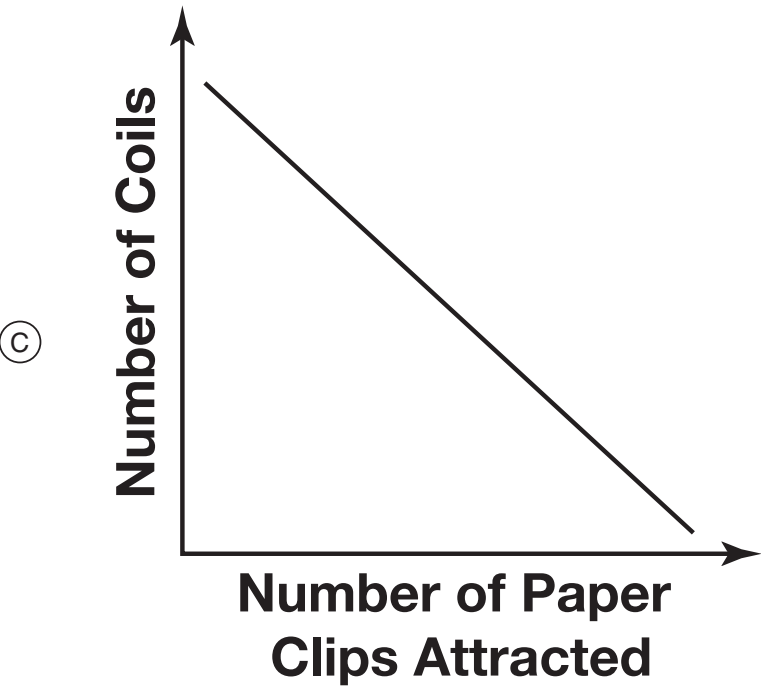
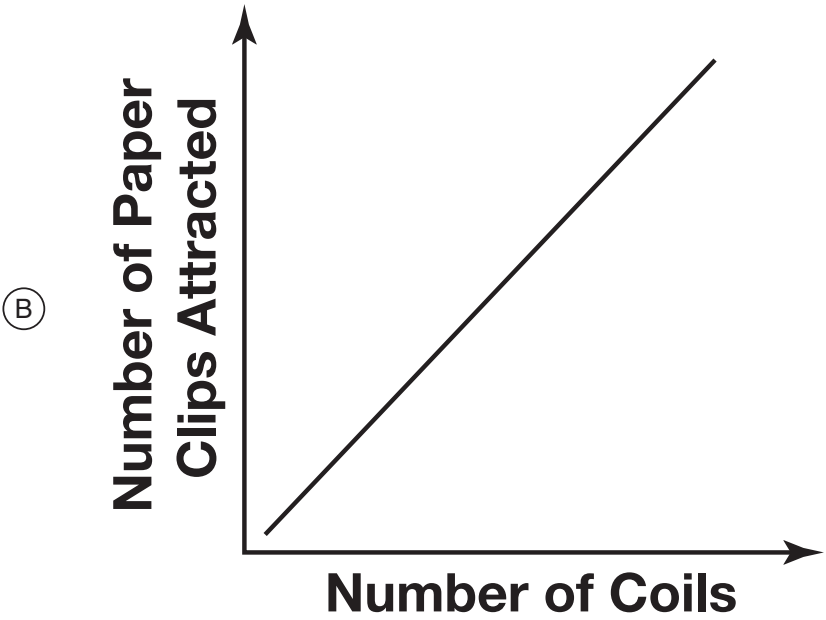
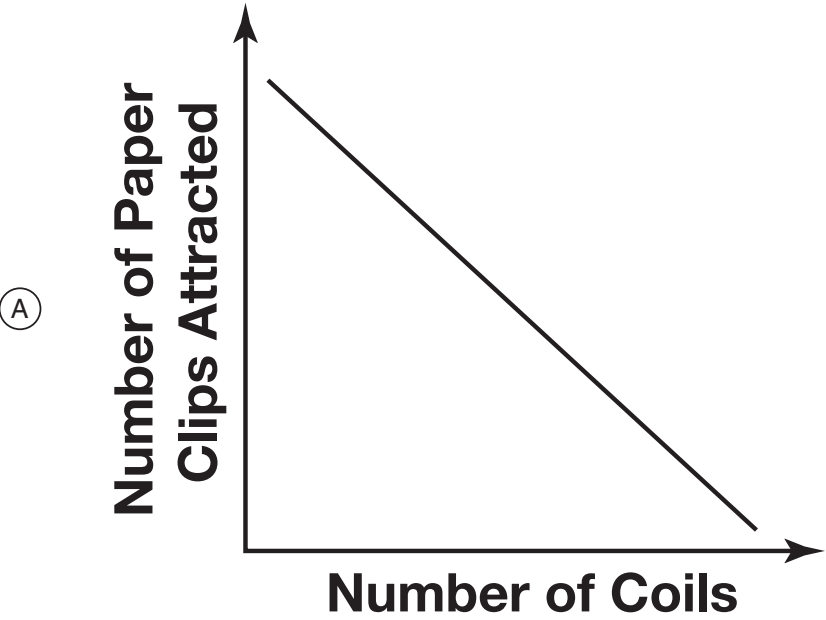
- Ⓐ how to change the strength of an electromagnet.
- Ⓑ how the size of the core affects the electromagnet.
- Ⓒ how much energy an electromagnet requires to work.
- Ⓓ how paper clips are attracted to certain types of metal.

- 4 Before the investigation, the students hypothesized that the number of coils directly affect the strength of an electromagnet.**

Which evidence from the investigation confirms the student's hypothesis?

- Ⓐ When the number of coils decreased, the strength of the electromagnet decreased.
- Ⓑ When the number of coils decreased, the strength of the electromagnet increased.
- Ⓒ When the number of coils increased, the strength of the electromagnet decreased.
- Ⓓ When the number of coils increased, the strength of the electromagnet remained the same.

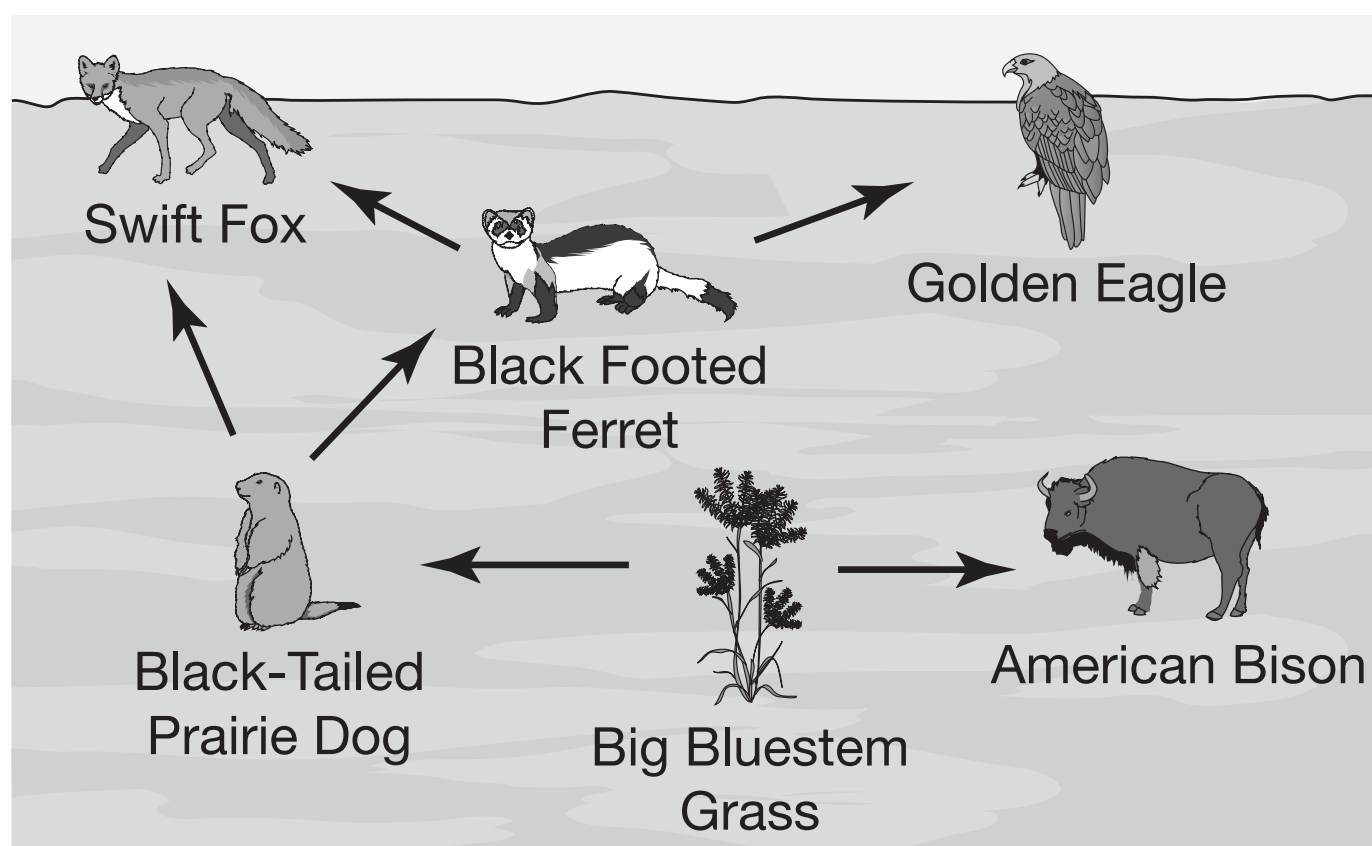
5 The student wanted to graph the results of the initial investigation.
Which graph best represents the data the student collected?



This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Read all of the information. Use the information to answer the questions.

During a visit to the Maryland Zoo, a group of students observed a colony of black-tailed prairie dogs. The students decided to research prairie dogs and the North American prairie ecosystem in which they live. The students found the following food web that illustrated relationships between several organisms in the prairie ecosystem.



The students wanted to understand how the availability of resources affects population size. The students used a computer simulation, changed the number of ferrets in a prairie ecosystem and observed the population changes for three different animals and one plant. The simulation collects data every two years. The students studied an eight-year period and completed the following data tables.

INITIAL FERRET POPULATION 20

Species	Initial Population	Population after 2 years	Population after 4 years	Population after 6 years	Population after 8 years
Grass (kilograms)	4000	2000	500	1000	5000
Prairie Dogs	25000	31000	8000	4000	11000
Ferrets	20	25	35	15	15
Foxes	10	4	4	3	2

INITIAL FERRET POPULATION 80

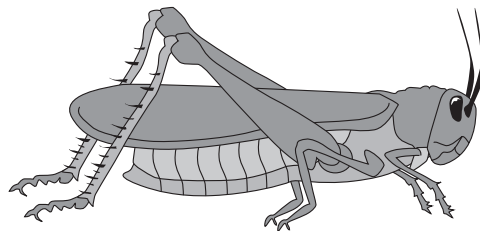
Species	Initial Population	Population after 2 years	Population after 4 years	Population after 6 years	Population after 8 years
Grass (kilograms)	4000	4000	4000	4000	4000
Prairie Dogs	25000	25000	25000	25000	25000
Ferrets	80	80	80	80	80
Foxes	10	10	10	10	10

INITIAL FERRET POPULATION 140

Species	Initial Population	Population after 2 years	Population after 4 years	Population after 6 years	Population after 8 years
Grass (kilograms)	4000	5100	4900	2800	3900
Prairie Dogs	25000	21000	28000	26000	22500
Ferrets	140	75	75	90	75
Foxes	10	11	10	10	10

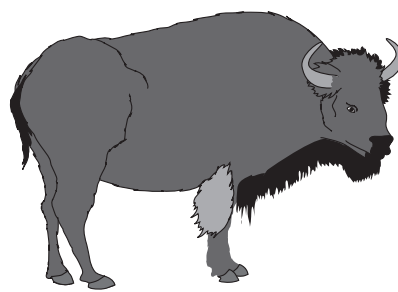
The students researched other animals in the prairie that are not predators of prairie dogs to consider other types of interactions. The students organized the research into the following diagram and used it to identify these interactions as competitive or mutually beneficial to the prairie dogs in the prairie ecosystem.

SPECIES THAT HAVE RELATIONSHIPS WITH PRAIRIE DOGS



Grasshopper

- eat the shorter grass that the prairie dogs also like
- eaten by birds like burrowing owls
- reproduce in large numbers
- are active in warmer months/inactive in winter months



American Bison

- eat the same type of grass as the prairie dogs
- eat the taller grass that has less nutrients than the shorter grass
- fertilize the soil with dung which helps grass grow
- roll in the dirt mounds created by prairie dogs digging tunnels to help keep biting flies away
- produce one calf each year



Burrowing Owl

- live underground in burrows that have been dug out and abandoned by prairie dogs
- eat grasshoppers
- produce 3–12 hatchlings a year
- are active in the daytime, unlike other types of owls
- may collect bison dung around burrows when nesting

7 The prairie food web illustrates interactions among organisms that live in the prairie ecosystem.

Select the table that correctly identifies each organism in the food web as a producer or a consumer.

Ⓐ

Producer	Consumer
big bluestem grass	American bison
	black-tailed prairie dog
	golden eagle

Ⓑ

Producer	Consumer
big bluestem grass	American bison
black-tailed prairie dog	golden eagle

Ⓒ

Producer	Consumer
American bison	black-tailed prairie dog
golden eagle	
big bluestem grass	

Ⓓ

Producer	Consumer
big bluestem grass	American bison
golden eagle	black-tailed prairie dog

8 The prairie food web diagram illustrates interactions among organisms that live in the prairie ecosystem.

Which statement best describes the sources of energy for the producers and consumers in the food web?

- Ⓐ Consumers and producers both obtain energy from decomposers.
- Ⓑ Consumers gain energy from the sun, while producers obtain energy by eating other organisms.
- Ⓒ Producers obtain energy from living organisms, while consumers obtain energy from the nonliving parts of the ecosystem.
- Ⓓ Producers use the sun and nonliving parts of the ecosystem to generate energy, while consumers gain energy from other living organisms.

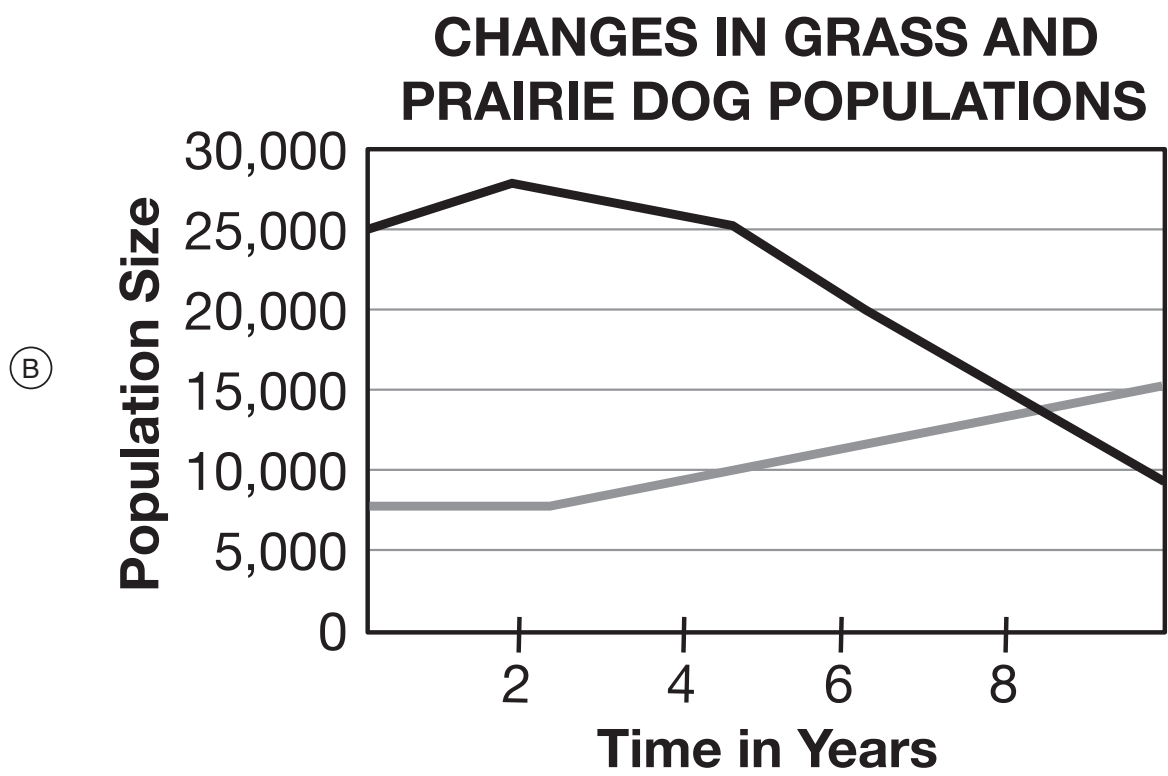
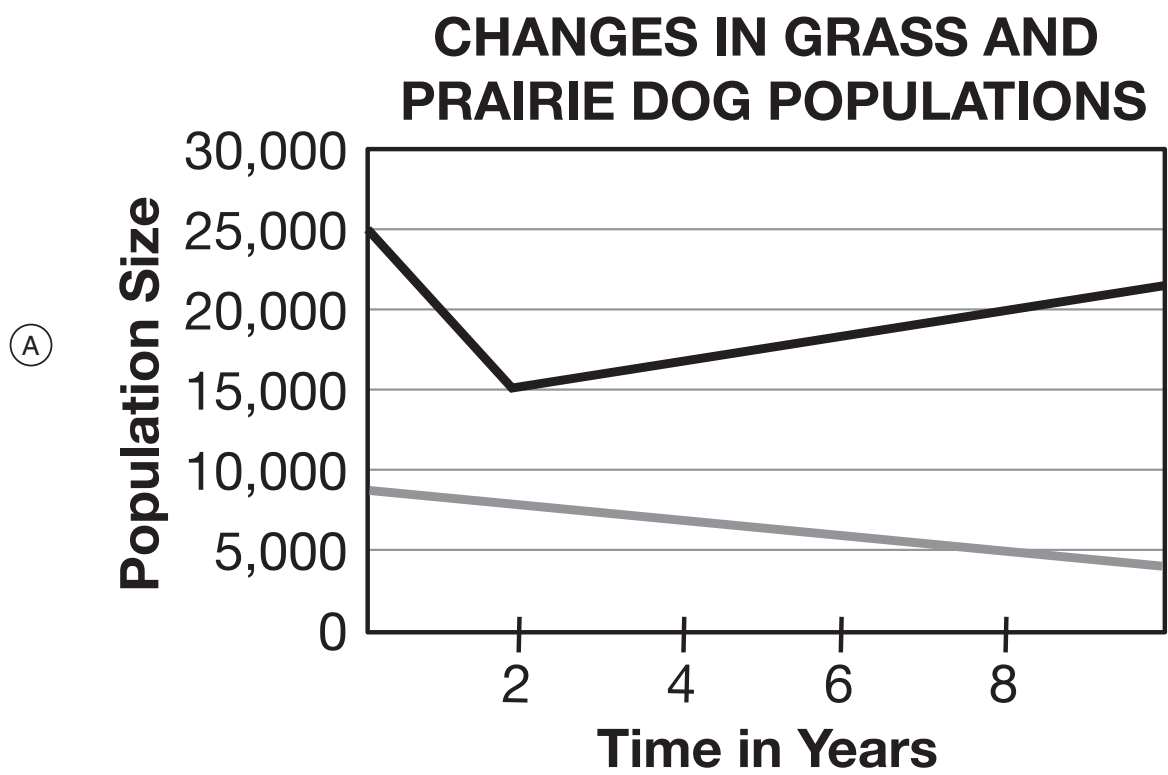
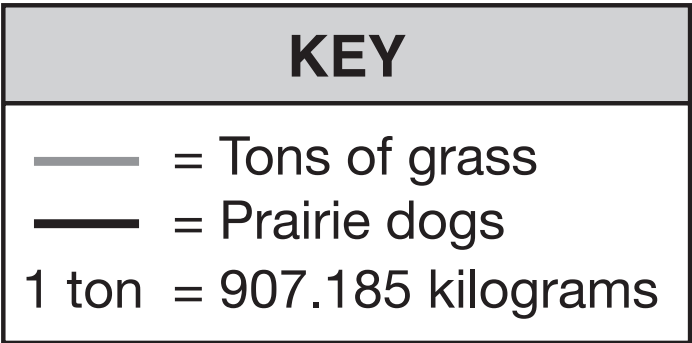
9 The prairie food web diagram illustrates interactions among organisms that live in the prairie ecosystem.

The arrows in the food web represent

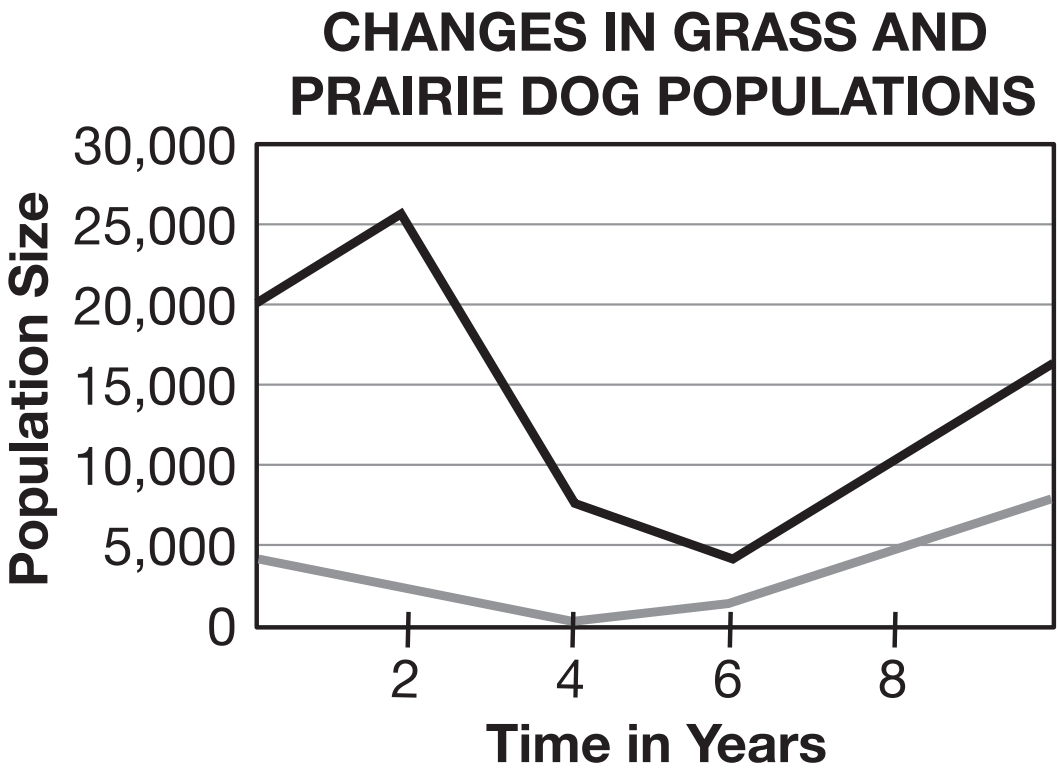
- Ⓐ the movement of one organism into the territory of another organism.
- Ⓑ the transfer of energy from one organism to another.
- Ⓒ a parasitic interaction between two organisms.
- Ⓓ a genetic similarity between two organisms.

10 The research stated that the prairie dog and ferret interact with one another in the prairie ecosystem.

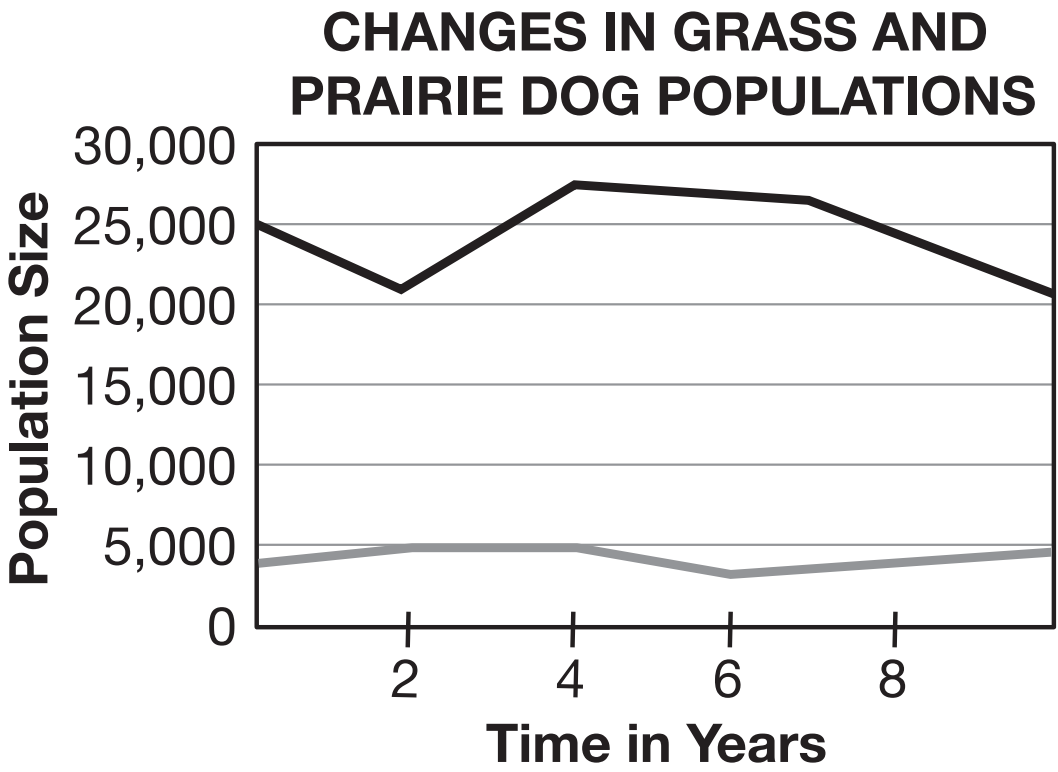
Which graph best represents the changes in the amount of grass and prairie dog population when the initial number of ferrets in the ecosystem was 140?



Ⓒ



Ⓓ



11 The prairie organisms' interactions illustrate the interactions that occur among three different organisms and the prairie dog.

The interaction between the prairie dog and the grasshopper is

- Ⓐ competitive because the prairie dog consumes the same resources as the grasshopper.
- Ⓑ parasitic because the prairie dog has nutrients taken from it by the grasshopper.
- Ⓒ mutualistic because the prairie dog receives resources from the grasshopper.
- Ⓓ predatory because the prairie dog tracks and hunts the grasshopper.

GO ON TO NEXT PAGE

12 The three prairie food web resources illustrate the interactions among organisms in the prairie ecosystem.

Describe how the prairie dog and bison populations will most likely change if a severe drought were to occur for a four-year period. In your description, be sure to include

- the cause of any changes to the populations
- the movement of energy within the ecosystem
- the interactions among the organisms

This image shows a single page of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



You have come to the end of Section 4 of the test. Review your answers from Section 4 only.





Maryland Comprehensive Assessment Program



Large Print

