Do NOT Affix Student ID Label Here

A

Student Name _____

School Name _____

LEA Number _____

MCAP
Maryland Comprehensive Assessment Program

Grade 8

MISA

Practice Test

B Last Name | First Name | MI

C

Place the Student ID Label Here

D Gender

○ Female ○ Male ○ Non-Binary

E Date of Birth

Day	Month	Year
0 1 2 3	○ Jan	0
0 1 2 3 4 5 6 7 8 9	○ Feb	1
0 1 2 3 4 5 6 7 8 9	○ Mar	2
0 1 2 3 4 5 6 7 8 9	○ Apr	0 1 2 3
0 1 2 3 4 5 6 7 8 9	○ May	0 1 2 3 4
0 1 2 3 4 5 6 7 8 9	○ Jun	0 1 2 3 4 5
0 1 2 3 4 5 6 7 8 9	○ Jul	0 1 2 3 4 5 6
0 1 2 3 4 5 6 7 8 9	○ Aug	0 1 2 3 4 5 6 7
0 1 2 3 4 5 6 7 8 9	○ Sep	0 1 2 3 4 5 6 7 8
0 1 2 3 4 5 6 7 8 9	○ Oct	9
	○ Nov	9
	○ Dec	9

School Use Only

F SASID

0 1 2 3 4 5 6 7 8 9

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SERIAL #

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.

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GO ON ▶

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

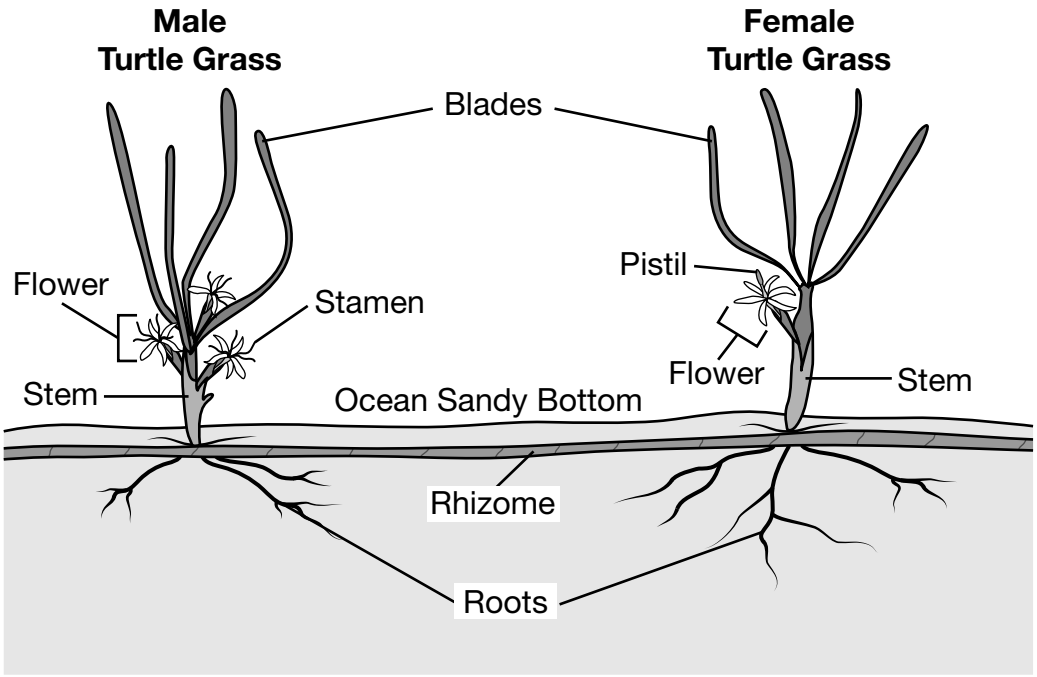
Turtle grass, a type of seagrass, is a flowering plant that lives in shallow coastal areas. Turtle grass is an important component in ocean ecosystems because it filters out pollutants, cycles nutrients, and provides shelter to small marine organisms and their offspring. An area measuring 0.0040 square kilometer of turtle grass can support more than forty thousand fish and fifty million small marine organisms.

Turtle grass reproduces in three ways:

- **asexually, by using a horizontal stem called a rhizome and a root system under the ocean sandy bottom to quickly establish a community**
- **sexually, by using ocean currents that carry pollen, a method that can take longer to establish a community than asexual reproduction**
- **sexually, by relying on other marine organisms serving as pollinators, which has been shown to speed up reproduction compared to the ocean current method of sexual reproduction**

Scientists determined that there are male and female turtle grass plants with specialized structures.

Turtle Grass Specialized Structures



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SERIAL #

To better understand the three reproductive methods of turtle grass, scientists recorded underwater videos for several days and nights.

The videos showed the flowers of male plants opening at night. Small marine organisms and fish were selectively feeding on the pollen from the male plants. The videos also showed pollen sticking to the bodies of small marine organisms and fish after they interacted with the male plants. Small marine organisms would later get briefly stuck to the female's pistil. This allowed the pollen to be deposited, which could lead to a seed forming.

In addition, the pollen that was eaten by small fish would be carried large distances before being deposited in their waste. In some instances, this pollen would come into contact with a female plant, leading to fertilization and the growth of a new plant.

The scientists observed that this method of sexual reproduction led to seagrass populations that covered large amounts of space. The scientists determined that the small marine organisms and fish were turtle grass pollinators. The scientists called them the "Bees of the Seas."

After viewing their videos, the scientists conducted further research. They collected data on specific traits from healthy turtle grass. The specific traits were dry mass of the living parts of the plant below the ocean's sandy bottom measured in grams per square meter (g/m^2), blade length measured in centimeters (cm), and blade width measured in millimeters (mm).

Turtle Grass Traits

Traits	Average Range	Maximum Measurement	Minimum Measurement
Dry Mass (g/m^2)	300-600	1500	100
Blade Length (cm)	10-20	35	4
Blade Width (mm)	10	38	6

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SERIAL #

The scientists discovered that some environmental factors can affect these traits, as shown in the table.

Turtle Grass Information

Factors	Effect on Population Size	Effects on Traits
Decrease in water clarity	Large decrease in population numbers	• Blade length: large number of blade lengths measuring 4 cm • Blade width: large number of blade widths measuring 6 mm
Increase in rainfall	Small decrease in population numbers	• Average dry mass: large number of plant parts measuring 100 g/m^2 • Blade length: large number of blade lengths measuring 4 cm • Blade width: large number of blade widths measuring 6 mm
Increase in fast-moving underwater currents	Small decrease in population numbers	• Blades were broken off, causing large number of blade fragments shorter than 4 cm

1 Which claim about sexually reproducing turtle grass is supported by evidence?

Ⓐ A fish feeding on pollen increases the probability of successful reproduction.

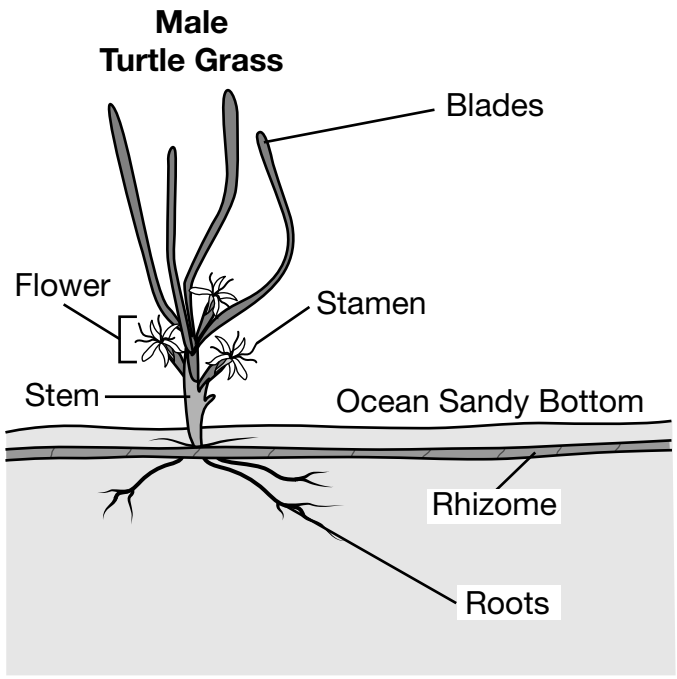
Ⓑ The presence of the sticky female pistil decreases the probability of successful reproduction.

Ⓒ The presence of blades on the seagrasses increases the probability of successful reproduction.

Ⓓ A small marine organism with pollen on its body decreases the probability of successful reproduction.

GO ON ▶

2 Scientists claim that turtle grass plants are successful at reproducing sexually.



Which <u>two</u> specialized structures support this claim?

Ⓐ blades

Ⓑ flower

Ⓒ stamen

Ⓓ stem

Ⓔ rhizome

3 Which sequence orders the events that describe the relationship between increased runoff from heavy rains and the effect on turtle grass populations?

Ⓐ a decrease in the amount of light reaching the sandy bottom, a decrease in the ability of turtle grass to make food, followed by a decrease in turtle grass growth

Ⓑ an increase in the amount of light reaching the sandy bottom, an increase in the ability of turtle grass to make food, followed by an increase in turtle grass growth

Ⓒ a decrease in the amount of light reaching the sandy bottom, an increase in the ability of turtle grass to make food, followed by a decrease in turtle grass growth

Ⓓ an increase in the amount of light reaching the sandy bottom, a decrease in the ability of turtle grass to make food, followed by an increase in turtle grass growth

4 Based on the evidence, an increase in the erosion of the ocean's sandy bottom would <u>most directly</u> affect the

Ⓐ dry mass of the turtle grass. This may lead to possible measurements of 100 grams per square meter and a decrease in the growth of turtle grass.

Ⓑ dry mass of the turtle grass. This may lead to possible measurements of 1500 grams per square meter and an increase in the growth of turtle grass.

Ⓒ blade widths of the turtle grass. This may lead to possible measurements of 38 millimeters and a decrease in the growth of turtle grass.

Ⓓ blade widths of the turtle grass. This may lead to possible measurements of 4 millimeters and an increase in the growth of turtle grass.

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5 Based on the evidence, which pair includes an environmental factor that will have a positive effect on turtle grass growth and an environmental factor that will have a negative effect on turtle grass growth?

Ⓐ a storm that produces large waves and an increase in water depth

Ⓑ a large number of sunny days and an increase in water depth

Ⓒ a storm that produces large waves and more runoff

Ⓓ a large number of sunny days and less runoff

6 Use evidence to explain how the different methods of reproduction used by the turtle grass individually and collectively increase the probability of successful reproduction.

Write your response on the lines provided.

GO ON ▶

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SERIAL #

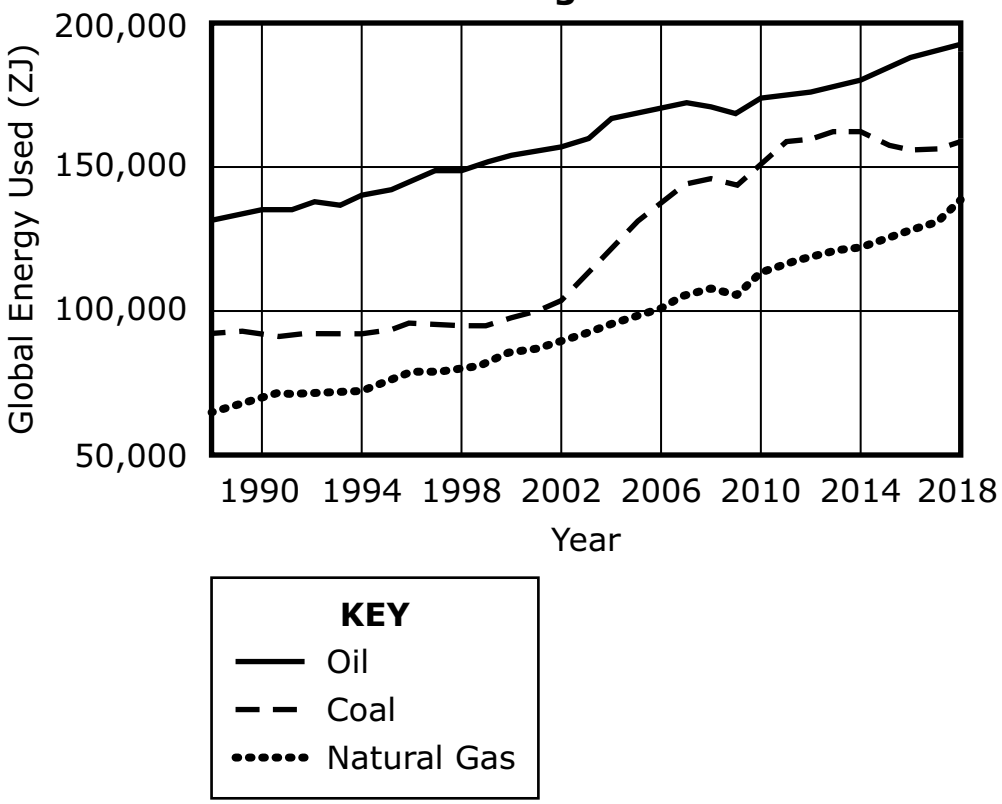
GO ON TO NEXT PAGE

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

A scientist researched an island in the Chesapeake Bay. The land area of the island had decreased over time. In 2018, the island was completely under seawater. Rising seawater levels and erosion from storms partially caused the changes to the island.

The scientist studied the relationship between the global energy use from fossil fuels, the average global temperature at Earth's surface, and the rise in seawater levels around the island. Global energy is measured in zettajoules (ZJ). Average global temperature is measured in degrees Celsius (°C). The graphs show the data the scientist collected.

Global Energy Used from 1988 through 2018



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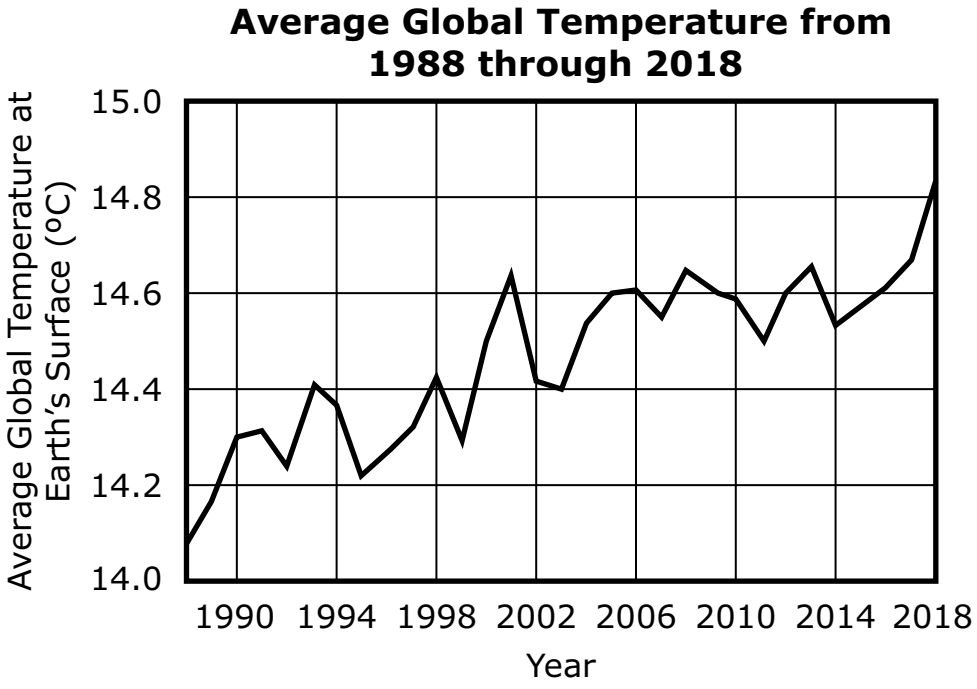


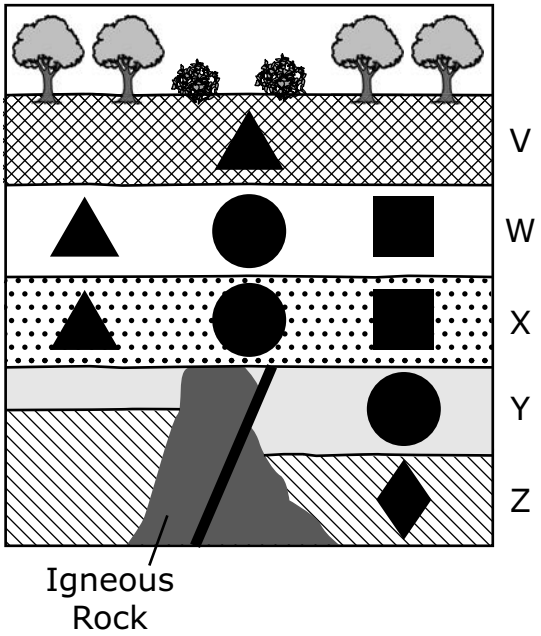
The scientist also studied data of the overall amounts of greenhouse gases in Earth's atmosphere. The data was from 1988 through 2018. The amount of carbon dioxide increased by nearly 16%. The amount of methane increased by nearly 9%.

After studying the island in the Chesapeake Bay, the scientist began studying Maryland's other natural features. They wanted to know if the changes to Maryland's landscape were similar to those that were found on other continents.

The scientist started by recording characteristics of an outcrop found in the mountains of Maryland. The outcrop contained:

- **different fossil types in sedimentary rock layers V through Z**
- **an area where igneous rock pushed into layers Y and Z**
- **a fault line**

Outcrop Characteristics



GO ON ▶

7 Which question can be answered based on evidence from the data?

Ⓐ Does the global energy used by humans from fossil fuels follow the same overall trend as the average global temperature at Earth's surface from 1900 through 2000?

Ⓑ Does the global energy used by humans from oil follow the same overall trend as the average global temperature at Earth's surface from 1988 through 2018?

Ⓒ Does the rate of change of the global energy used by humans from coal follow the same overall trend as the rate of change in the rise in seawater levels from 2000 through 2016?

Ⓓ Does the rate of change of the global energy used by humans from natural gas follow the same overall trend as the rate of change in the rise in seawater levels from 2010 through 2014?

8 The scientist asked this question:

Is an increase in the global energy used by humans from fossil fuels related to an increase in the global amounts of greenhouses gases in Earth's atmosphere?

Which <u>two</u> pieces of evidence from the data can be used to answer the scientist's question?

Ⓐ The global energy used by humans from oil changed from 1988 through 2018.

Ⓑ The global energy used by humans from coal changed from 2014 through 2016.

Ⓒ The global energy used by humans from natural gas changed from 2008 through 2009.

Ⓓ The average global temperature at Earth's surface changed from 2008 through 2009.

Ⓔ The global amounts of carbon dioxide and methane changed from 1988 through 2018.

9 Which statement <u>best</u> explains how the fossil record of the outcrop can be used to organize Earth's geologic history?

Ⓐ Fossil types 1 and 2 are the oldest fossil types because they were found in the shallowest layers of the outcrop.

Ⓑ Fossil types 1 and 3 are the oldest fossil types because they were found in the most layers of the outcrop.

Ⓒ Fossil types 2 and 4 are the oldest fossil types because they were found in the deepest layers of the outcrop.

Ⓓ Fossil types 3 and 4 are the oldest fossil types because they were found in the largest layers of the outcrop.

10 Which statement provides the <u>best</u> evidence that a volcanic eruption occurred at the outcrop?

Ⓐ Fossil Type 4 was found in Layer Z only.

Ⓑ A fault line is present in layers Y and Z.

Ⓒ Igneous rock pushed into layers Y and Z.

Ⓓ Layers V through Z do not share a common fossil.

11 The scientist wanted to explain that an organism identified at the outcrop most likely became extinct before all other organisms.

Which statement <u>best</u> supports the explanation?

Ⓐ Fossil Type 3 was not found in Layer V, and the organism became extinct before Layer V formed.

Ⓑ Fossil Type 4 was not found in layers V through Y, and the organism became extinct before layers V through Y formed.

Ⓒ Fossil Type 2 was not found in layers V and Z, and the organism became extinct after Layer Z formed but before Layer V formed.

Ⓓ Fossil Type 1 was not found in layers Y and Z, and the organism became extinct due to contact with liquid rock from Earth's hot interior.

12 Use evidence to explain how human activities have caused changes in the overall average global temperatures.

Write your response on the lines provided.

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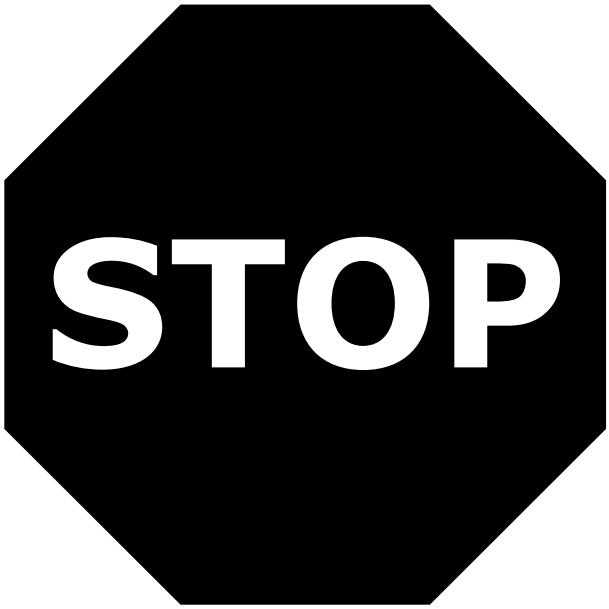

You have come to the end of Section 1 of the test. Review your answers from Section 1 only.

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GO ON ▶

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SERIAL #

Section 2

Directions:

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GO ON ▶

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

As part of a competition, a middle school engineering club was given the design challenge of providing electricity to communities where less than 10% of the population has reliable access to electricity. The research included data that compared solar- and gasoline-powered generators, which are frequently used to provide power to remote locations.

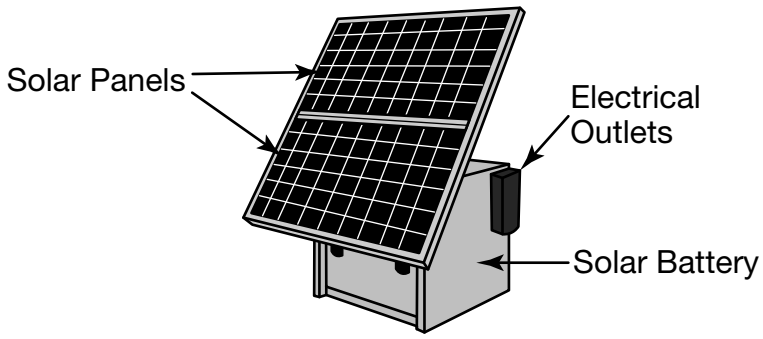
ELECTRICAL POWER SOURCES

Criterion	Solar Generator	Gasoline Generator
Initial cost	$2,000 to $4,000	$800 to $1,000
Ongoing cost per year	$30 to $40	$200 to $300
25-year lifetime cost of generator	$3,000 to $5,000	$6,000 to $8,500
Operating sound level in decibels (dB) at a distance of 6 m	0	50 to 70
Environmental effect	• Uses renewable energy • No emissions	• Uses nonrenewable fuel • Emissions
Power availability	Depends on sunlight	Continuous and on demand

GO ON ▶

The members of the club decided to develop a device that used a renewable form of energy, so they completed additional research on solar panels. Solar panels are flat and covered with glass. Under the glass is a material that can convert energy from the sun into electricity.

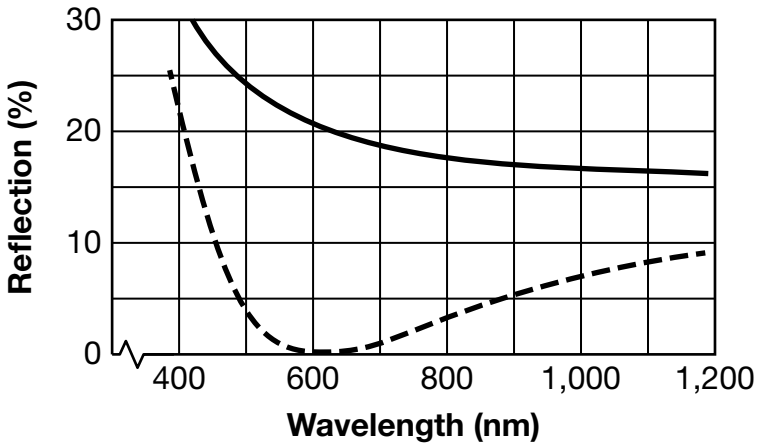
PORTABLE SOLAR GENERATOR



GO ON ▶

Sunlight consists of a wide range of electromagnetic waves with wavelengths from 300 to 1,250 nanometers (nm). However, due to the glass on the panel, some of that energy is reflected. To decrease the amount of energy that is reflected, some solar panels are covered with an antireflective coating, as shown in the graph.

ANTIREFLECTIVE COATING EFFECT



KEY
Glass without antireflective coating
Glass with antireflective coating

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SERIAL #

1 Which statement <u>best</u> describes the design problem that the engineering club needs to address?

Ⓐ New types of batteries that are less expensive and lighter need to be developed.

Ⓑ Local and national governments need to be encouraged to invest in solar power infrastructure.

Ⓒ Locations without electricity would benefit from convenient, inexpensive, and environmentally friendly power sources.

Ⓓ The majority of the electricity produced on Earth is from nonrenewable sources, and new technologies need to be developed to utilize renewable sources.

2 Which design criteria must be met to achieve the goal of the competition?

Ⓐ simple to operate

Ⓑ uses the latest technology

Ⓒ easy to manufacture in a local company

Ⓓ produces enough electrical power for a remote community

3 Which <u>two</u> criteria of the generator can be quantitatively measured?

Ⓐ the ease of operation

Ⓑ the cost of each panel

Ⓒ the electrical output of each panel

Ⓓ the material from which each panel is made

Ⓔ the type of antireflective coating used on each panel

4 Which statement <u>best</u> indicates a major advantage of using gasoline generators and a major advantage of using solar generators?

Ⓐ the initial cost of gasoline generators and the environmental effect of solar generators

Ⓑ the lifetime cost of gasoline generators and the environmental effect of solar generators

Ⓒ the sound level of gasoline generators and the power availability of solar generators

Ⓓ the initial cost of gasoline generators and the power availability of solar generators

5 Which statement <u>best</u> describes the amount of solar energy that can be converted to electrical energy?

Ⓐ all of the energy because energy is always conserved

Ⓑ all of the energy because light can completely pass through glass

Ⓒ some of the energy because light is reflected off the glass

Ⓓ some of the energy because light is an electromagnetic wave

GO ON ▶

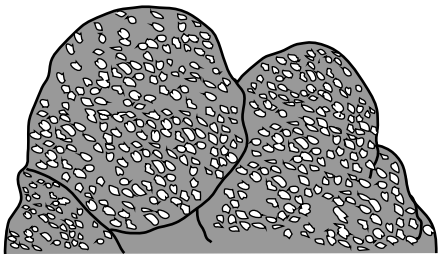
6 **Use evidence to explain possible outcomes of light shining on the surface of panels with and without antireflective coating.**

Write your response on the lines provided.

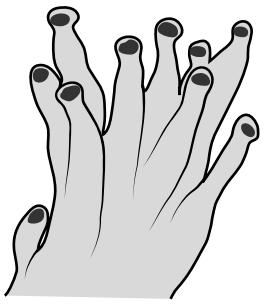
Read all of the information. Use the information to answer the questions.

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



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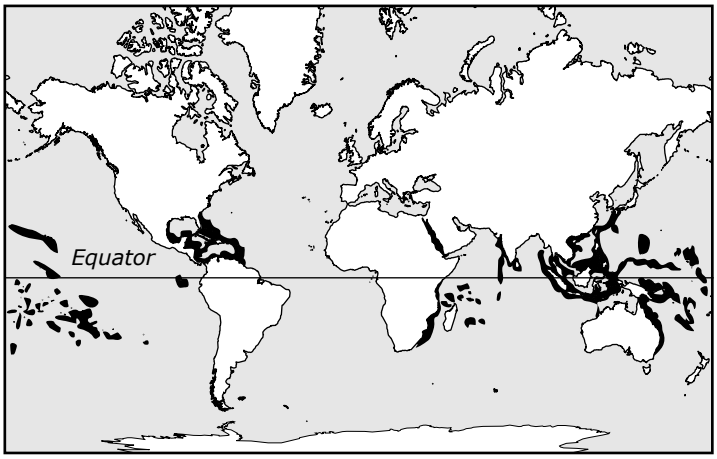
SERIAL #

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.



LEGEND
■ = Coral reef locations

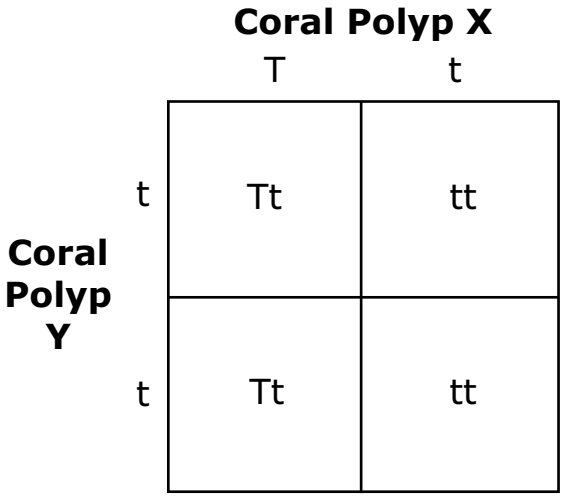
GO ON ▶

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.

GO ON ▶

SERIAL #

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 <u>most likely</u> 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

GO ON ▶

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SERIAL #

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

Section 2

10 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 (°C).

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

Ⓐ 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 <u>most likely</u> effects to coral populations if ocean temperatures continue to increase?

Select <u>three</u>.

Ⓐ 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

GO ON ▶

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SERIAL #

11 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.

Section 2

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

GO ON ▶

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SERIAL #

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

Write your response on the lines provided.

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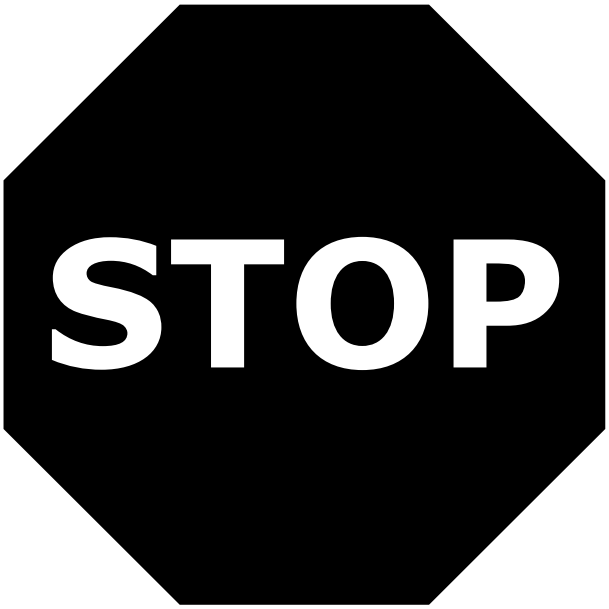

You have come to the end of Section 2 of the test. Review your answers from Section 2 only.

STOP

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SERIAL #

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.

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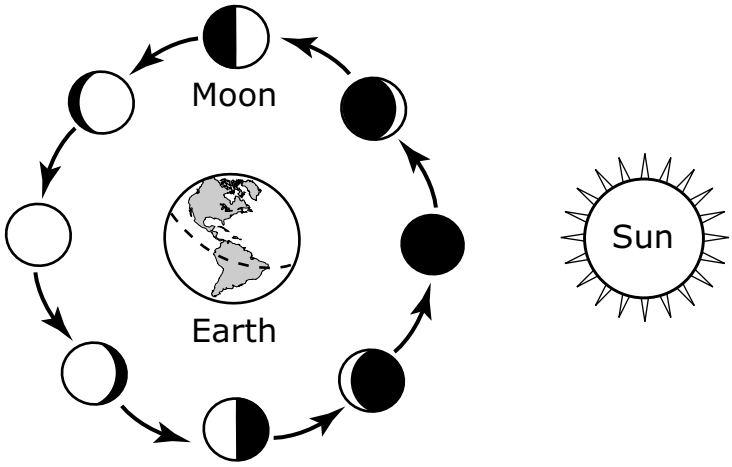
GO ON ▶

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.



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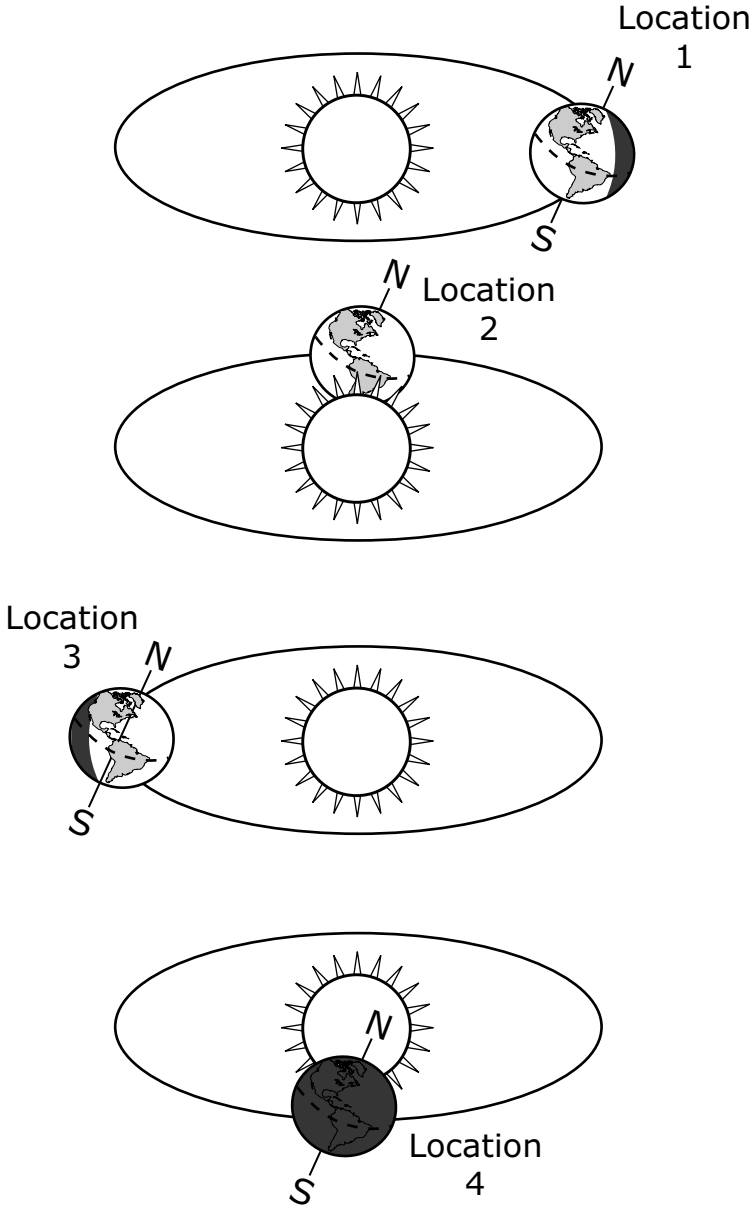
SERIAL #

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



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SERIAL #

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

GO ON ▶

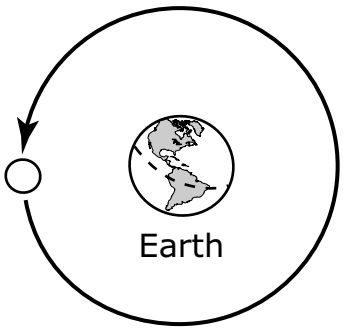
SERIAL #

Section 3

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

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

Ⓐ



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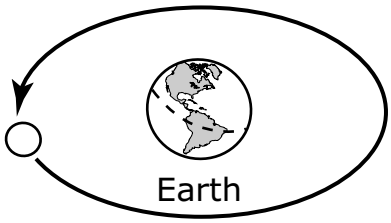
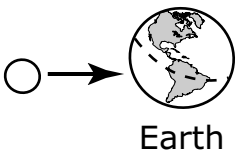


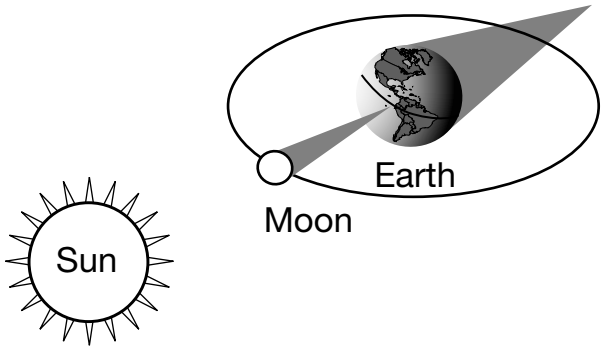
Ⓒ

Ⓓ



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 <u>most likely</u> make about a solar eclipse?

Select <u>two</u>.

Ⓐ 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.

GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

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 <u>most likely</u> 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.

6 **After the students constructed the table of the sun and planet data, the students examined the information to compare the differences between the inner planets and the outer planets.**

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

Write your response on the lines provided.

GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

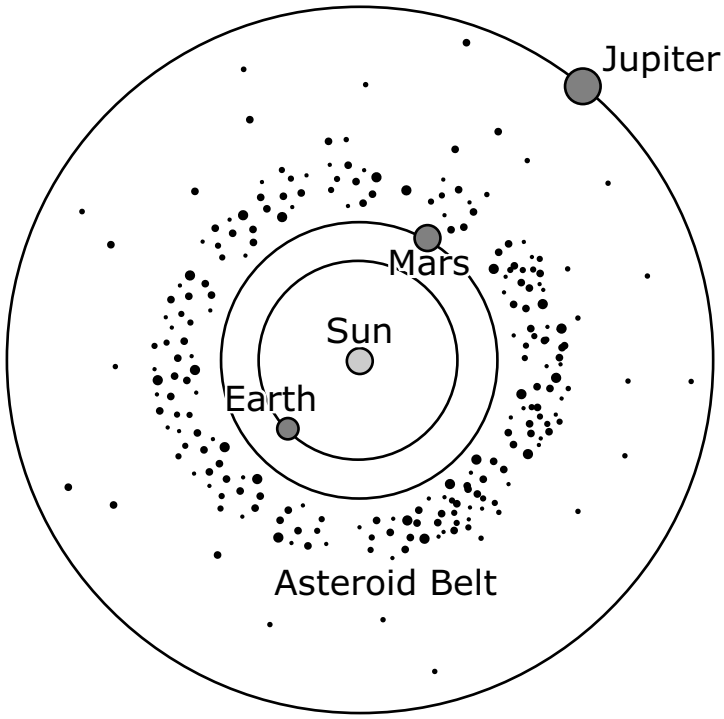
Read all of the information. Use the information to answer the questions.

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.



not drawn to scale

Additionally, the research indicated the following:

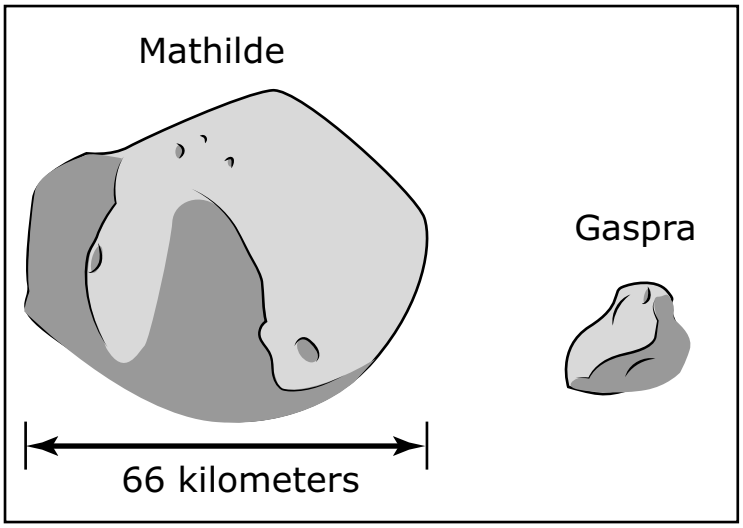
- **Asteroids in our solar system orbit the sun.**
- **Asteroids can orbit a planet or larger asteroid.**
- **Smaller asteroids do not have enough gravity to pull themselves into a round shape.**
- **More massive asteroids have a more circular shape.**
- **It is possible for the orbits of asteroids and 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.**

GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

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

GO ON ▶

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

GO ON ▶

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SERIAL #

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 <u>most likely</u>

Ⓐ 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?

Ⓐ

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

Ⓑ

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

Ⓒ

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

Ⓓ

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

GO ON ▶

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SERIAL #

10 Part A

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

Which asteroid would <u>most likely</u> be orbited by other asteroids?

Ⓐ Itokawa

Ⓑ Juno

Ⓒ Mathilde

Ⓓ Vesta

Part B

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

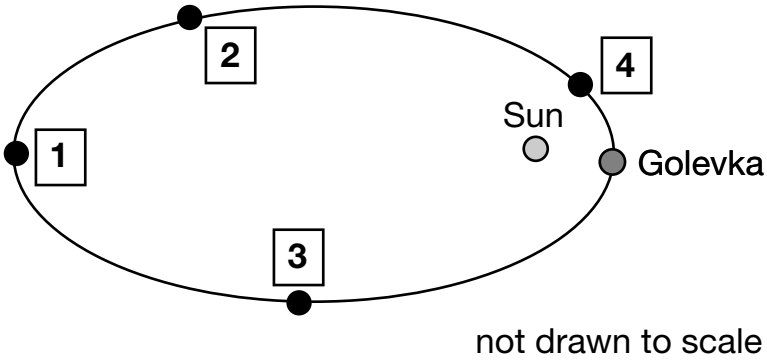
Ⓐ mass, which results in a strong gravitational force.

Ⓑ 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

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SERIAL #

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

GO ON ▶

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

Write your response on the lines provided.

STOP

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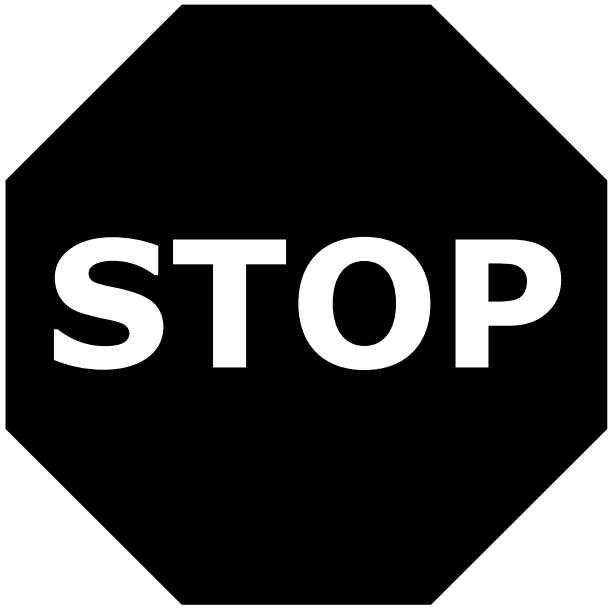
SERIAL #



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 lined space provided in your test book. Be sure to keep your response within the provided space. Only responses written within the lined box 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.

GO ON ▶

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SERIAL #

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

What do asphalt, heating oil, and scented soaps have in common? Some varieties of these products are made from crude oil. Crude oil, also known as petroleum, is a resource that is extracted from the earth and refined into various products. Some companies continue to use crude oil more than healthier options in developing their products because it saves them money.

A student studied alternative ways to develop soaps that are healthier for people and safer for the environment, such as using coconut oil to make soap. The student obtained information on how to create soap from an online resource and asked the teacher to repeat the process in the classroom. The teacher wore goggles and followed proper lab safety procedures when making the soap.

Making Soap from Coconut Oil

Materials

- **coconut oil**
- **castor oil**
- **lye (sodium hydroxide)**
- **water**

Steps

1. **Melt the coconut oil in a pan.**
2. **Add the lye to the water and mix to dissolve. The mixture will become warm. Let cool to room temperature.**
3. **Pour the castor oil and melted coconut oil into a large pot. Let the mixture cool to room temperature.**
4. **Slowly add the lye solution to the oils and mix them together. This combined solution will be warm.**
5. **Continue mixing until the solution has a thin pudding-like consistency. This is the time to add color and fragrance (scent) if you decide to use them.**
6. **Pour the mixture into containers with different shapes for the soap.**
7. **Let the finished soap solidify overnight.**

GO ON ▶

The student measured the mass of all the materials used to make the soap and recorded the measurements in a table.

Materials	Mass (g)
Coconut Oil	400
Castor Oil	40
Lye	60
Water	150

The final mass of the mixture was 650 grams.

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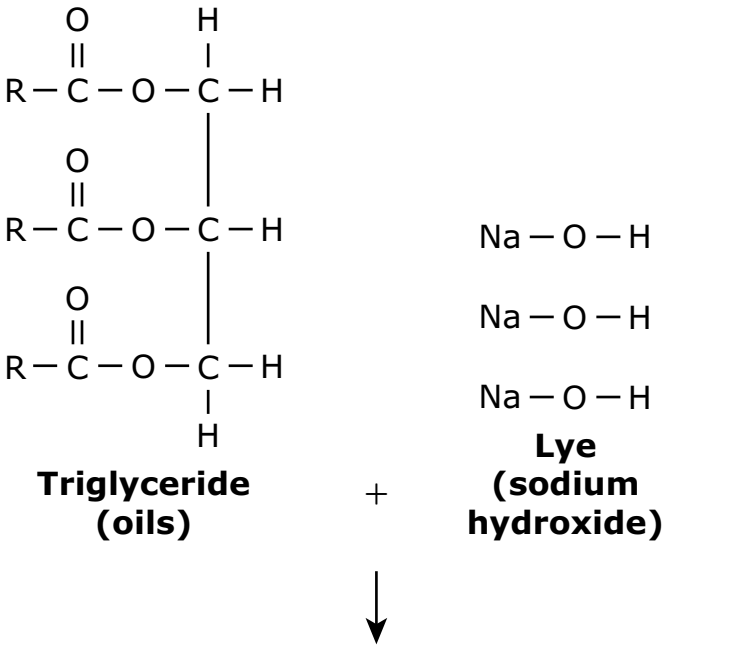
SERIAL #

The student created a general model to show the chemical reaction for making soap.



KEY
C — Carbon
O — Oxygen
H — Hydrogen
Na — Sodium
R — R group (other atoms not shown)

1 Which reason <u>best</u> describes the societal need for soap made from materials such as coconut oil?

Ⓐ The need for sodium hydroxide will decline in demand.

Ⓑ The need for fossil fuels used in soaps will decrease.

Ⓒ More farms will be built for soap materials.

Ⓓ More soap will be available at stores.

2 The student decided to do more research on the effects of the production and use of crude oil. Gathering information from which of the following sources would be <u>most</u> reliable?

Ⓐ an asphalt manufacturer that uses crude oil regularly

Ⓑ a petroleum company that uses crude oil as its primary resource

Ⓒ a reporter from a news outlet who shares information on local and global news

Ⓓ a scientist at a university who studies the effects of resource usage on the environment

GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

3 Which step in the procedure can be used as evidence to support the claim that chemical reactions can turn natural resources into synthetic materials?

Ⓐ Step 1

Ⓑ Step 5

Ⓒ Step 6

Ⓓ Step 7

4 How many different types of reactant molecules are used in the chemical reaction to make soap?

Ⓐ 2

Ⓑ 4

Ⓒ 5

Ⓓ 8

5 Which statement <u>best</u> describes the types of atoms in the soap reaction?

Ⓐ All of the atoms have the same mass as one another.

Ⓑ Each of the atoms has a specific mass, which is the same for all atoms of that type.

Ⓒ Each of the atoms appears in every reactant molecule in the soap reaction.

Ⓓ Each of the atoms appears in every product molecule in the soap reaction.

6 **Explain how mass is conserved in the chemical reaction that forms soap.**

Write your response on the lines provided.

GO ON ▶

GO ON TO NEXT PAGE

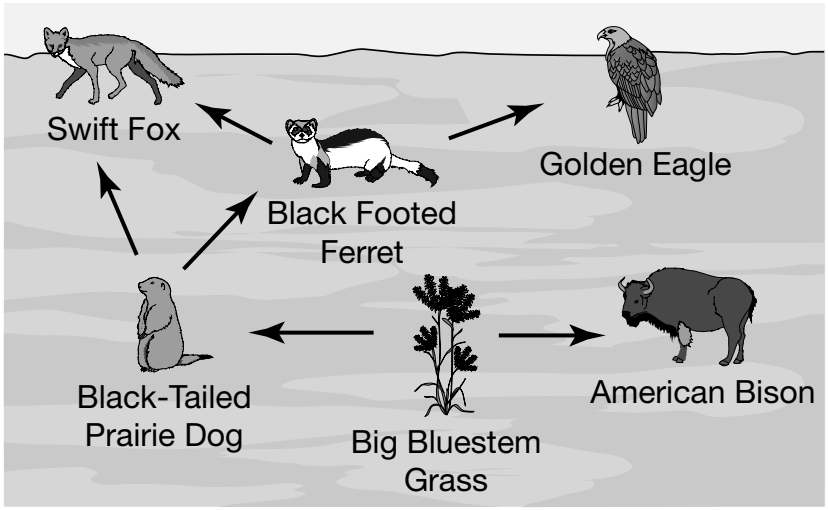
GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

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.

GO ON ▶

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SERIAL #

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

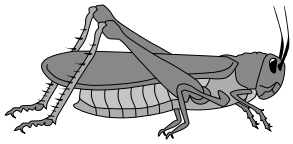
INITIAL FERRET POPULATION 140

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

GO ON ▶

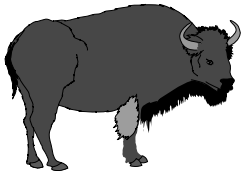
The students researched other animals in the prairie that are not predators of prairie dogs to consider other types of interactions. The students organized the research into the following diagram and used it to identify these interactions as competitive or mutually beneficial to the prairie dogs in the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

GO ON ▶

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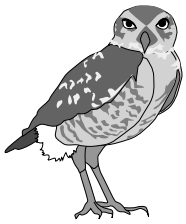
SERIAL #



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

GO ON ▶

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

SERIAL #

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

Which statement <u>best</u> 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.

GO ON ▶

PLEASE DO NOT WRITE IN THIS AREA

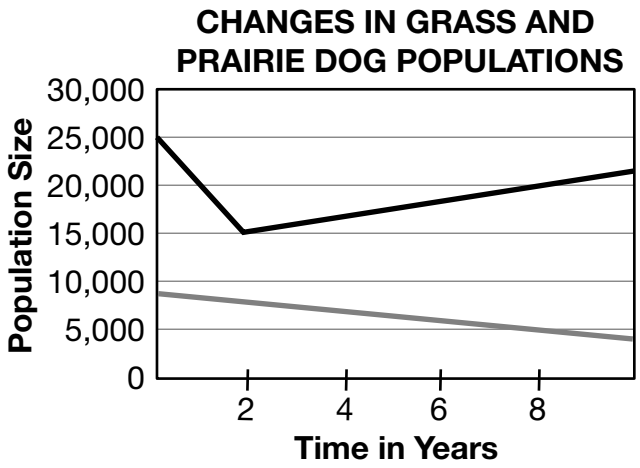
SERIAL #

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

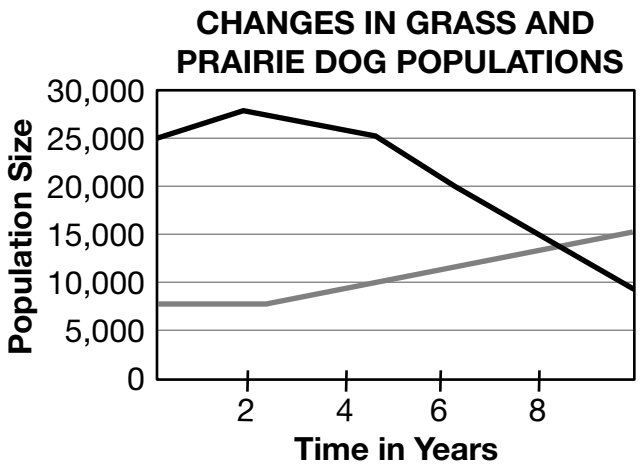
Which graph <u>best</u> represents the changes in the amount of grass and prairie dog population when the initial number of ferrets in the ecosystem was 140?

KEY
= Tons of grass
= Prairie dogs
1 ton = 907.185 kilograms

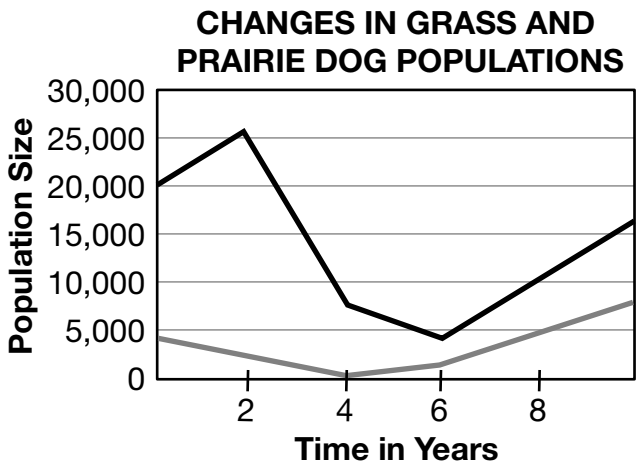
Ⓐ



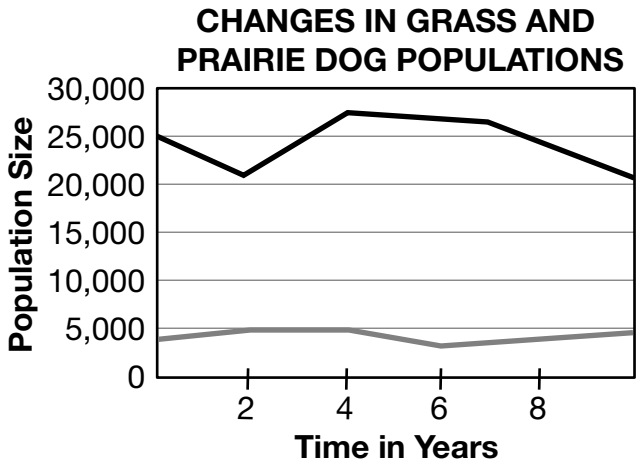
Ⓑ



Ⓒ



Ⓓ



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 ▶

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #

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 <u>most likely</u> change if a severe drought were to occur for a four-year period. In your description, be sure to include

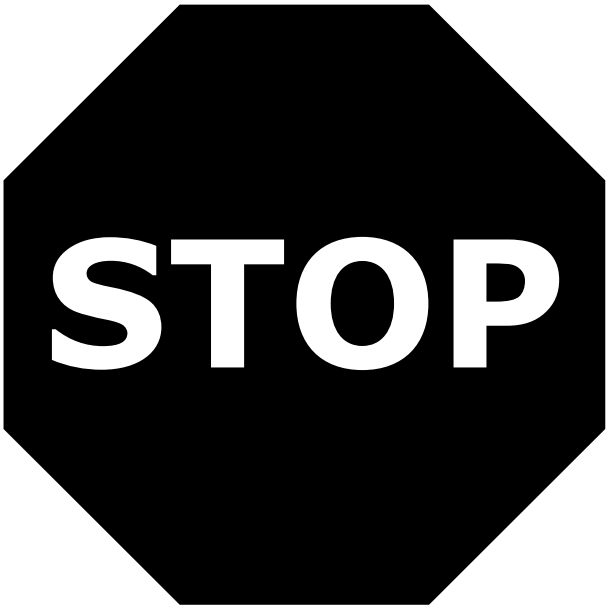
- **the cause of any changes to the populations**
- **the movement of energy within the ecosystem**
- **the interactions among the organisms**

Write your response on the lines provided.

STOP

PLEASE DO NOT WRITE IN THIS AREA

SERIAL #



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

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MCAP

Maryland Comprehensive Assessment Program

Grade 8 MISA Practice Test

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