

# Maryland MCAP Grade 8 Science Practice

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Maryland Comprehensive  
Assessment Program

Grade 8  
MISA  
Practice Test



# Section 1

**Directions:**

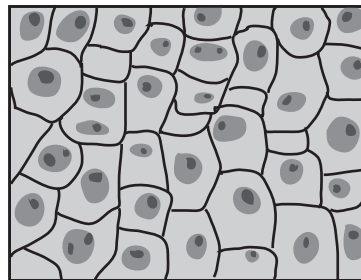
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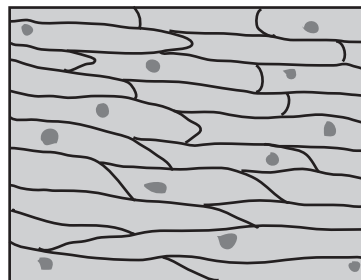
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**During a class investigation on cells, students observed different cell types using a compound light microscope and prepared slides. Shown below are diagrams of some of the cells the students observed.**



## Human Skin



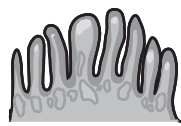
## Onion

4

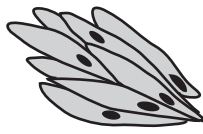
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SERIAL #

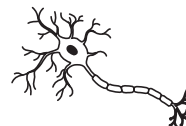
As the students continued their research, they found evidence that indicated that humans and other complex organisms have many cells that are found in only one system of an organism's body. Their research also stated that it is estimated that on average 37.2 trillion cells compose a human body. Some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



Intestinal  
Cell



Heart  
Muscle Cell



Nerve Cell

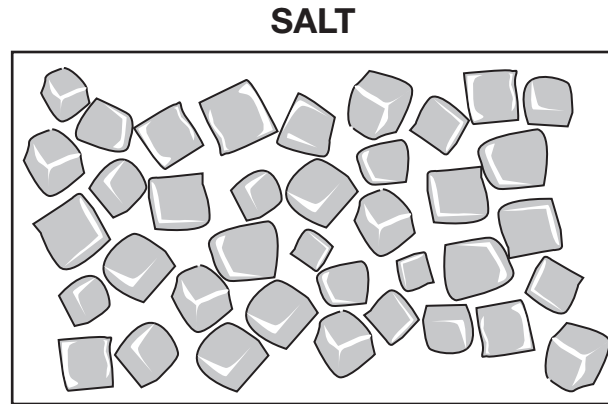
The students also found that researchers are trying to determine the number of different cell types there are in the human body. Until recently, scientific evidence supported the claim that the human body has approximately 200 cell types, each with a unique function. Researchers are now analyzing the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

**The observations on the amoeba and euglena provide evidence that**

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

- (A) unicellular organisms that have cells for different tissues
- (B) unicellular organisms that have cells that work independently
- (C) multicellular organisms that have different types of cells with specialized functions
- (D) 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 below.



**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

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

<b>Least Complex Organization</b>	→	→	→	<b>Most Complex Organization</b>
body	organs	cells	tissues	organ systems

<b>Least Complex Organization</b>	→	→	→	<b>Most Complex Organization</b>
cells	tissues	organs	organ systems	body

<b>Least Complex Organization</b>	→	→	→	<b>Most Complex Organization</b>
tissues	organs	cells	organ systems	body

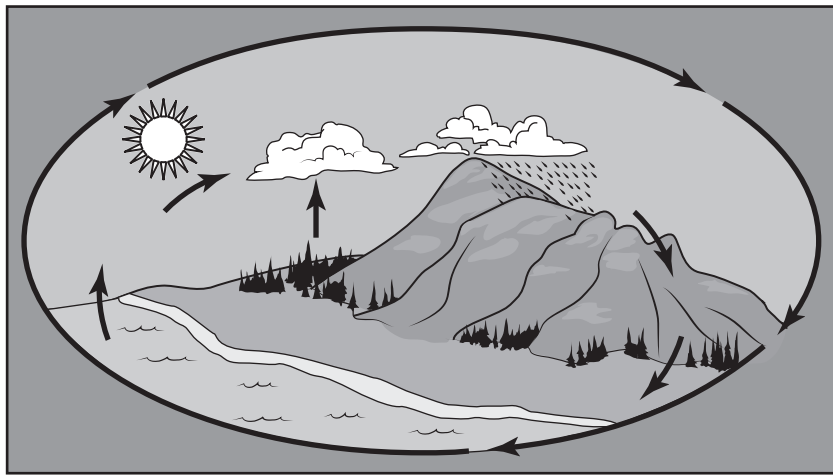
<b>Least Complex Organization</b>	→	→	→	<b>Most Complex Organization</b>
organs	cells	tissues	body	organ systems



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

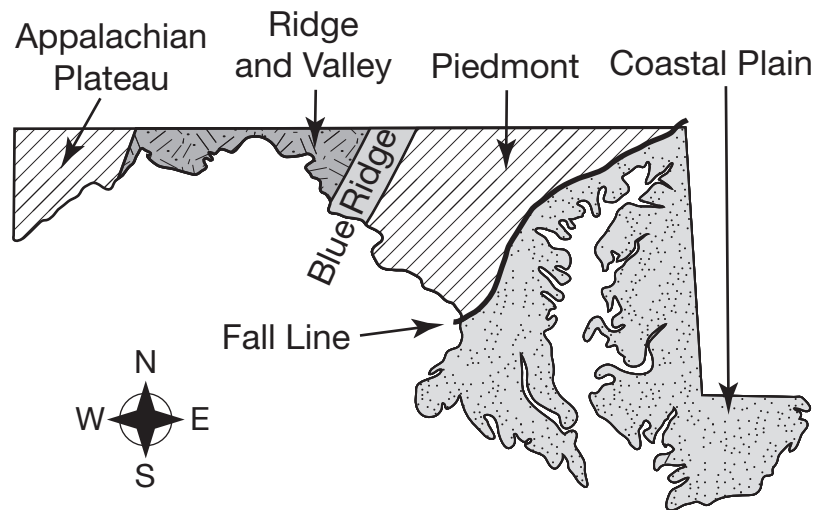
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- This image shows a blank sheet of white paper with horizontal ruling lines. The lines are evenly spaced and extend across the width of the page. There are no margins, text, or other markings on the paper.

**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 below.**






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 map below, 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



#### LEGEND

-  = Sand and gravel
-  = Limestone
-  = Fractured rock

# MARYLAND GROUNDWATER LEVELS, MAY 2016



**PLEASE DO NOT WRITE IN THIS AREA**

**SERIAL #**

**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



- 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 all that apply.**

- ☐ (A) aquifers
- ☐ (B) atmosphere
- ☐ (C) clouds
- ☐ (D) lakes
- ☐ (E) 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**

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

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



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

[illegible]

# Section 2

**Directions:**

Today you are going to 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.

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**While studying phase changes in common substances in their science class, a group of students investigated how water (H<sub>2</sub>O) and table sugar (C<sub>12</sub>H<sub>22</sub>O<sub>11</sub>) respond to temperature changes. The students exposed beakers containing the substances to three different temperatures.**

- Place 50 milliliters (mL) of each substance into separate beakers.
- Place each beaker in a freezer until each substance reaches 0 degrees Celsius ( $^{\circ}\text{C}$ ).
- 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 ( $20^{\circ}\text{C}$ ).
- The teacher used a hot plate to heat the beakers to  $100^{\circ}\text{C}$ .
- Record observations of the appearance of the substances.

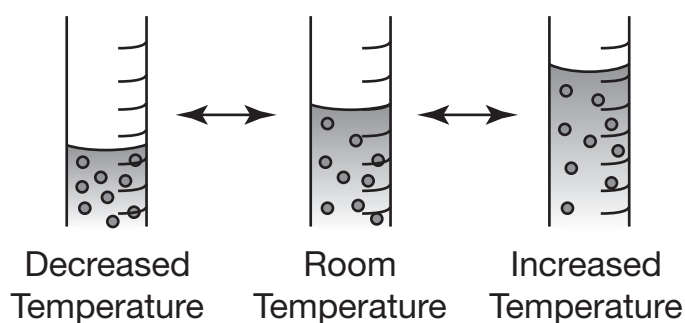
**After completing the investigation, the students organized their data into a table, shown below.**

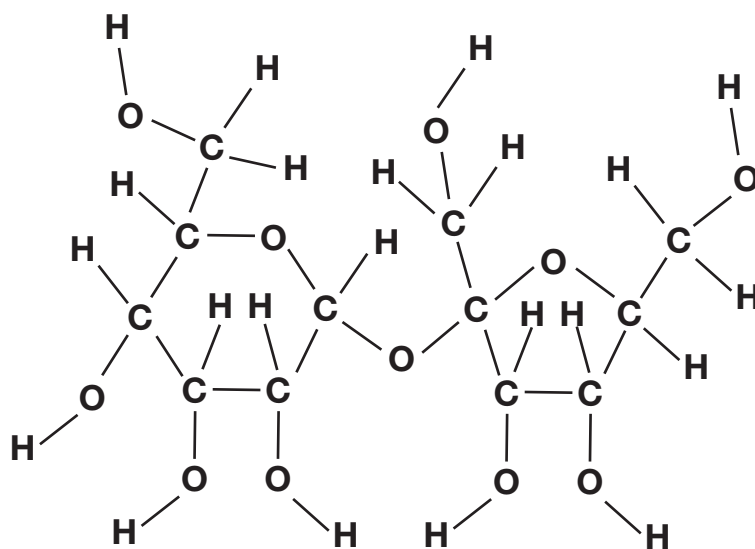
## SUGAR AND WATER DATA TABLE

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

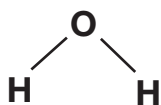
In the sugar and water investigation, the students observed that the liquid inside the thermometers moved when exposed to different temperatures. They researched thermometers and found that most are filled with alcohol ( $C_2H_6O$ ). When a thermometer is exposed to warmer temperatures, the liquid inside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

### ALCOHOL THERMOMETER MODEL

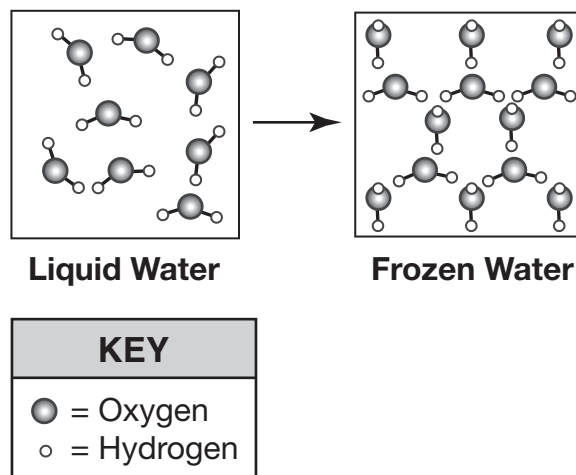




1



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



**The volume of water increases when water freezes because**

- (A) water molecules have a low density
  - (B) the components of a water molecule increase in mass
  - (C) the arrangement of the molecules in the water changes
  - (D) 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**

- (A) carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) atoms
- (B) carbon (C), hydrogen (H), and oxygen (O) atoms
- (C) carbon dioxide ( $\text{CO}_2$ ) and water ( $\text{H}_2\text{O}$ ) molecules
- (D) carbon (C), hydrogen (H), and oxygen (O) molecules



**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



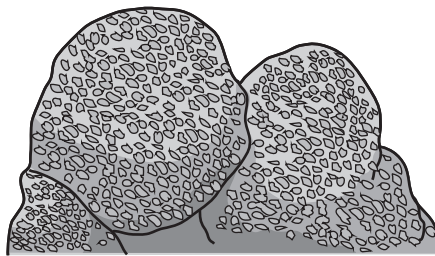
- **the transfer of energy**
- **the molecular structure**

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 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. A diagram of a colony of corals and a coral polyp is shown below.

Coral Colony



Coral Polyp



■ = Coral reef locations

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.

Diagram illustrating a monohybrid cross for the trait of height (T = tall, t = short).

Parents: Tt (Tall) × Tt (Tall)

Offspring possibilities:

	T	t
T	Tt (Tall)	Tt (Tall)
t	Tt (Tall)	tt (Short)

Genotypic ratio: 1 TT : 2 Tt : 1 tt

Phenotypic ratio: 3 Tall : 1 Short

T = Dominant  
t = Recessive

- Ⓐ 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?

(A)

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

(B)

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

(C)

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

(D)

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

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

- 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**

- GO ON ►**

**11 Part 1**

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 (°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 2**

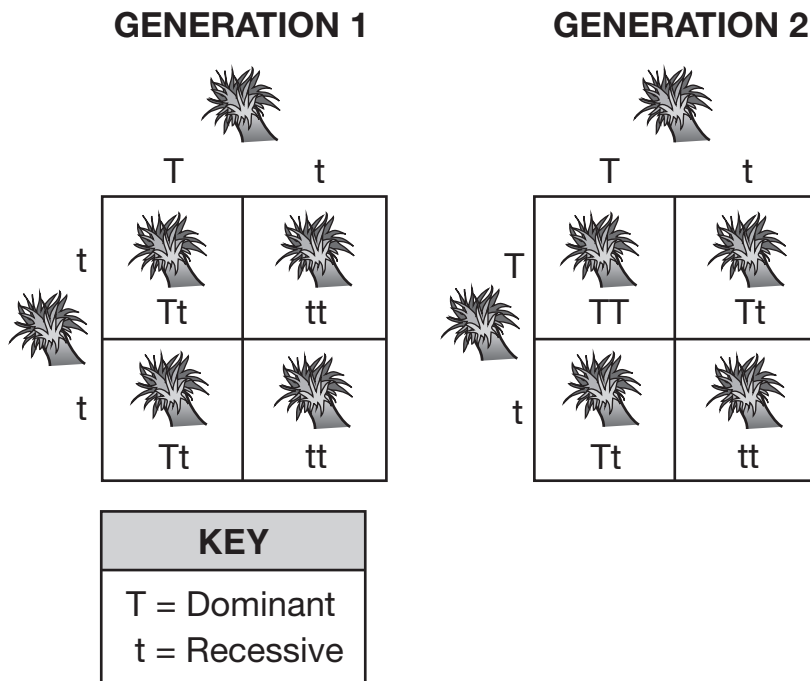
According to the students' research, which are the most likely effects to coral populations if ocean temperatures continue to increase?

● **Select all that apply.**

- Ⓐ 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



- 



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

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# Section 3

**Directions:**

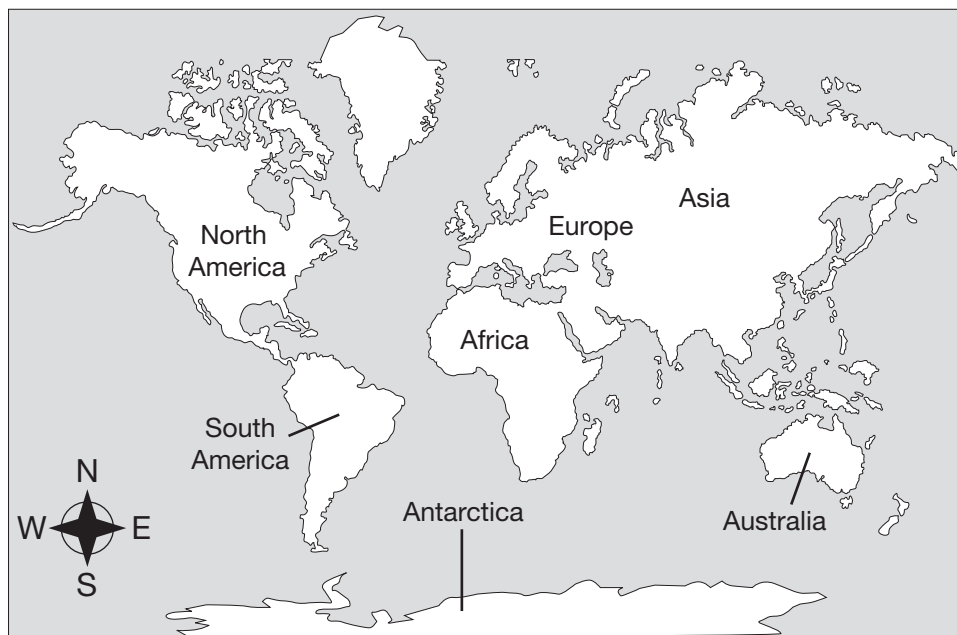
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**In a science class, students examined a map of Earth's tectonic plates, and one student observed that the eastern side of South America fits like a puzzle piece with the western side of Africa. The class then began to research scientific information to find data on reasons the coastlines of South America and Africa appear to have once been connected. The class investigated maps of fossils, rocks, and glaciers as well as data about the age of rock near the mid-Atlantic ridge. As the students completed their investigation, they compared the maps found to a map of the current continents, shown below.**






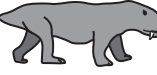

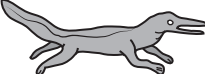


The students used the fossil evidence map to observe the locations of the strata in which four different fossil types were found. The fossils are at least 250 million years old.

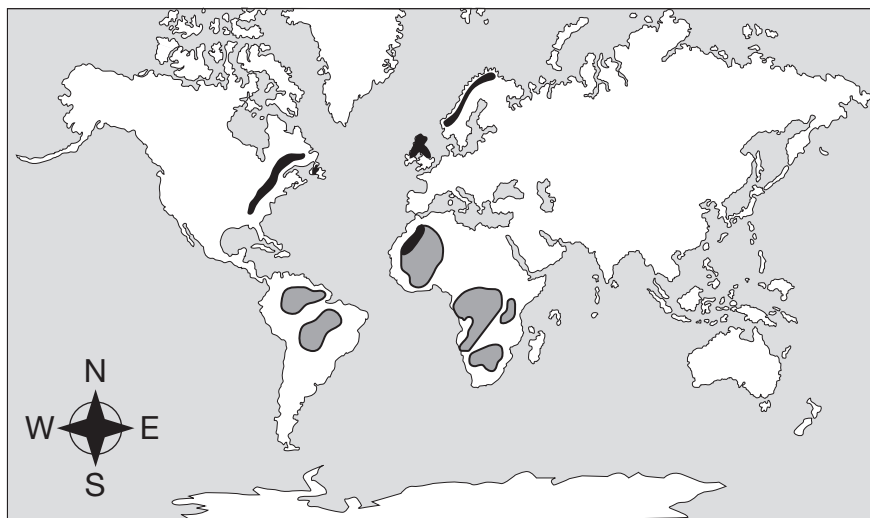
FOSSIL EVIDENCE MAP



LEGEND

- |   |                       |   |
|---|-----------------------|---|
|  | = <i>Glossopteris</i> |  |
|  | = <i>Cynognathus</i>  |  |
|  | = <i>Lystrosaurus</i> |  |
|  | = <i>Mesosaurus</i>   |  |

## ROCK STRATA EVIDENCE MAP

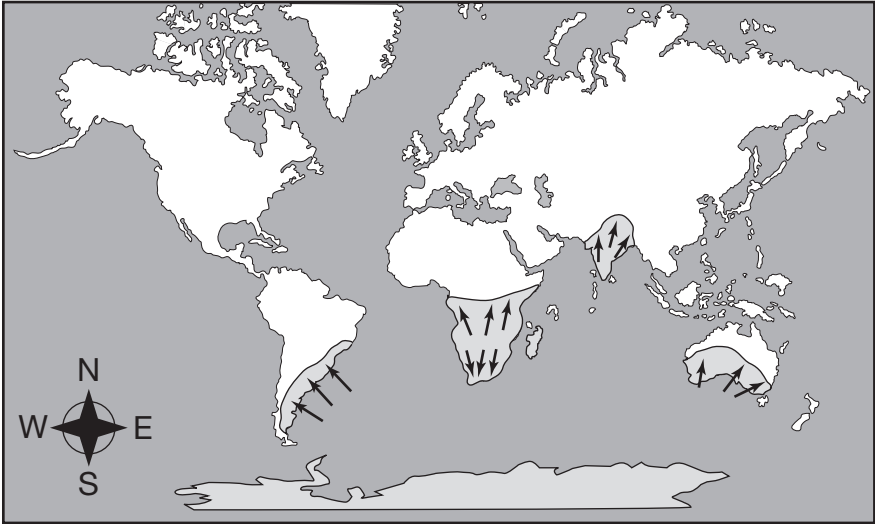




## LEGEND

- = 2-billion-year-old rock  
■ = 450-million-year-old mountains

The students observed the glacier evidence map to determine where glaciers existed in the Southern Hemisphere and the direction the glaciers moved.

GLACIER EVIDENCE MAP

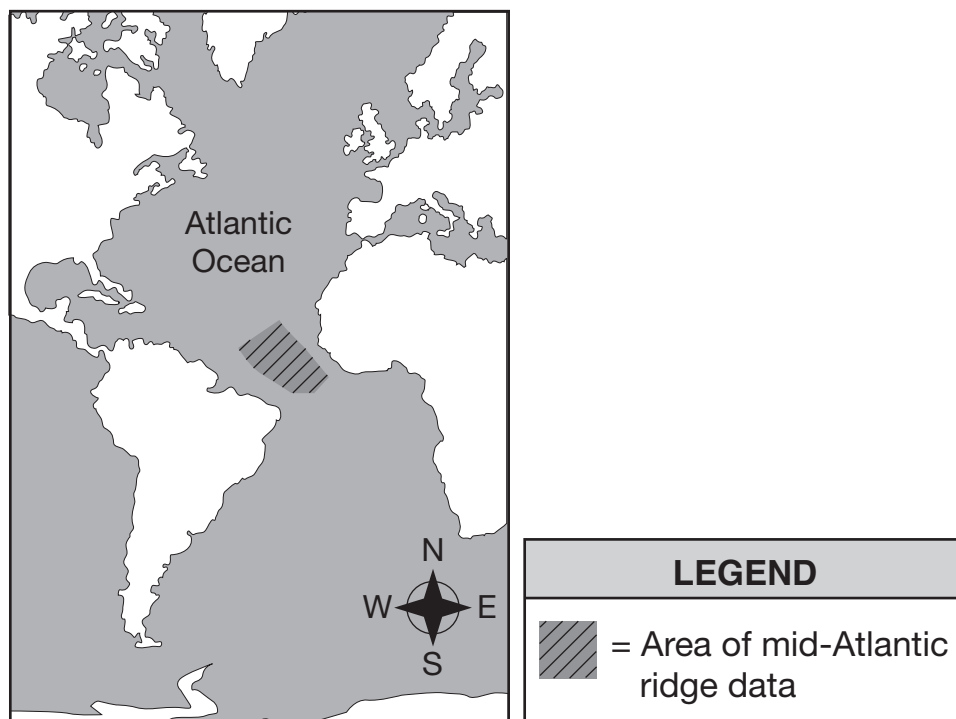


LEGEND	
	= Signs of glaciers
	= Direction of glacial scratches

## MID-ATLANTIC RIDGE DATA

Site	Distance from Ridge (kilometers)	Age of Sediment (millions of years)	Direction from Ridge
A	1,303	67	West
B	1,010	49	West
C	745	40	West
D	422	24	West
E	221	11	West
F	506	26	East
G	718	33	East

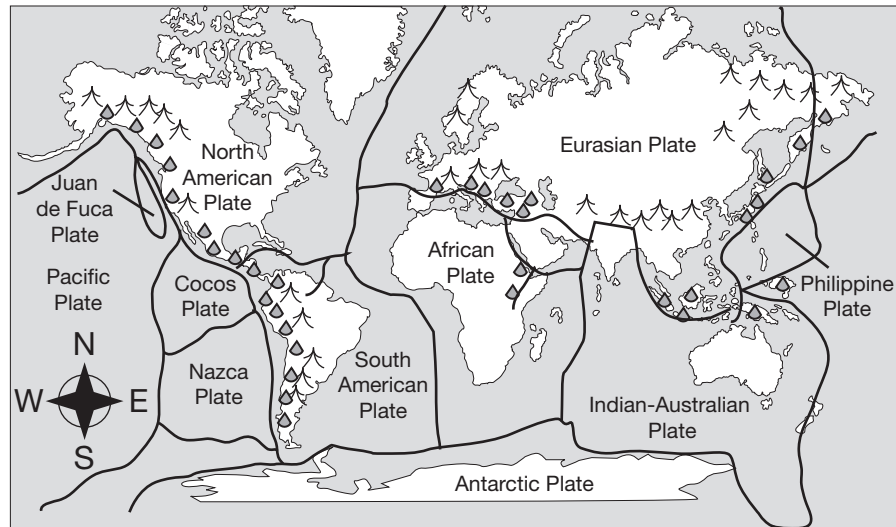
## MAP OF ATLANTIC OCEAN







**The students used the plate boundary map to observe the locations of Earth's tectonic plates.**

## PLATE BOUNDARY MAP



## LEGEND

-  = Mountains  
 = Volcanoes

- 1 The students found that scientists used the data from the mid-Atlantic ridge to support the claim that continent shape and location change over time due to tectonic plate movement.**

**Which data best supports this claim?**

- Ⓐ the rate at which the plates are moving near the ridge
- Ⓑ the age of the sediment and its distance from the ridge
- Ⓒ the amount of sediment and its direction from the ridge
- Ⓓ the direction in which the plates are moving near the ridge

- 2 The students' research indicated that *Lystrosaurus* was a slow-moving, plant-eating reptile that lived over 250 million years ago.**

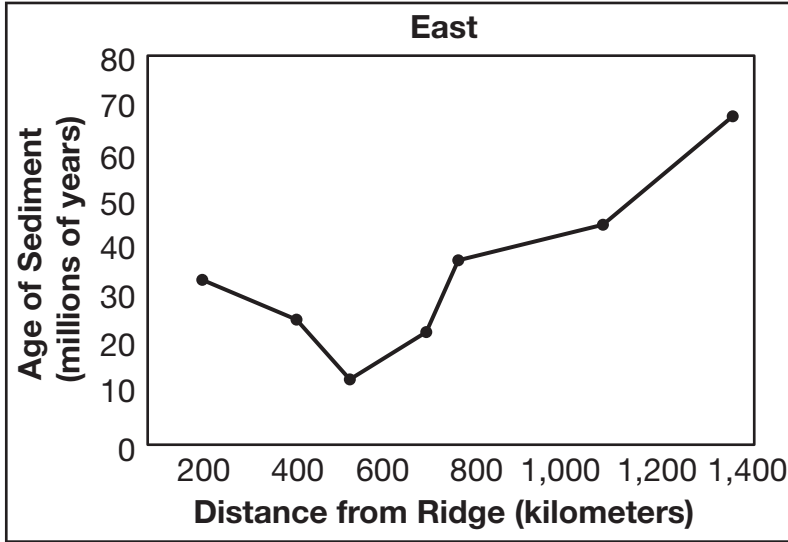
**The supporting evidence that *Lystrosaurus* inhabited a single landmass that broke apart is that fossils of *Lystrosaurus* are found**

- Ⓐ on different landmasses
- Ⓑ on glacial ice shelves
- Ⓒ in seafloor trenches
- Ⓓ in the oceanic crust

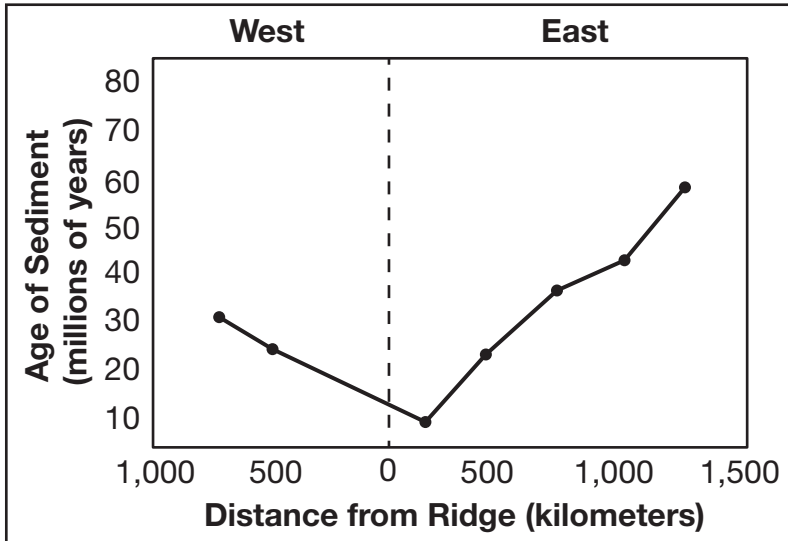
3 The students found that the mid-Atlantic ridge data were used to support a scientist's claim that new crust forms at ridges.

Which graph best represents the mid-Atlantic ridge data?

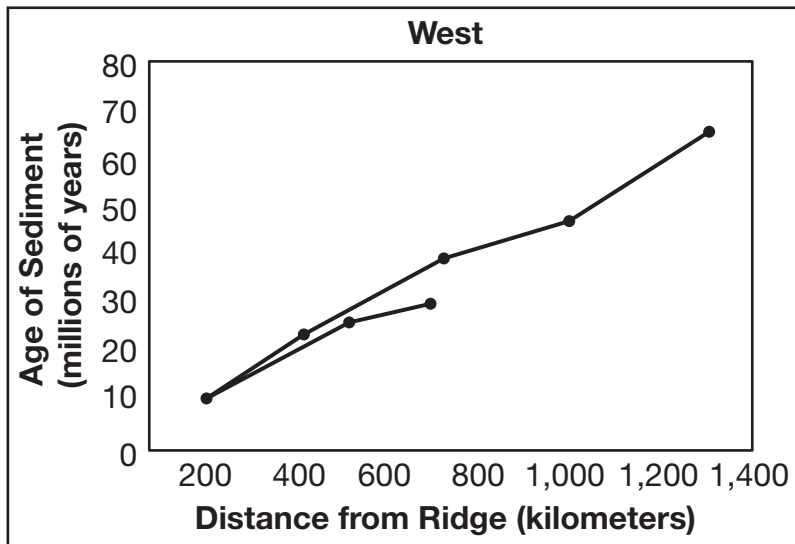
(A)



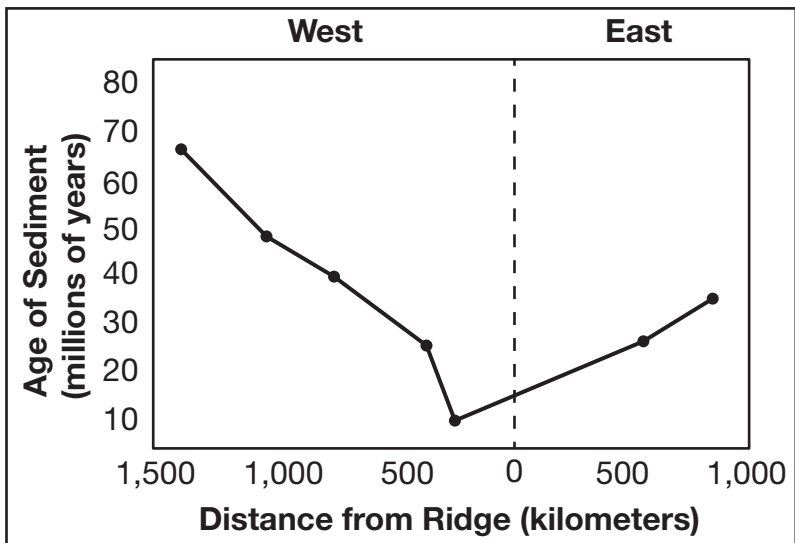
(B)



©



(D)



- 4 After examining the tectonic plate maps, the students determined where the plate boundaries exist on Earth.**

**Some mountain ranges occur along plate boundaries.**

**Future plate movement will most likely result in these mountains**

- Ⓐ staying the same size because the plates slide past one another
- Ⓑ decreasing in size because the plates will slide past one another
- Ⓒ increasing in size because the plates will collide with one another
- Ⓓ staying the same size because the plates separate from one another

- 5 A student observed the plate boundary map and found that active volcanoes form where two plates currently meet. The student stated that extinct volcanoes are likely found where plates met in the past and wanted to determine if the past eruptions of the extinct volcanoes could be used as evidence of plate motion.**

**Which evidence found in and around extinct volcanoes would best support the concept of plate motion?**

- Ⓐ lava fields forming near coastlines on different continents
- Ⓑ lava fields forming near mountain ranges on different continents
- Ⓒ a large volume of ash appearing in different rock strata on different continents
- Ⓓ a large volume of ash appearing in the same rock strata on different continents

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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 data listed below.

- 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.

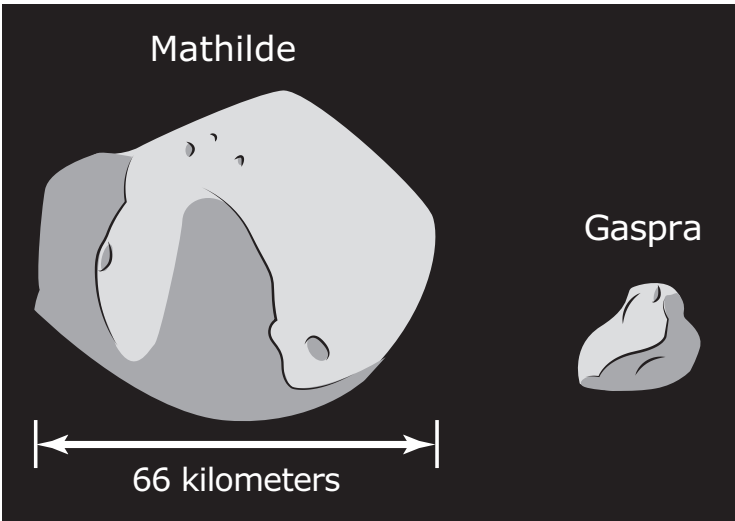


not drawn to scale

- **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 below 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 <sup>15</sup> 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

**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)<sup>1</sup> 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](http://nationalgeographic.com)

<sup>1</sup>(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)

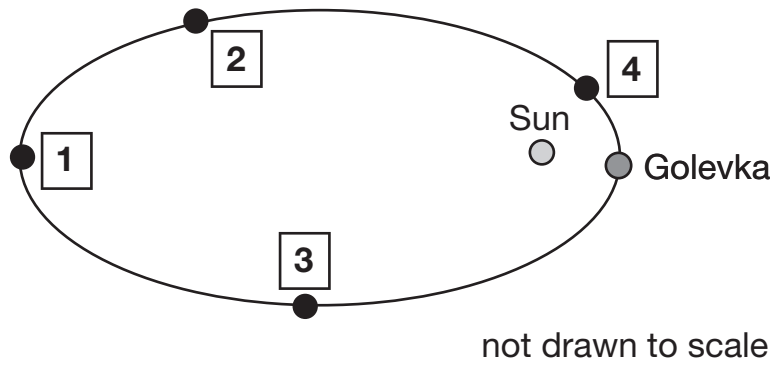
Weakest Gravitational Attraction	→	→	→	Strongest Gravitational Attraction
Juno	Eugenia	Gaspra	Otawara	Mathilde

(D)

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



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



- (A) 1
- (B) 2
- (C) 3
- (D) 4

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

MASS OF CELESTIAL OBJECTS

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



[illegible]

## Section 4

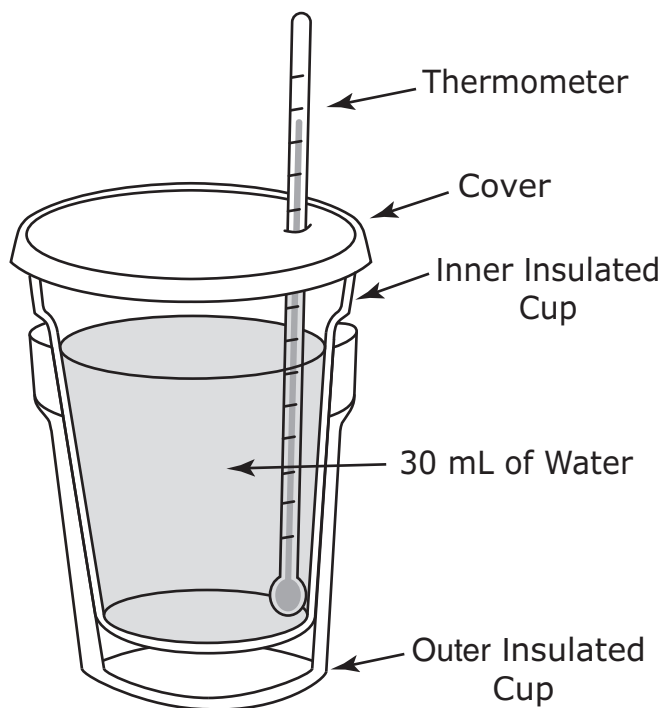


If you do not know the answer to a question, you may go on to the next question. If you finish early, you may review your answers and any questions you did not answer in this Section **ONLY**. Do not go past the stop sign.

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

A student observed a cooking demonstration at a grocery store using pans made of different metals and decided to research how different materials transfer thermal energy. The student placed one insulated cup into another insulated cup, poured 30 milliliters (mL) of water at 20 degrees Celsius into the inner cup, and covered the cup. Finally, a hole was made in the cover and a thermometer was placed in the hole. The student then obtained four 20-gram cubes of different metal types.

### THERMAL ENERGY TRANSFER DEVICE



One of the metal cubes was heated to 100°C with the assistance of an adult and then placed into the cup, which was covered again. The student observed the thermometer until the temperature no longer changed and recorded the final temperature of the water. The process was repeated for the other three metal samples and the results of the investigation were recorded.



## Section 4

**1 Which statements best describe the purpose of the design of the investigational device?**

**Select all that apply.**

- Ⓐ The design allows the thermometer to be moved so the temperature can be measured.
- Ⓑ The design maximizes the thermal energy transferred from the water to the metal.
- Ⓒ The design minimizes the thermal energy transferred to the outside environment.
- Ⓓ The design provides the initial thermal energy for the metal samples.
- Ⓔ The design ensures the metal-water device is a closed system.

**2 Which property of the metals used in the investigation is most likely the reason the student chose to use metal cubes?**

- Ⓐ large mass
- Ⓑ small volume
- Ⓒ low malleability
- Ⓓ high conductivity

**3 What is the most likely reason the student waited until the temperature no longer changed to record the data?**

- Ⓐ to make sure that the water did not start to boil
- Ⓑ to have time to calculate the change in temperature
- Ⓒ to allow the transfer of thermal energy to be complete
- Ⓓ to observe that the temperature of the water was affected by the metal cube

**4 The data from the investigation showed that after each metal cube was placed into the water,**

- Ⓐ the temperature of the water increased, and the kinetic energy of the water molecules increased
- Ⓑ the temperature of the water decreased, and the kinetic energy of the water molecules decreased
- Ⓒ the temperature of the water remained the same, and the kinetic energy of the water molecules increased
- Ⓓ the temperature of the water decreased, and the kinetic energy of the water molecules remained the same

**5 Which phrases describe the types of energy present in the cubes after being placed in the water?**

**Select all that apply.**

- Ⓐ Kinetic energy was less.
- Ⓑ Thermal energy was less.
- Ⓒ Kinetic energy was greater.
- Ⓓ Thermal energy was greater.
- Ⓔ Kinetic energy remained the same.
- Ⓕ Thermal energy remained the same.

**Use evidence from the investigation to refute or support this claim.**

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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 a food web, shown below, that illustrated relationships between several organisms in the prairie ecosystem.



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**SERIAL #**



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 data tables shown.



## 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

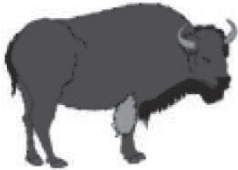
The students researched other animals in the prairie that are not predators of prairie dogs to consider other types of interactions. The students organized the research into a diagram, shown below, and used it to identify these interactions as competitive or mutually beneficial to the prairie dogs in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

**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
	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.

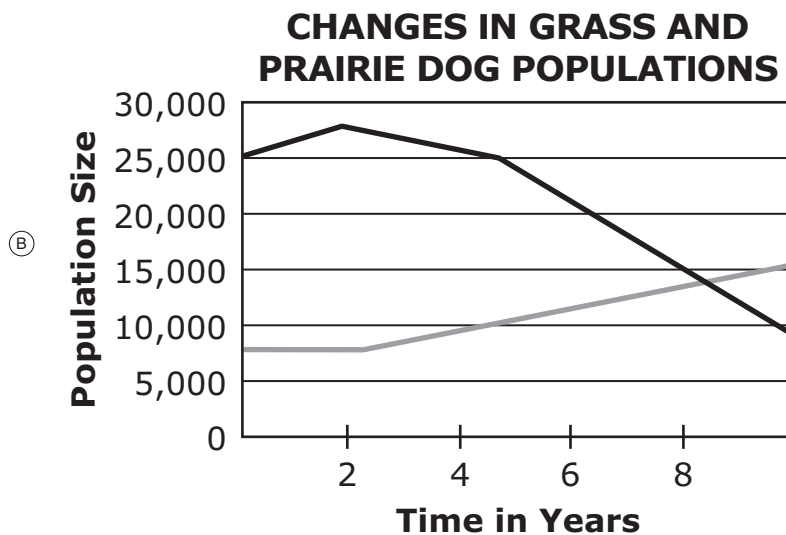
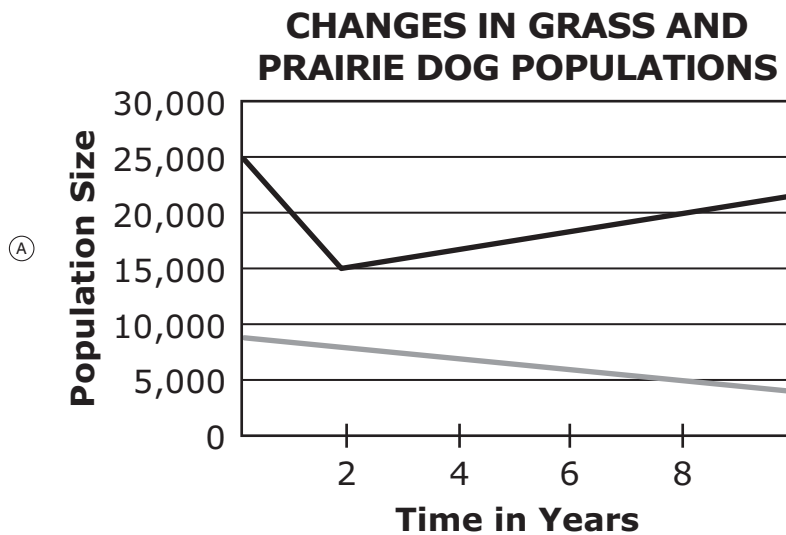
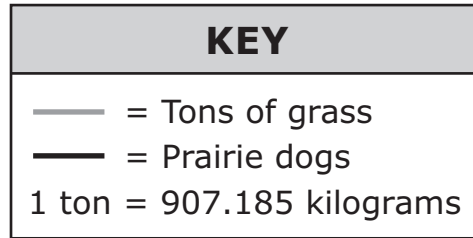
**9 The prairie food web diagram illustrates interactions among organisms that live in the prairie ecosystem.**

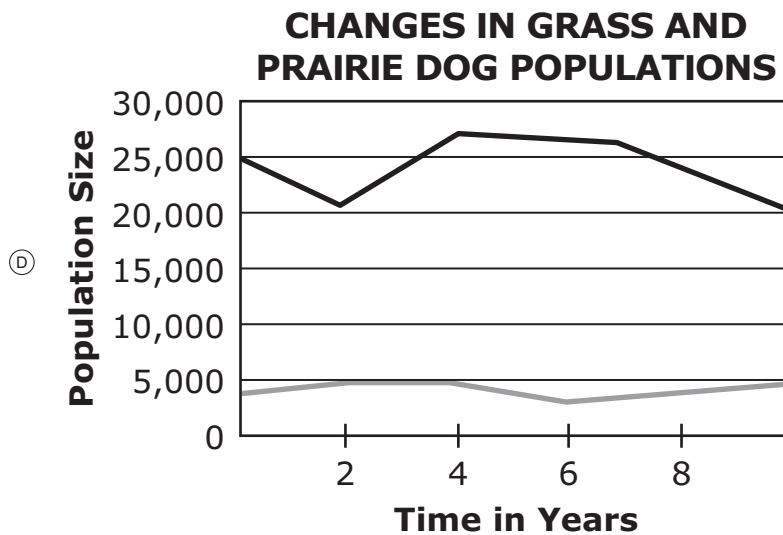
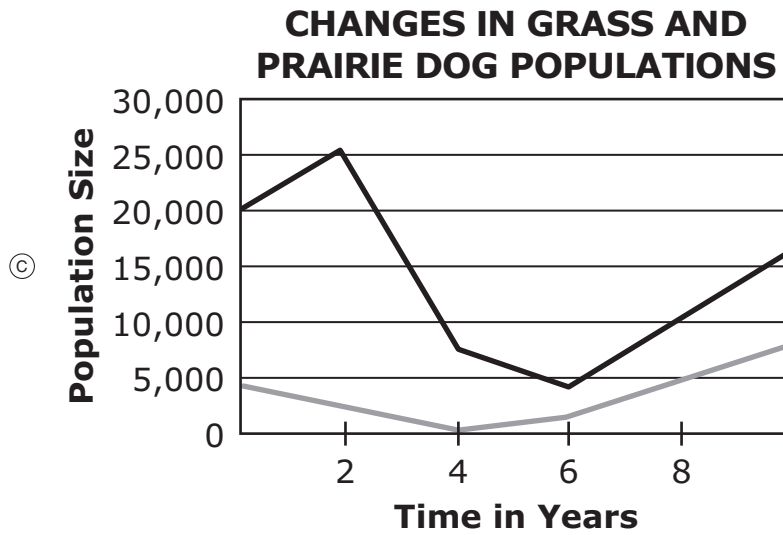
**The arrows in the food web represent**

- Ⓐ 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



- 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

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## MCAP Practice Test Answer and Alignment Document

### Science: Grade 8

#### Section 1

Item Number	Answer Key	Performance Expectation
1. 81626_01	C	MS-LS1-1
2. 81626_02	C	MS-LS1-1
3. 81626_03_P	C	MS-LS1-1
4. 81626_10	D	MS-LS1-3
5. 81626_11_P	B	MS-LS1-3
6. 81626_12	Refer to Grade 8 Science Scoring Rubric	MS-LS1-3
7. 81630_01	D	MS-ESS2-4
8. 81630_07_P	<b>Part A:</b> D, E, F <b>Part B:</b> D	MS-ESS3-1
9. 81630_05	A, D, E	MS-ESS2-4
10. 81630_10	A	MS-ESS3-1
11. 81630_08	B	MS-ESS3-1
12. 81630_12	Refer to Grade 8 Science Scoring Rubric	MS-ESS3-1

## Section 2

Item Number	Answer Key	Performance Expectation
1. 81625_09	C	MS-PS1-1
2. 81625_01	B	MS-PS1-1
3. 81625_03	A	MS-PS1-1
4. 81625_08	D	MS-PS1-1
5. 81625_02_P	D	MS-PS1-4
6. 81625_11	Refer to Grade 8 Science Scoring Rubric	MS-PS1-4
7. 81643_02	B	MS-LS3-2
8. 81643_04_P	C	MS-LS3-2
9. 81643_08_P	B	MS-LS4-4
10. 81643_07	A	MS-LS4-4
11. 81643_10_P	<b>Part A:</b> D <b>Part B:</b> B, C, E	MS-LS4-4
12. 81643_11	Refer to Grade 8 Science Scoring Rubric	MS-LS3-2

## Section 3

Item Number	Answer Key	Performance Expectation
1. 81636_03	B	MS-ESS2-3
2. 81636_09	A	MS-ESS2-2
3. 81636_10	D	MS-ESS2-3
4. 81636_01_P	C	MS-ESS1-4
5. 81636_05	D	MS-ESS1-4
6. 81636_06	Refer to Grade 8 Science Scoring Rubric	MS-ESS1-4
7. 81619_11_P	B	MS-PS2-4
8. 81619_03	B	MS-PS2-1
9. 81619_10_P	D	MS-PS2-4
10. 81619_08_P	<b>Part A:</b> D <b>Part B:</b> A	MS-PS2-4
11. 81619_07_P	A	MS-PS2-4
12. 81619_06	Refer to Grade 8 Science Scoring Rubric	MS-PS2-4

## Section 4

Item Number	Answer Key	Performance Expectation
1. 81721_02	C, E	MS-PS3-3
2. 81721_07	D	MS-PS3-3
3. 81721_04	C	MS-PS3-4
4. 81721_10_P	A	MS-PS3-4
5. 81721_11_P	A, B	MS-PS3-5
6. 81721_06	Refer to Grade 8 Science Rubric	MS-PS3-5
7. 81698_01_P	A	MS-LS2-3
8. 81698_07_P	D	MS-LS2-3
9. 81698_02_P	B	MS-LS2-3
10. 81698_04_P	D	MS-LS2-1
11. 81698_05_P	A	MS-LS2-2
12. 81698_06_P	Refer to Grade 8 Science Rubric	MS-LS2-1