



OHIO
SCIENCE
FUSION

Grade 5 Ohio Science Test Prep



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Contents

Grade 5 Ohio Science Test Prep

Introduction	iv
Test-Taking Tips	v
Standards Review and Practice	1
5.ESS.1 Content Statement: The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.....	1
5.ESS.2 Content Statement: The sun is one of many stars that exist in the universe	4
5.ESS.3 Content Statement: Most of the cycles and patterns of motion between the Earth and sun are predictable	8
5.LS.1 Content Statement: Organisms perform a variety of roles in an ecosystem.....	12
5.LS.2 Content Statement: All of the processes that take place within organisms require energy	16
5.PS.1 Content Statement: The amount of change in movement of an object is based on the mass of the object and the amount of force exerted.....	20
5.PS.2 Content Statement: Light and sound are forms of energy that behave in predictable ways	25
Performance-Based Assessment Practice A	29
Performance-Based Assessment Practice B	32
End-of-Year Assessment Practice A	35
End-of-Year Assessment Practice B	57
Answer Keys	79

Introduction

This booklet is designed to help students prepare to take the Ohio Next Generation science assessment. The table of contents at the beginning of this book shows how the book is organized. The first section of the book contains review material and practice questions that are grouped by Ohio New Learning Standards for Science content statement. Following the review material and practice questions are practice tests. There are two Performance-Based Assessment practice tests and two End-of-Year Assessment practice tests. These tests are followed by answer keys for all review materials and practice tests.

When students take the Ohio Next Generation science assessment, they will be tested on the Ohio New Learning Standards for Science. Each of the content statements that students will be tested on is included in the review and practice section of the student booklet. Having students read the short review of each concept and then answer the practice questions that follow will be a good way to check their understanding of the material.

Taking the Performance-Based Assessment and End-of-Year Assessment practice tests will also help students prepare for the Ohio assessment. Although the Ohio Next Generation science assessment is an online-only test, the style and format of the test items found in these practice tests model what students will encounter online. These practice tests will help students become familiar with the kinds of tasks they will be expected to complete in order to respond to the test items. Assessment item types that students will encounter include multiple choice, short answer, graphic response, and constructed response. Each practice test is similar in length and difficulty to the Ohio assessment that students will take.

Test-Taking Tips

The following Test Taking Tips can help students approach test-taking armed with strategies that can build their confidence. Practicing the tips with each question type will help prepare students to successfully answer these questions on high-stakes tests.

General Tips

- Read the directions carefully before you begin.
- Budget your time based on the number and type of questions. Set aside time to recheck your answers after you're done.
- When using a separate answer sheet, use a ruler or blank sheet of paper as a guide to avoid marking answers on the wrong line.
- If there is no penalty for guessing, it's better to guess than to leave an answer blank.
- Guess well, not wildly. Try to eliminate one or two answer choices first.
- Read the question fully and carefully. Many students miss the correct answer because they read only part of the question and choose an answer based on what they think the question is asking.
- In the question stem, note key terms that tell you what to look for in the answer choices: What? When? Where? What NOT? What kind? How many?
- If you encounter a question that uses a word that is unfamiliar to you, try to break the word up into word parts. If you know what part of the word means, you may be able to eliminate some answer choices.

Tables and Graphs

- Read the title.
- Note the units of measure.
- For tables, read row and column headings.
- For graphs, read the axis labels.
- For graphs, note the data points.
- Look for trends and patterns.

Maps and Diagrams

- Read the title and all labels.
- Do not rely on relative sizes of items to compare size. Look for a scale.
- BEFORE you look at the map or diagram, read the question all the way through. Look for hints in the question that will tell you what to look for in the map or diagram.
- AFTER reading the question, read and look through the whole map or diagram to understand what it illustrates and what processes or parts are involved.
- For diagrams, follow arrows or numbered steps to understand a process.
- Look at a diagram's parts, and then see how they work together.

- For maps, note the key, place names, and names of other map features.
- For maps, note the scale, compass direction, and location of important features with respect to one another.

Multiple-Choice Questions

- Read the whole question and answer it on your own before you read the answer choices.
- Read all of the answer choices before you choose one.
- Read each answer choice together with the question to see if they make sense.
- Eliminate any obviously wrong choices.
- Look for words that limit your choices, such as *most* or *best*. These words may indicate that there are several possible answers but that you should look for the one that is the most important or had the most effect.

Graphic-Response Questions

- Read the question completely to be sure you understand what you're supposed to do.
- If you're supposed to draw on a graphic, use a scratch piece of paper for a rough draft.
- If you're supposed to fill in a graph, be sure to plot the data carefully before filling in any lines or bars on the graph.
- If the responses are numbered or lettered, be sure that your response matches the correct number or letter on the graphic.

Short-Answer Questions

- For fill-in-the-blank answers, read the statement once it is completed to be sure that it makes sense with the words you've filled in.
- For short-answer items, read the directions and note whether you need to answer in complete sentences or with words or phrases.
- Think about which key words or phrases would best indicate a correct response. When short-answer items are machine-scored, the computer looks for these key words and phrases.

Constructed-Response Questions

- Be sure to write neatly.
- Look for key words that tell you what the purpose of your answer will be: Identify, describe, explain, compare, predict, defend, justify, critique.
- Look for key words and phrases that tell you what you're supposed to do. For example, "Why did this happen..." implies a cause-and-effect answer. "How do you think..." implies that you should draw and support a conclusion.
- Make a list of key points that you want to be sure to include in your answer.
- Questions that have several parts are easier to answer one part at a time. Focus on each part. If there are some parts you cannot answer, answer the ones that you can.
- For a longer essay, make an outline to ensure that you cover the points you intend to without getting off topic.
- Do not write everything you can recall about a topic. Focus your essay to answer only the question that is asked.

Standards Review

5.ESS.1

The solar system includes the sun and all celestial bodies that orbit the sun. Each planet in the solar system has unique characteristics.

The distance from the sun, size, composition and movement of each planet are unique. Planets revolve around the sun in elliptical orbits. Some of the planets have moons and/or debris that orbit them. Comets, asteroids and meteoroids orbit the sun.

Read the summary statements below to review the main concepts of the content statement.

- Earth and its moon form a system in space that is part of a larger system, called the solar system. The eight planets of the solar system revolve in orbits around the sun and differ in size and makeup.
- The planets of the solar system are classified by their distance from the sun. Inner planets are the four planets closest to the sun, and outer planets are the farthest from the sun. The farther a planet is from the sun, the longer it takes for that planet to revolve, or go around the sun.
- The gravitational pull of the sun keeps the planets and other bodies in space in their orbits. The gravitational pull of the planets keeps their moons in their orbits around each planet.
- The four inner planets, Mercury, Venus, Mars, and Earth, are dense and rocky. They are much smaller than the outer planets. Only Earth and Mars have moons, and Earth is the only planet that has water and life.
- The outer planets, Jupiter, Saturn, Uranus, and Neptune, are known as the gas giants. All of the gas giants have many moons and ring systems. Because the gas giants are farther from the sun than the inner planets, they are much colder than the inner planets.
- Dwarf planets are found mostly at the edge of the solar system in a region called the Kuiper Belt. These planets have not cleared their orbits of other objects. Pluto is classified as a dwarf planet.
- Asteroids are smaller rocky bodies that orbit the sun. Many are found in the region between Mars and Jupiter, known as the Asteroid Belt. Comets are made up of frozen gases, rock, and dust. As comets approach the sun, particles break away from the comet to form visible long tails. Meteoroids are chunks of rock that move through space.

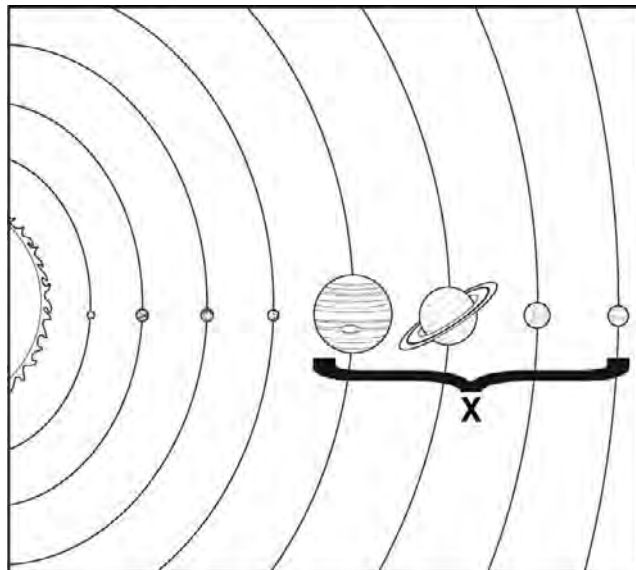
Standards Review

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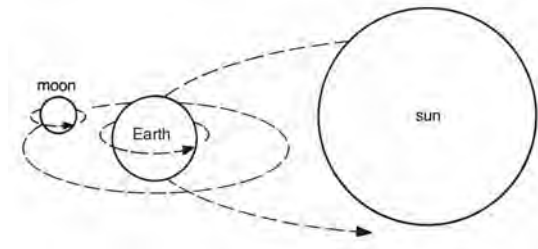
Fill in the correct answer bubble or write your answer in the space provided.



1. Use the diagram to answer each question.
 - a. In the space below, write two or three sentences that describe the planets labeled with an X in the diagram.

- b. Explain how the planets labeled X are different from the other planets in the diagram.

2. The diagram below represents the Earth-moon-sun system.



How do Earth and the moon remain in their orbits?

3. Which of the following statements **best** describes dwarf planets?
- (A) They are found in the region between Mars and Jupiter.
 - (B) They are made up of frozen gases, rock, and dust.
 - (C) They have not cleared their orbits of other celestial bodies.
 - (D) They are chunks of rock that burn up as they enter Earth's atmosphere.
4. Which technology is likely the best way for a scientist to study the composition of a comet?
- (A) probe
 - (B) electron microscope
 - (C) satellite
 - (D) telescope

Standards Review

5.ESS.2

The sun is one of many stars that exist in the universe.

The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun.

Read the paragraphs below to review the main concepts of the content statement.

The sun is the only star in the solar system. It is a medium-size star that appears larger than other stars because of its close distance to Earth. Stars in space appear as tiny points of light in the night sky because they are so far away. However, many stars are much smaller than Earth's sun, and many stars are much larger. For example, a white dwarf star can be as small as a planet, and supergiant stars are many times larger than Earth's sun.

The sun is much larger than Earth, about 109 times the size of Earth. But, unlike Earth and the other rocky planets, the sun does not have a solid surface. Like other stars, the sun is a hot ball of glowing gases. Its atmosphere extends millions of kilometers into the solar system. The sun and other stars produce energy in their cores and give off heat and light.

Thousands of years ago, people looked at the night sky and imagined the stars connecting to form pictures of gods, kings, or animals. These star patterns are called constellations. Perhaps the most familiar constellation is the Ursa Major, or the Great Bear. The Big Dipper, a pot-shaped group of stars, is a part of this constellation. Early explorers used the star patterns of the Big Dipper to navigate when crossing the Atlantic Ocean. They would follow an imaginary line passing through the two stars farthest from the Big Dipper's handle to find the North Star. The North Star remains in nearly the same spot above the northern horizon year round, so it became a handy guide for sailors when trying to determine direction.

Standards Practice

5.ESS.2

The sun is one of many stars that exist in the universe.

The sun appears to be the largest star in the sky because it is the closest star to Earth. Some stars are larger than the sun and some stars are smaller than the sun.

Fill in the correct answer bubble or write your answer in the space provided.

Use the chart to answer each question.

Earth	Sun
Liquid water	Sunspots, solar flares
Solid surface	?
Atmosphere of nitrogen and oxygen	Atmosphere of hydrogen and helium

- 1a. Which of the following **best** completes the chart?
- (A) craters and mountains
 - (B) gaseous layers
 - (C) oxygen and silicon
 - (D) rocky layers
- 1b. Which one of the following statements can be added to the chart to compare Earth and the sun?
- (A) The sun is over 100 times larger than Earth.
 - (B) Both the Earth and sun produce their own light.
 - (C) Both the Earth and sun have flat plains on their surface.
 - (D) The sun has a surface temperature that is about the same as Earth.

2. Which of the following statements is true about the sun?

- (A) The sun is brighter than most stars.
- (B) The sun is larger than most stars.
- (C) The sun is a medium-size star.
- (D) The sun is a supergiant star.



3. In the space below, describe why the sun appears different from the stars shown in the picture.

4. Explain why a very bright star might appear dimmer in the sky than other stars that are equally as bright.

Name _____ Date _____

5. Which of the following describes a star pattern in the sky?

- (A) asteroid
- (B) constellation
- (C) galaxy
- (D) sunspot

Standards Review

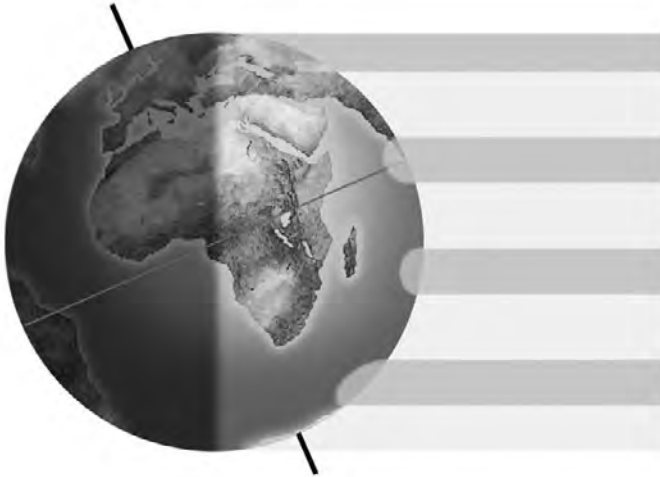
5.ESS.3

Most of the cycles and patterns of motion between the Earth and sun are predictable.

Earth's revolution around the sun takes approximately 365 days. Earth completes one rotation on its axis in a 24-hour period, producing day and night. This rotation makes the sun, stars and moon appear to change position in the sky. Earth's axis is tilted at an angle of 23.5° . This tilt, along with Earth's revolution around the sun, affects the amount of direct sunlight that the Earth receives in a single day and throughout the year. The average daily temperature is related to the amount of direct sunlight received. Changes in average temperature throughout the year are identified as seasons.

Read the summary statements below to review the main concepts of the content statement.

- The rotation of Earth on its axis produces day and night. The side of Earth facing the sun experiences day. The side of Earth facing away from the sun experiences night.
- Earth is tilted on its axis at an angle of 23.5° . Because Earth is tilted on its axis, areas near the north pole or south pole may experience daylight or night for 24-hour periods depending on the season of the year.
- As the Earth revolves around the sun, the tilt of its axis and its position in space causes different amounts of sunlight to reach different places on Earth. The amount of sunlight and its intensity affects the average daily temperature, which in turn causes the seasons.
- When the Northern Hemisphere is tilted toward the sun, it receives more direct rays from the sun resulting in warmer temperatures, causing summer. Then when the Northern Hemisphere is tilted away from the sun, it experiences fewer direct rays of sunlight resulting in colder temperatures, causing winter.



- Earth's revolution and the tilt of its axis also affects the amount of hours of sunlight and darkness. In summer, there are more hours of daylight, and the sun appears higher in the sky relative to the horizon. In winter, there are fewer hours of daylight, and the sun appears lower in the sky relative to the horizon.
- In some areas of the world, the average daily temperatures of the seasons contribute to specific, predictable weather patterns, such as hurricanes or monsoons. For example, in places like India and Western Africa, the extreme heat of the summer contributes to weather conditions that bring monsoon winds with moist air from nearby oceans, resulting in high levels of rain. In those areas, this time of year is referred to as the rainy season, or the monsoon season.

Standards Practice

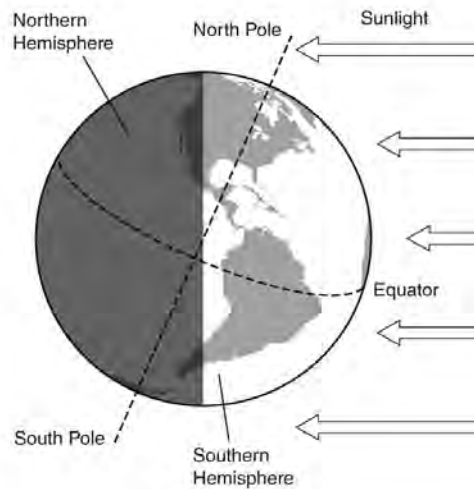
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Fill in the correct answer bubble or write your answer in the space provided.

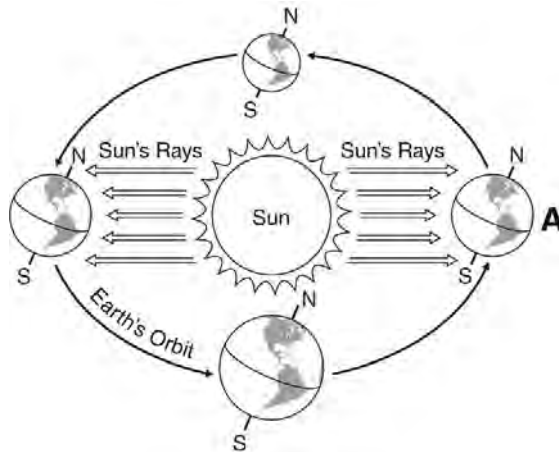
Use this image to answer questions 1 and 2.



1. In the space below, write a sentence that describes what is taking place in the diagram. Explain how you know.

2. Which of the places on the diagram would you expect to receive sunlight for 24 hours every day? Explain.

The diagram below represents Earth's position in space during its one-year revolution. Use this diagram to answer questions 3 and 4.



3. What season of the year is it in the Northern Hemisphere at the point marked A? Explain how you know.

4. Describe two patterns of change that happen in the Northern Hemisphere during the course of the year due to Earth's revolution and rotation.

Standards Review

5.LS.1

Organisms perform a variety of roles in an ecosystem.

Populations of organisms can be categorized by how they acquire energy.

Food webs can be used to identify the relationships among producers, consumers, and decomposers in an ecosystem.

Read the summary statement below.

The role of an organism in an ecosystem depends on how the organism obtains its energy. Some organisms use the energy of the sun to make their own food. These organisms, known as producers, are the foundation of food chains and food webs. Other organisms, known as consumers, eat the organisms that make their own food. Food chains are diagrams that illustrate how energy is transferred through the organisms in an ecosystem. Food webs show how food chains are connected. Food webs are also used to show the complex feeding relationships among the organisms in an ecosystem. When an organism leaves an ecosystem, it upsets the balance of the ecosystem. For example, if a population of mice leaves an ecosystem, the predators that prey upon the mice will have fewer sources of food. That population may decrease because its food source, the mice, has decreased.

Fill in each blank with the term that best completes each sentence to review the main concepts of the content statement.

- | | | | |
|--------------|------------|----------------|-----------|
| balance | ecosystem | nutrients | producers |
| commensalism | feed | parasitism | survival |
| consumers | food chain | photosynthesis | |
| decomposers | increase | predators | |
| decrease | mutualism | prey | |

Organisms that make their own food through a process called _____ are called _____. Organisms that eat other living things to obtain energy are called _____. Some organisms, known as _____ because they consume dead and decaying matter, return _____ to the soil and water.

A _____ describes how energy travels through the organisms in an ecosystem. The organisms in a(n) _____ maintain a delicate _____. Organisms that _____ on other animals are called _____. If their prey suddenly increases, their population may _____.

Many living things form relationships in which they depend on other living things for _____. For example, _____ is when an organism lives off and harms its host. However, _____ occurs when two living organisms benefit, and _____ is when one organism benefits and the other organism is not affected.

Standards Practice

5.LS.1

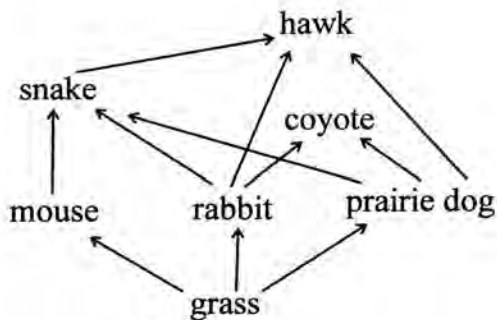
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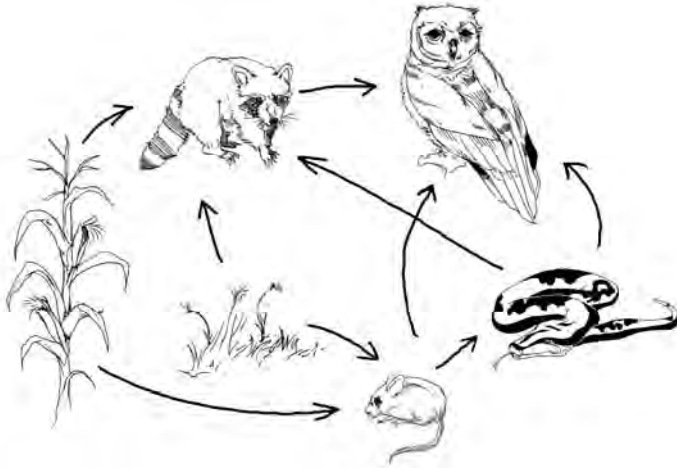
Fill in the correct answer bubble or write your answer in the space provided.

Use the diagram to answer questions 1 and 2.



- Which of the following forms a complete food chain within the food web?
 - grass, rabbit, hawk
 - prairie dog, snake, hawk
 - grass, mouse, rabbit
 - mouse, snake, hawk
- Which of the following statements is **true** about this food web?
 - The hawk preys upon the rabbit and the mouse.
 - The grass is the only producer in this food web.
 - The grass and the mouse form a symbiotic relationship.
 - The prairie dog preys upon the snake, coyote, and hawk.

Use the diagram to answer questions 3 and 4.



3. This food web shows the relationship among the plants, mice, snakes, raccoons, and owls in an ecosystem. What would likely happen to the population of snakes if the population of mice were to suddenly disappear? Explain how you know. Describe the impact on at least two of the snake's relationships in this ecosystem.

4. Which of the organisms in the food web are predators? Explain how you know.

Standards Review

5.LS.2

All of the processes that take place within organisms require energy.

For ecosystems, the major source of energy is sunlight.

Energy entering ecosystems as sunlight is transferred and transformed by producers into energy that organisms use through the process of photosynthesis. That energy then passes from organism to organism as illustrated in food webs.

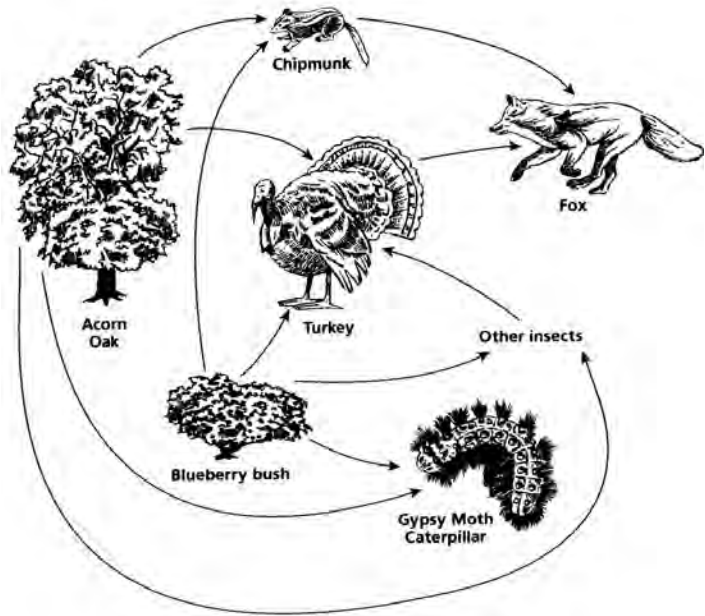
In most ecosystems, energy derived from the sun is transferred and transformed into energy that organisms use by the process of photosynthesis in plants and other photosynthetic organisms.

Read the paragraphs below to review the main concepts of the content statement.

All living things require energy to live and to grow. Producers such as plants make their own food by using the energy of sunlight to produce sugars through a process called photosynthesis. The sugars in plants are food that consumers feed upon to get energy. Other consumers feed on animals that eat other organisms, and the energy is passed along through food chains.

Energy moves through an ecosystem from producers to consumers. The energy flows in only one direction. There are different types of consumers. Herbivores are animals that eat only plants. Omnivores are animals that eat both plants and other animals. Carnivores are animals that eat only other animals.

A diagram called a food web can show the way that energy travels through an ecosystem. The food web below shows how energy travels from the acorn oak and the blueberry bush to the consumers in the ecosystem. The arrows show the direction that energy travels. For example, the turkey gets its energy from the blueberry bush. The fox preys upon and gets its energy from the turkey.



Standards Practice

5.LS.2

All of the processes that take place within organisms require energy.

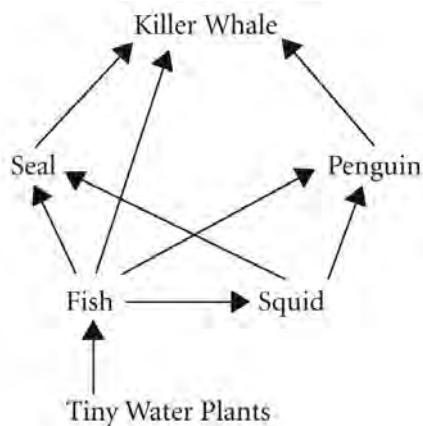
For ecosystems, the major source of energy is sunlight.

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In most ecosystems, energy derived from the sun is transferred and transformed into energy that organisms use by the process of photosynthesis in plants and other photosynthetic organisms.

Fill in the correct answer bubble or write your answer in the space provided.

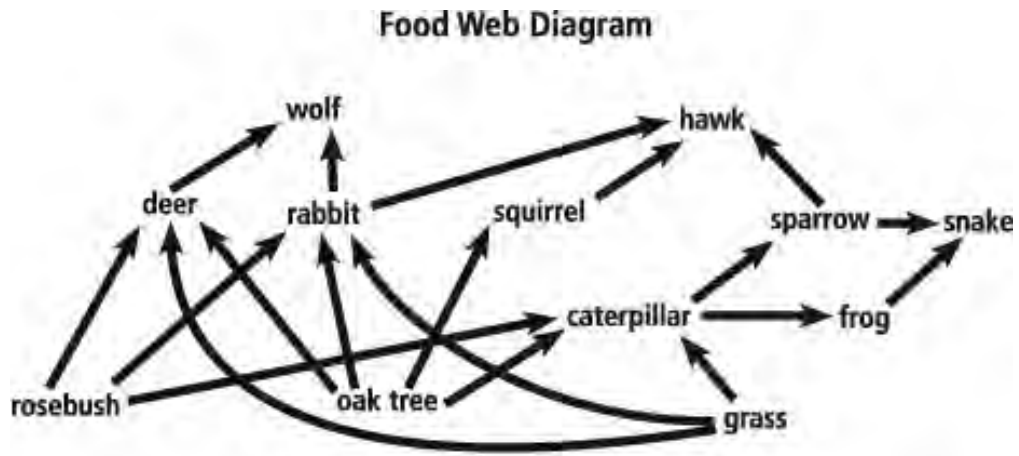
Use the diagram to answer questions 1 and 2.



1. In which direction does the energy flow in this food web?
 - (A) killer whale → seal → fish → tiny water plants
 - (B) fish → squid → penguin → fish
 - (C) tiny water plants → fish → seal → squid
 - (D) tiny water plants → fish → killer whale

2. Describe where the energy for this ecosystem comes from and how it is produced.

Use the diagram to answer questions 3 and 4.



3. How would you describe the wolf, hawk, and snake in this food web ecosystem?
- (A) carnivores
 - (B) herbivores
 - (C) omnivores
 - (D) producers
4. Which of the organisms in this food web are herbivores? What do they eat? Explain how you know.

Name _____ Date _____

Standards Review

5.PS.1

The amount of change in movement of an object is based on the weight of the object and the amount of force exerted.

Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t).

Earth pulls down on all objects with a gravitational force. Weight is a measure of the gravitational force between an object and the Earth.

Any change in speed or direction of an object requires a force and is affected by the weight of the object and the amount of force applied.

Read the summary statements below to review the main concepts of the content statement.

Motion occurs when an object changes its position. Forces, such as a push or a pull, cause changes in motion. These changes in motion may involve slowing down, speeding up, or changing direction. When a force such as a push is applied to an object in the direction that the object moves, its speed increases. If the force is applied in the opposite direction that the object is moving, the object slows down.

Speed is how fast or how slow an object moves. It tells how the position of an object changes during a certain period of time. Speed is measured in units of distance over time, such as meters per second (m/sec) or kilometers per hour (km/hr). To calculate speed, divide the distance traveled by the time. For example, if a car travels 60 miles in two hours, its average speed is 30 miles per hour. This can be shown as:

$$\text{distance} \div \text{time} = \text{speed}$$

$$60 \text{ miles} \div 2 \text{ hours} = 30 \text{ miles per hour}$$

If there are no forces acting on an object, its speed remains constant, and the object will continue to move in the same direction. When an object is not in motion, it is at rest. If there are no forces, such as pushes or pulls, acting on the object, it remains at rest.

Gravity is a force that pulls all objects toward Earth. The pull of gravity on an object is its weight. Objects of greater weight are not affected as much by forces such as pushes or pulls as objects of lesser weight.

When two objects traveling at different speeds move for the same amount of time, the faster object covers a greater distance. If an object's speed increases, it travels farther during each unit of time. For example, suppose a bicycle travels 20 miles in two hours. If the bicycle speeds up to 40 miles per hour, the distance it travels each hour doubles.

Standards Practice

5.PS.1

The amount of change in movement of an object is based on the weight of the object and the amount of force exerted.

Movement can be measured by speed. The speed of an object is calculated by determining the distance (d) traveled in a period of time (t).

Earth pulls down on all objects with a gravitational force. Weight is a measure of the gravitational force between an object and the Earth.

Any change in speed or direction of an object requires a force and is affected by the weight of the object and the amount of force applied.

Fill in the correct answer bubble or write your answer in the space provided.

Use this table to answer questions 1 and 2.

The table shows the times and distances run by four cars during a 200 km race.

Use the chart to answer each question.

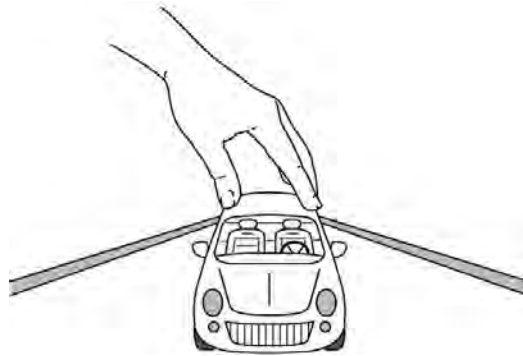
	Car A	Car B	Car C	Car D
Distance	80 km	90 km	120 km	150 km
Time	2 hours	2 hours	3 hours	3 hours

- If the cars continue to travel at the same distances per time as shown, which car do you predict will win the race? Explain why.

2. If Car A continues to travel at the same speed for the entire race, how long will it take for the car to cross the finish line from start to finish?

- Ⓐ 3 hours
- Ⓑ 4 hours
- Ⓒ 5 hours
- Ⓓ 6 hours

A group of students conduct an experiment. They use a rubber band to apply a force to a group of cars of different weights as shown in the diagram. Each time they pull back the rubber band the same distance. Then they measure the distance that each car travels.



3. Which statement **most likely** describes the results that the students may find in their experiment?

- Ⓐ All three cars will travel the same distance.
- Ⓑ The lightest car will travel the greatest distance.
- Ⓒ The heaviest car will travel the greatest distance.
- Ⓓ All three cars will change direction as they travel.

4. Study the illustration of the rowers. Use what you know about forces and motion to explain how the boat moves.



Standards Review

5.PS.2

Light and sound are forms of energy that behave in predictable ways.

Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted or absorbed.

Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound.

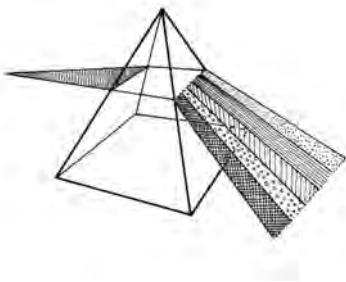
Read the paragraphs below to review the main concepts of the content statement.

Energy is the ability to cause changes in matter. Light and sound are two forms of energy. Light energy can travel through some types of matter, such as water and clear objects. It can also travel through empty space, like light from the sun does to reach Earth. Sound energy travels through different types of matter as waves. Sound energy is produced by vibrating objects. Light energy usually travels much faster than sound energy.

Light travels in a straight line until it strikes an object. Once the light strikes the object, it can react in different ways. Light is reflected when it strikes an object such as a mirror and bounces off in a different direction. If light strikes an object and is not reflected, it may be absorbed. When an object absorbs light, a shadow can form behind the object.

When an object absorbs light, the object may get warmer. The amount the temperature may increase depends on the intensity of light, the angle, and the period of time that the light strikes the object. You see colors because different colors of light are reflected or absorbed by objects. For example, an apple appears to be red because the red light that strikes the apple is reflected. Other colors of light are absorbed.

Light can also be refracted. When light refracts, it bends when it passes from one material to another, for example, from air into glass. A prism bends light into a rainbow of colors. A pencil placed in a glass of water appears to bend at the place where it enters the water.



When an object vibrates, it produces a sound, for example, the vibrating chords of a guitar. Sound waves travel out in all directions from a source. Unlike light, sound waves cannot travel through empty space. Sound waves travel through mediums such as liquids, gases, and solids. The speed of sound waves varies depending on the medium through which they pass. Sound waves travel much more slowly through air than through liquids or solids.

Sound varies in pitch and volume, or loudness. Pitch is the highness or lowness of a sound. Pitch changes with the speed of vibration. Objects that vibrate slowly produce low-pitched sounds such as the sounds of a tuba or string bass. Rapid vibrations produce the high-pitched sounds that you might hear from a flute.

Standards Practice

5.PS.1

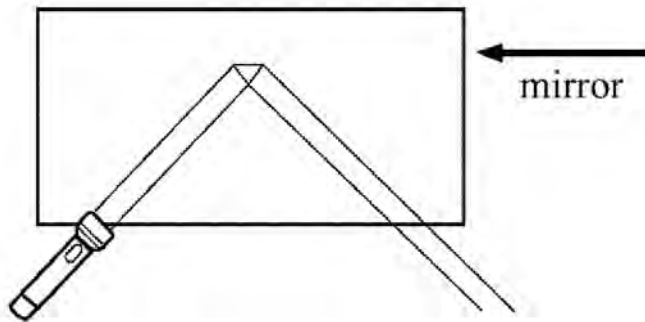
Light and sound are forms of energy that behave in predictable ways.

Light travels and maintains its direction until it interacts with an object or moves from one medium to another and then it can be reflected, refracted, or absorbed.

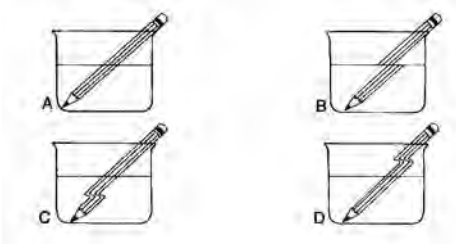
Sound is produced by vibrating objects and requires a medium through which to travel. The rate of vibration is related to the pitch of the sound.

Fill in the correct answer bubble or write your answer in the space provided.

1. Describe the property of light shown in the illustration.



2. Which of the diagrams below correctly shows the property of light known as refraction? Explain.



3. Which of the following would you expect to make a sound with a high pitch?

- (A) bird chirping
- (B) car horn
- (C) tuba
- (D) engine motor

4. Which of the following statements is **true** about sound?

- (A) Sound can travel through space.
- (B) Sound must travel through a medium.
- (C) Sound only travels in a straight line until it hits an object.
- (D) Sound travels at a much faster speed than light travels.

5. Through which medium would you expect sound to travel the most slowly?

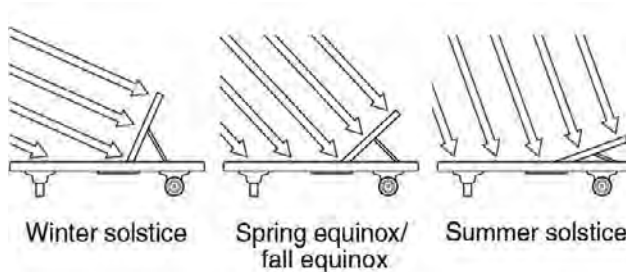
- (A) a foam pillow
- (B) an inflated balloon
- (C) a glass of orange juice
- (D) a container of molasses

Performance-Based Assessment Practice Test A

Complete the following tasks, and write your responses in the space provided. If needed, use an additional sheet of paper for your answers.

Use this diagram to answer questions 1–6.

The model shows midday sun rays in the Northern Hemisphere striking a lawn chair at different times of the year. The back of the chair is positioned to get the direct sunlight.



1. Describe the relationship between the position of the back of the chair and Earth's position in space during the seasons.

2. Explain why the back of the chair is in the same position for the spring equinox and for the fall equinox.

3. What is the relationship between the angle of the back of the chair and the angle of the direct rays of the sun during the fall and spring equinoxes?

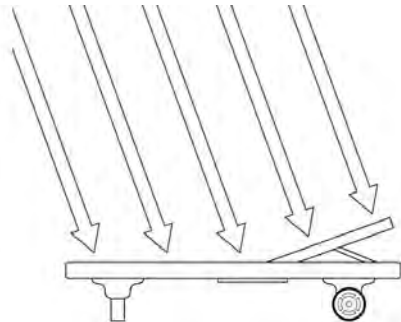
4. Which of the following factors determine how warm the chair will get while sitting in the sun? Mark all that apply.

- the amount of time the chair is in the sun
- the color of the chair
- the speed of the sun moving across the sky
- the material the chair is made of
- the angle at which light strikes the chair
- the height of the chair seat
- the temperature of the sun
- the time of day

5. Will the back or the seat of the chair get warm faster? How do you know?

6. The chair is blue. What happens to the light when it reaches the chair?

7. The front of this lawn chair is facing south. It is noon.



How will Earth's motion through the rest of the day affect the angle at which the sunlight strikes the chair?

8. Make two sketches to show the sunlight striking a chair in the midday and in the late afternoon. (Position the chair to be facing the sun in each sketch.)

9. Predict how the tilt of the chair's back will change between noon and sunset as the chair is moved to get the direct rays of the sun.

10. At what time of day will the back of the chair be closest to straight up?

11. Design an experiment that uses the angle of the back of a lawn chair that is facing the sun to find out if direct sunlight heats up an object to different temperatures at different times of the day.

12. Predict the results of the experiment.

Name _____ Date _____

Performance-Based Assessment Practice Test B

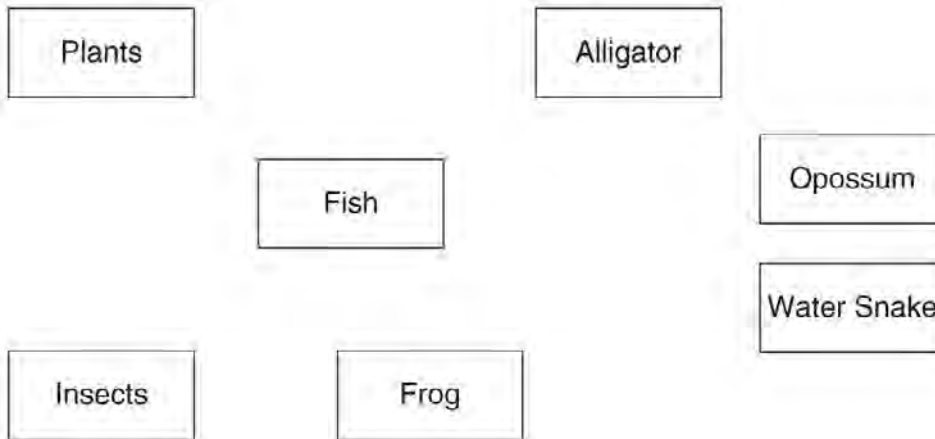
Complete the following tasks, and write your responses in the space provided. If needed, use an additional sheet of paper for your answers.

Use this table to answer questions 1–7.

Giovanni studied the eating habits of the inhabitants of a local swamp. He made this table of his observations.

Consumer	Food
alligator	fish, frog, opossum
water snake	fish, frog
opossum	insects, plants, water snake
fish	insects, plants
frog	insects
insects	plants

1. Draw arrows pointing from food to consumer. Complete a food web showing the relationships in the table.



2. Use the food web to classify each consumer. Complete the table.

Herbivore	Omnivore	Carnivore

3. What is the original source of energy for all of the members of this food web?

4. Which members of the food web will be consumed by decomposers?

5. What are all of the possible energy sources for the fish? How is the energy stored in the fish used by other organisms in this food chain?

6. Pollution in the area threatens the frog population. If the number of frogs declines, how might the food web be affected?

7. Describe the role plants play in this food web.

Use this diagram to answer questions 8–10.

Zena is doing an experiment to determine how changing the weight on her rope swing affects the motion of the swing.



Zena will use a spring scale to measure the force needed to start the swing moving. Then she will count the number of times the swing moves back and forth before stopping and how many seconds are needed from the time the swing starts moving to the time it stops.

8. Place a check next to the variables Zena should keep constant for each trial of her experiment.
- the angle the swing is pulled back
 - the weight on the swing
 - the length of the swing rope
 - the distance that the swing is pulled back
 - the time needed for the swing to stop
 - the force used to pull the swing back
 - the scale used to measure force
 - the number of times the swing moves back and forth

9. Set up a table to record the data.

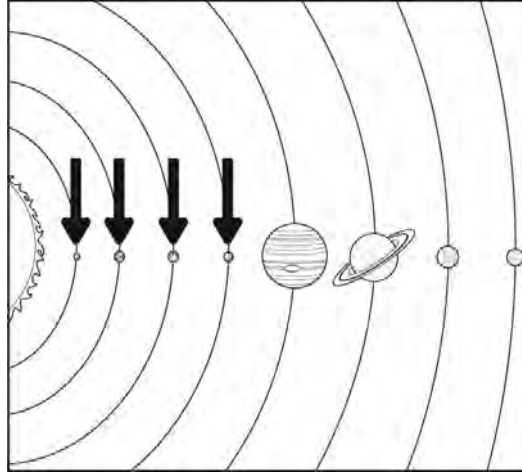
10. Describe how Zena can use the data to determine the effect of weight on the motion of her swing.

Name _____ Date _____

End-of-Year Assessment Practice Test A

Fill in the correct answer bubble, or write your answer in the spaces provided.

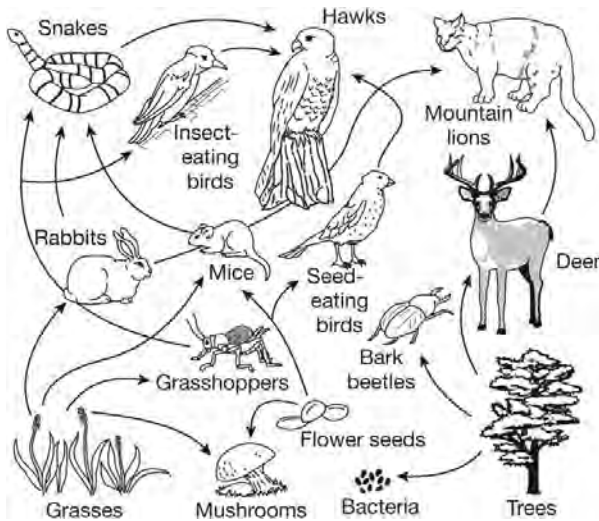
1. The diagram below represents the eight planets of the solar system.



Which of the following best describes the planets indicated by the arrows?

- (A) dense composition, gaseous surfaces
- (B) multiple moons, liquid cores
- (C) rocky surfaces, ring systems
- (D) thin atmospheres, solid cores

The food web diagram below represents the feeding relationships in an ecosystem. Use this diagram to answer questions 2 and 3.



2. Which organisms are the decomposers in this ecosystem?

- (A) bacteria, flower seeds
- (B) bacteria, mushrooms
- (C) grasses, trees, flower seeds
- (D) grasses, trees, mushrooms

3. Describe two things that might happen if the population of grasshoppers and bark beetles were to suddenly disappear from this ecosystem.

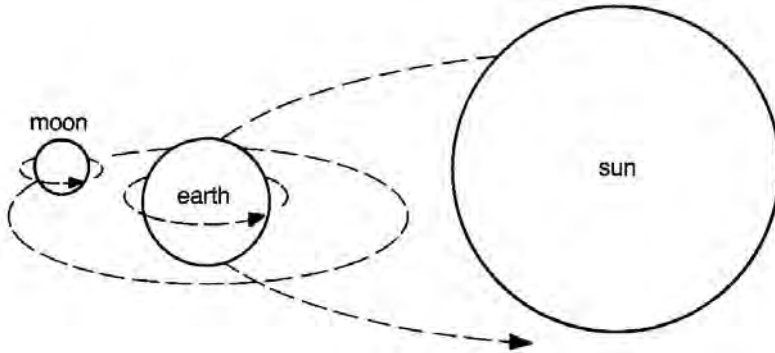
4. A student launches four equal-sized rocks of different weights one at a time from a slingshot and records the distances in the table below. Each time the student launches the rocks, she pulls the slingshot back a distance of exactly 25 cm.

	Granite	Mica	Pumice	Sandstone
Weight	57.0 g	35.0 g	42.0 g	49.0 g
Distance traveled	3.3 m	5.8 m	?	4.2 m

Based on the student's data, how far do you predict the pumice will travel?

- Ⓐ between 4.2 and 5.8 m
- Ⓑ between 3.3 and 4.2 m
- Ⓒ less than 3.3 m
- Ⓓ more than 5.8 m

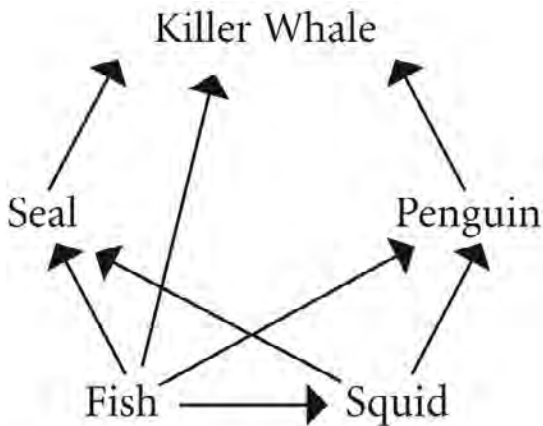
Refer to the diagram of the orbital paths of Earth and the moon to answer questions 5 and 6.



5. Contrast the orbits of Earth and the moon.

6. What role does gravity play in the orbits of Earth and the moon?

7. Study the food web of the marine ecosystem. The arrows show the path of energy through the food web. All food webs begin with a producer. The producer of the food web is missing. Fish are the primary dependent of this marine ecosystem producer. Draw or write where the producer belongs. Describe its role in the ecosystem.

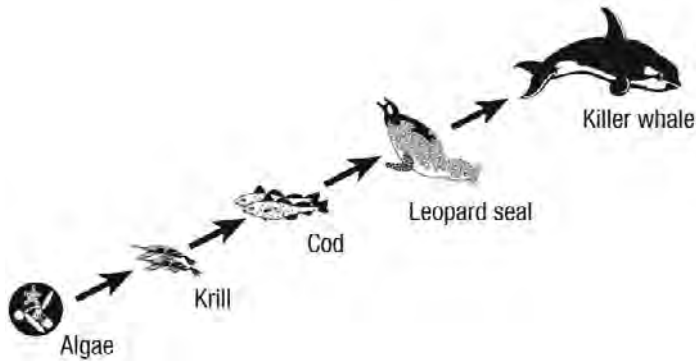


8. Suppose the cyclist in the picture is in a race. The cyclist is traveling at a speed of 22 kilometers per hour and is 110 kilometers from Paris. If he continues to travel at that same rate, how long will it take for him to reach Paris?



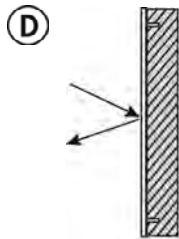
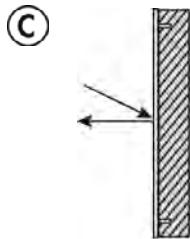
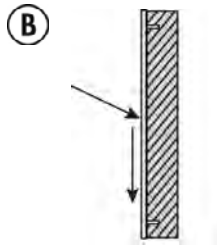
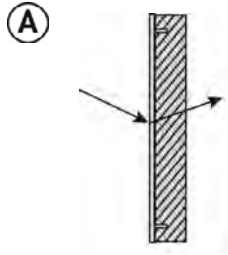
- (A) 4 hours
 - (B) 5 hours
 - (C) 6 hours
 - (D) 7 hours
9. The sun, like other stars, is a hot ball of gases. These gases produce energy and light. Describe why the sun looks different from other stars.

10. Which of the following is a true statement about how the organisms in this marine food chain get their energy?



- (A) Cod obtain their energy from leopard seals
- (B) Krill obtain their energy directly through photosynthesis.
- (C) Algae obtain their energy directly through photosynthesis.
- (D) Leopard seals obtain their energy from killer whales.

11. Which of the following diagrams best illustrates refraction of light?



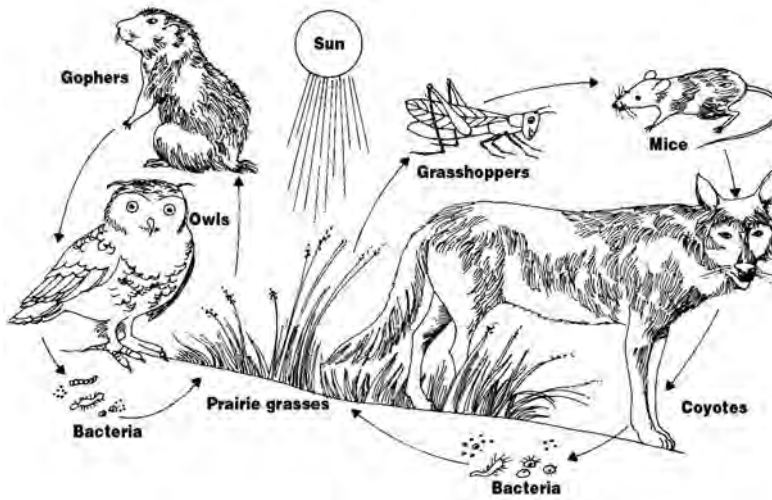
12. Analyze the data in the table to answer the question.

Average Annual Temperatures for Columbus, Ohio				
	Winter	Spring	Summer	Fall
Average High Temperature	11 °C	27 °C	29 °C	18 °C
Average Low Temperature	-7 °C	5 °C	18 °C	-3 °C

Which of the following explains the difference in average temperatures between winter and summer in Columbus Ohio?

- Ⓐ Earth is farthest from the sun in winter and receives less direct sunlight.
- Ⓑ Earth is closest to the sun in summer, and its axis is tilted toward the sun.
- Ⓒ The Northern Hemisphere has more hours of daylight in the summer and receives more direct sunlight.
- Ⓓ The Northern Hemisphere has more hours of daylight in the winter and receives more direct sunlight.

The diagram below shows a prairie food web. Use the diagram to answer questions 13 and 14.



13. Which term best describes the coyote in this ecosystem?

- (A) carnivore
- (B) herbivore
- (C) decomposer
- (D) omnivore

14. What is the source of energy for the grasshoppers?

- (A) bacteria
- (B) mice
- (C) prairie grasses
- (D) sun

Four trains are traveling to Columbus, Ohio. To reach Columbus, they each need to travel 400 km. The table shows the current distance each train has traveled and the elapsed time since they began their trip. Use the chart to answer questions 15 and 16.

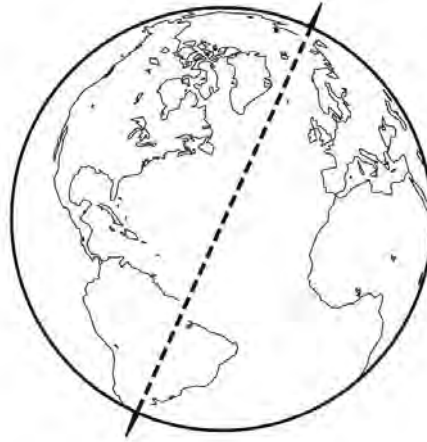
	Train A	Train B	Train C	Train D
Distance travelled	130 km	150 km	280 km	215 km
Elapsed time	2 hours	3 hours	4 hours	5 hours

15. If all the trains left at the same time, which train do you predict will arrive at Columbus first? Explain your answer.

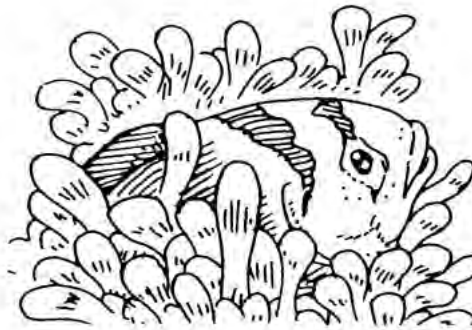
16. If Train A travels at the same rate for the entire distance, about how long will it take to travel the 400 km to Columbus?

- A 5 hours
- B 6 hours
- C 7 hours
- D 8 hours

17. Label the position of the sun in the following diagram of Earth to demonstrate daytime in North and South America.



18. This clownfish has a layer of mucus on its scales that makes it immune to the sting of the sea anemone. The anemone has tentacles that it uses to capture prey. The clownfish hides from its predators in the sea anemone's tentacles. In return for safety, the clownfish lures prey to the sea anemone and removes parasites from the sea anemone. Which of the following best describes the relationship between the sea anemone and the clownfish?



- (A) commensalism
- (B) mutualism
- (C) parasitism
- (D) tropism

19. Sounds differ in pitch and rate of vibration. Which of the following is true about the pitch and the rate of vibration of a bird's chirping?
- (A) The bird's chirp will have a high pitch and low rate of vibration.
 - (B) The bird's chirp will have a high pitch and high rate of vibration.
 - (C) The bird's chirp will have a low pitch and low rate of vibration.
 - (D) The bird's chirp will have a low pitch and high rate of vibration.

Analyze the table below to answer questions 20 and 21.

Planet	Average density (g/cm ³)	Radius (km)	Revolution in Earth Years
Earth	5.5	6,371	1
Jupiter	1.3	69,911	11.9
Mars	3.9	3,390	1.9
Mercury	5.4	2,440	0.24
Neptune	1.6	24,622	165
Saturn	0.69	58,232	29.5
Uranus	1.3	25,362	84.3
Venus	5.2	6,052	0.615

20. What is generally true about the time it takes a planet that is closer to the sun to revolve around the sun, compared to the time it takes a planet that is farther away from the sun?

21. The outer planets are sometimes called "gas giants." How does data in the table support this?

22. The statements below describe feeding relationships in a food chain.

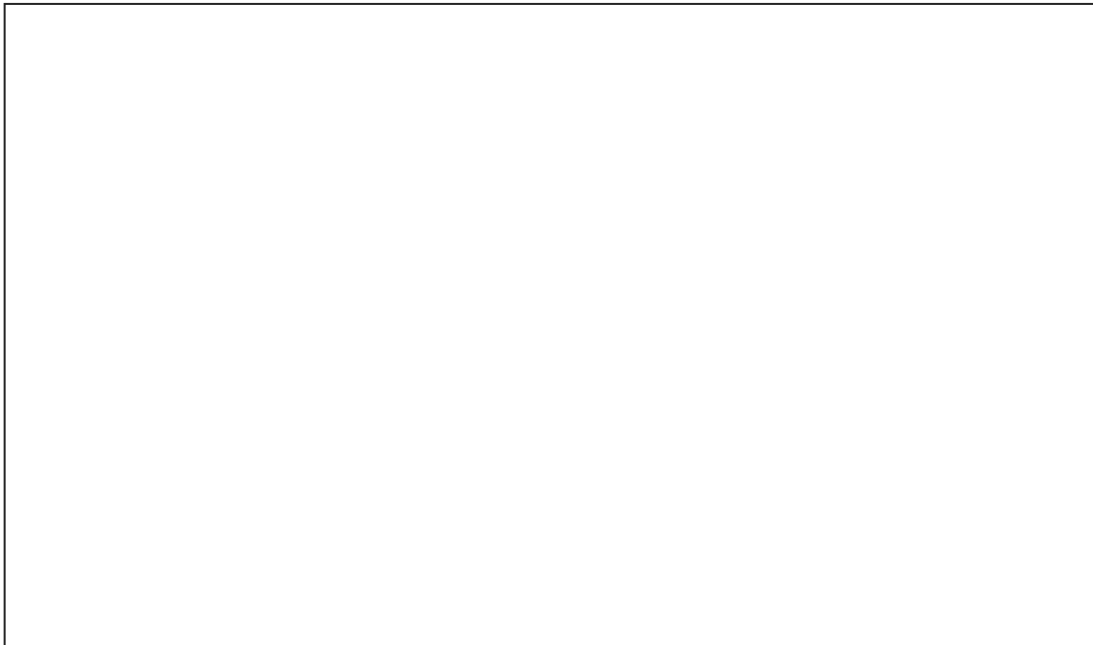
A **caterpillar** is an herbivore.

Photosynthesis occurs in **grasses**.

A **fox** is a carnivore.

A **bird** is both prey and predator.

Use the information to draw a diagram that shows the flow of energy through this food chain.

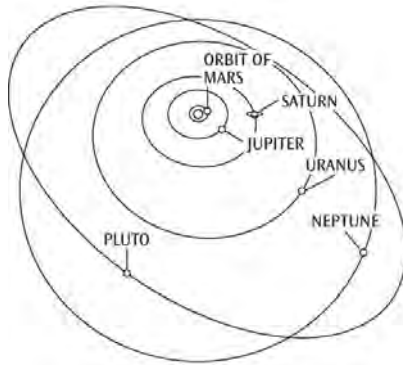


23. A student covered six boxes with different-colored paper. The student then placed a thermometer in each box and placed the boxes in the sun for several hours. Then the student recorded the temperature of the thermometers in the data table. What might the student conclude about light exposure and temperature from the data?

Temperature of Different-Colored Boxes	
Green	23°C
Yellow	20°C
Blue	23°C
Red	24°C
Black	25°C
White	19°C

24. Which of the following explains why the student sees the color of the green paper?
- (A) Only green light is reflected by the paper.
 - (B) Only green light is absorbed by the paper.
 - (C) Only green light is refracted by the paper.
 - (D) Only green light is compressed by the paper.

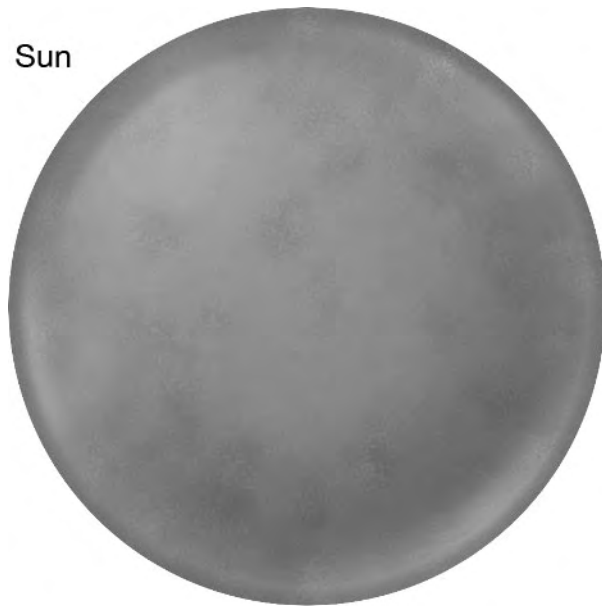
25. Which of the following is a true statement about Pluto?



- (A) Pluto is one of the gas giant planets.
 - (B) Pluto is the planet that is closest to Uranus.
 - (C) Pluto is the ninth planet of the solar system.
 - (D) Pluto is a dwarf planet found in the region of the Kuiper Belt.
26. The table shows the speed of sound as it travels through various objects. Write at least two inferences based on the data.

Speed of Sound through Various Objects (m/s)	
Material	Speed of Sound (m/s)
Glass	4,540
Air	350
Water	1,450
Aluminum	6,320

27. Which of the following represents an accurate comparison of the size of Earth and the sun?



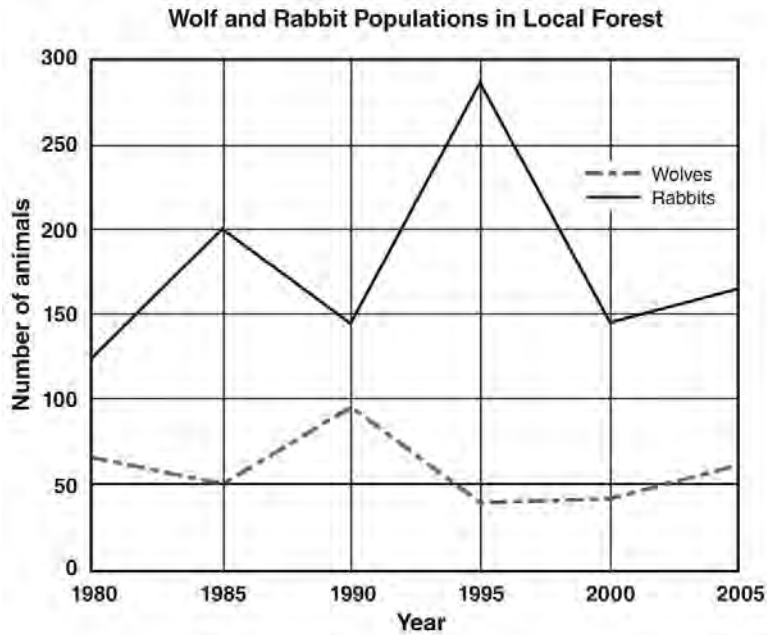
28. The table below shows all of the feeding relationships in an ecosystem.

Animal Feeding Habits	
Animal	Organisms It Feeds On
wolf	rabbit, deer
caterpillar	oak tree, rosebush, grass
hawk	rabbit, squirrel, sparrow
deer	oak tree, rosebush, grass
snake	sparrow, frog
rabbit	oak tree, rosebush, grass

Which of the following shows how energy flows through a food chain in this ecosystem?

- (A) grass → rabbit → deer
- (B) oak tree → snake → wolf
- (C) oak tree → squirrel → snake
- (D) rosebush → rabbit → hawk

29. The graph shows the changes in the populations of wolves and rabbits in an ecosystem over a period of time.



Which statement best describes the relationship of wolves and rabbits between the years 1985 and 1990?

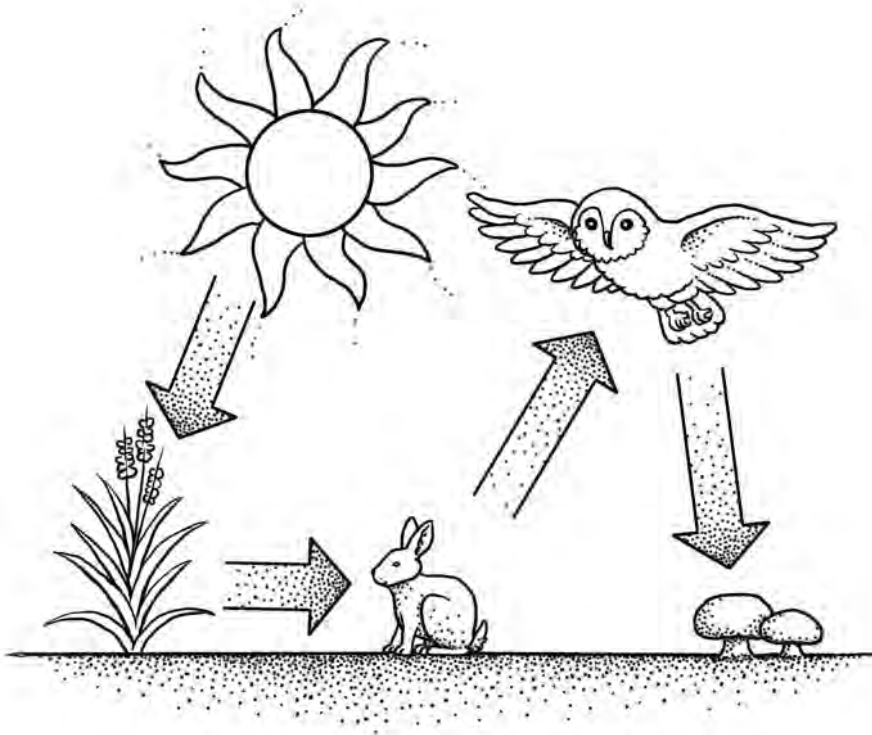
- (A) As the wolf population increased, the rabbit population decreased.
- (B) As the wolf population decreased, the rabbit population increased.
- (C) As the wolf population increased, the rabbit population stayed the same.
- (D) As the wolf population increased, the rabbit population decreased and then increased.

30. The illustration shows a basketball player bouncing a ball. Draw arrows to show the force of the floor acting on the ball. Label the arrow A. Then draw an arrow to show the force of the player's hand on the ball. Label the arrow B.

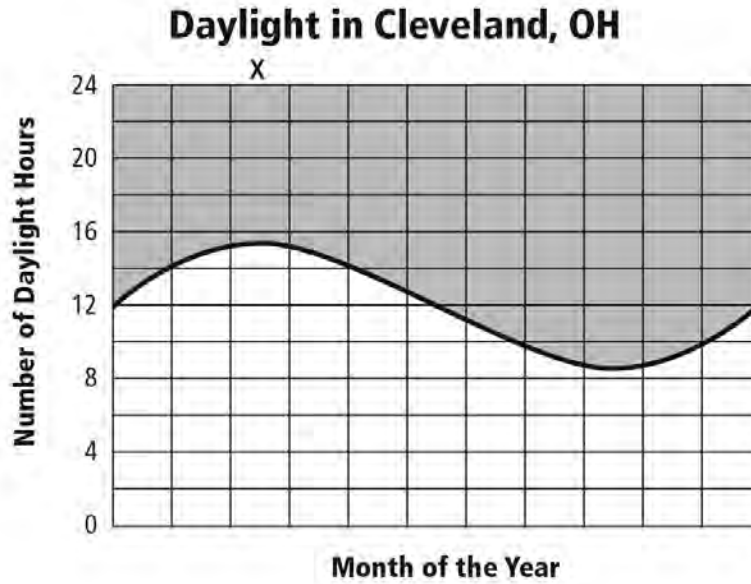


31. Which of the following explains why the sun appears larger than the other stars in the sky?
- (A) It is the star closest to Earth.
 - (B) It is much larger than other stars.
 - (C) It has more solar flares than other stars.
 - (D) It is much brighter than the nearest star.

32. Name and describe the process by which energy enters the organisms in the ecosystem shown by the diagram.



33. The graph below shows the number of daylight hours for one year in Cleveland, Ohio. Which of the following represents the point on the graph below the X?

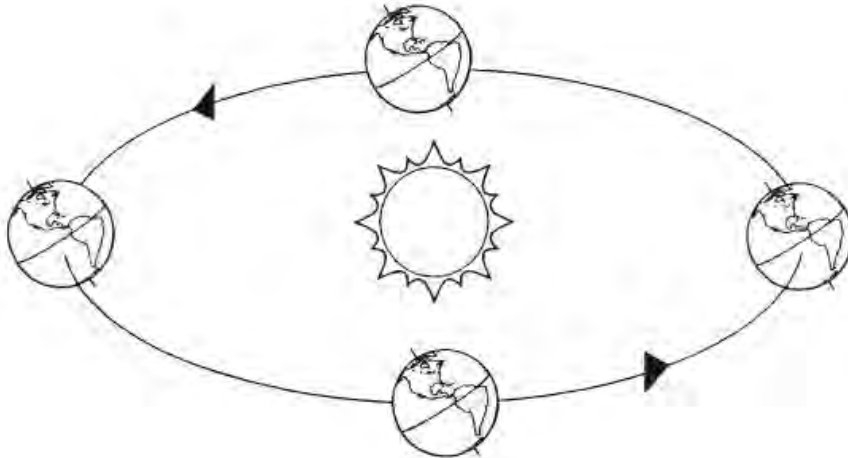


- (A) fall equinox
- (B) summer solstice
- (C) spring equinox
- (D) winter solstice

34. Which of the following best explains what happens to the soccer ball as a result of the force that was applied in the picture?



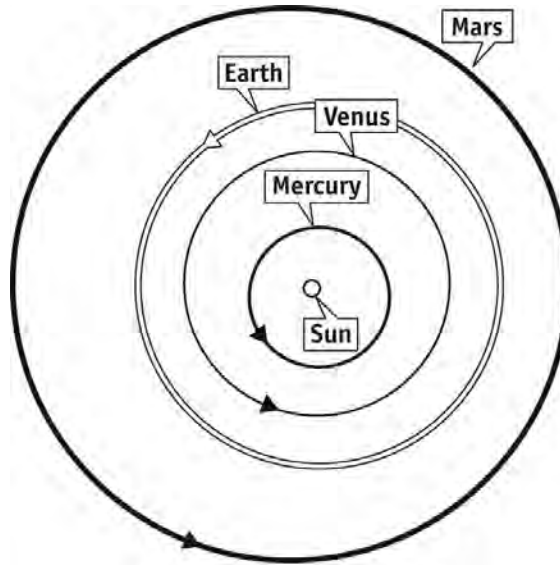
- (A) The ball stops moving.
 - (B) The ball changes size.
 - (C) The ball changes mass.
 - (D) The ball changes position.
35. Label the image of Earth that is experiencing summer in the Southern Hemisphere.



End-of-Year Assessment Practice Test B

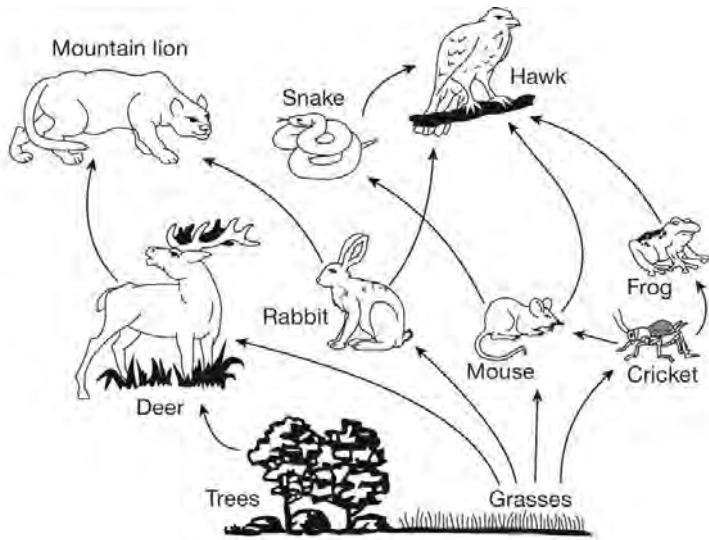
Fill in the correct answer bubble, or write your answer in the spaces provided.

1. Which of the following best describes the planets shown by the diagram?



- (A) few moons, gaseous surfaces
- (B) liquid water, ring systems
- (C) rocky surfaces, solid cores
- (D) thick atmospheres, small diameters

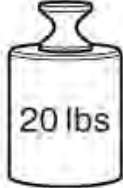



The food web below shows the feeding relationships among some forest animals. Use the diagram to answer questions 2 and 3.



2. Describe three paths that show how energy is transferred to the mountain lion.

3. Draw a circle around the two animals that prey upon the mouse.

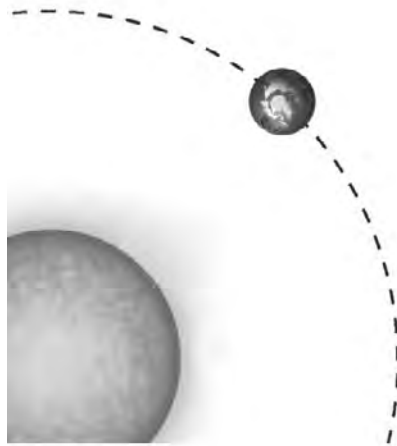
4. The table shows the force that is being applied to each of the weights shown.

A	B	C	D
 30 N	 30 N	 30 N	 30 N

Which weight do you predict will have the greatest change in motion?

- (A) Weight A
- (B) Weight B
- (C) Weight C
- (D) Weight D

The image below is a diagram of Earth's orbit around the sun. Use the diagram to answer problems 5 and 6 below.



5. Draw an arrow that represents the pull of the sun's gravity on Earth. Label the arrow A. Then draw an arrow that represents Earth's motion in space. Label the arrow B.

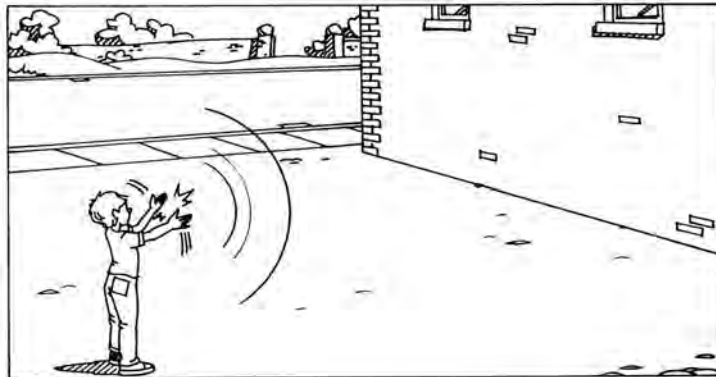
6. Explain how you would change the diagram to accurately represent the size of Earth compared to the size of the sun.

7. Each diagram below represents a symbiotic relationship. Which one best represents commensalism?

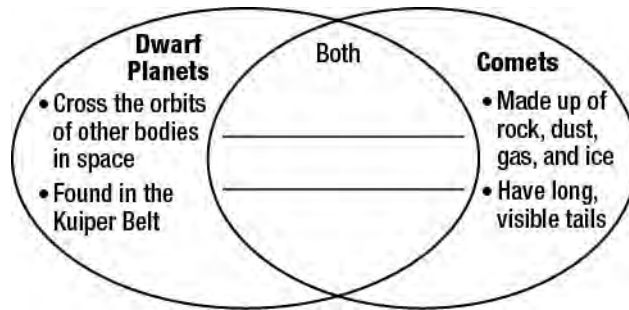


- (A) ant/acacia
- (B) cow/sheep
- (C) orchid/tree
- (D) tapeworm/dog

8. In the illustration, when the boy claps his hands and the clapping sound hits the wall, what happens to the sound?



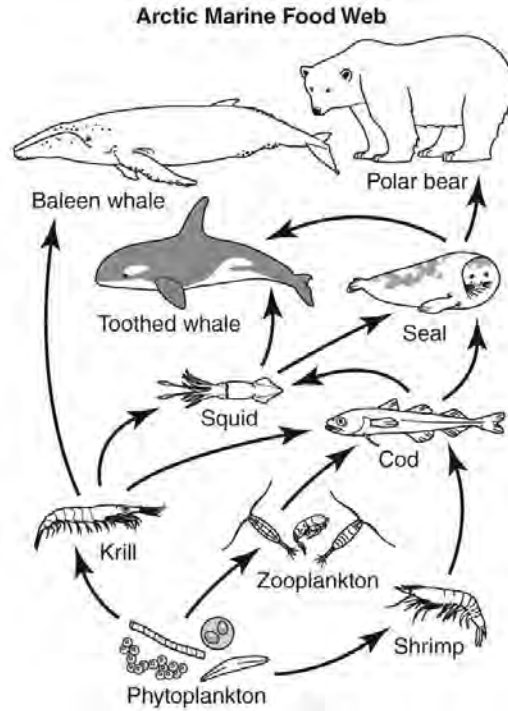
9. The Venn diagram below shows a comparison between comets and dwarf planets.



Which of the following best completes the center of the diagram?

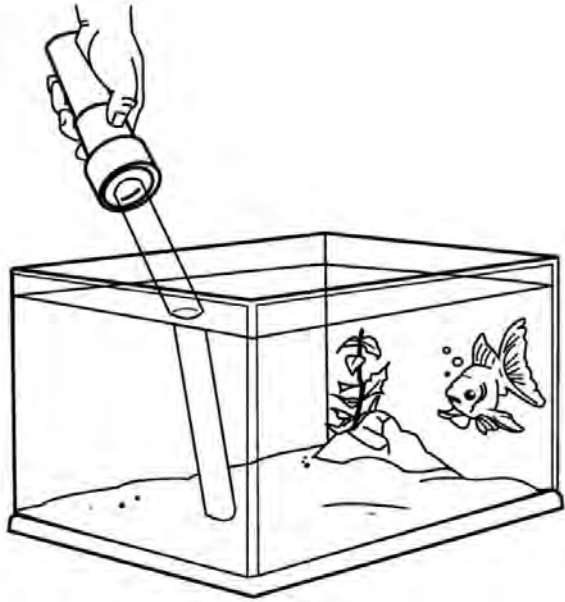
- (A) located at the edge of the Kuiper Belt
- (B) revolve around the sun in elliptical orbits
- (C) burn up when entering Earth's atmosphere
- (D) frozen surfaces turn into gases when nearing the sun

10. What are the primary energy sources for the squid in this marine ecosystem?



- (A) cod/krill
- (B) krill/zooplankton
- (C) seal/toothed whale
- (D) zooplankton/shrimp

11. Name and describe the property of light that is illustrated in the diagram.



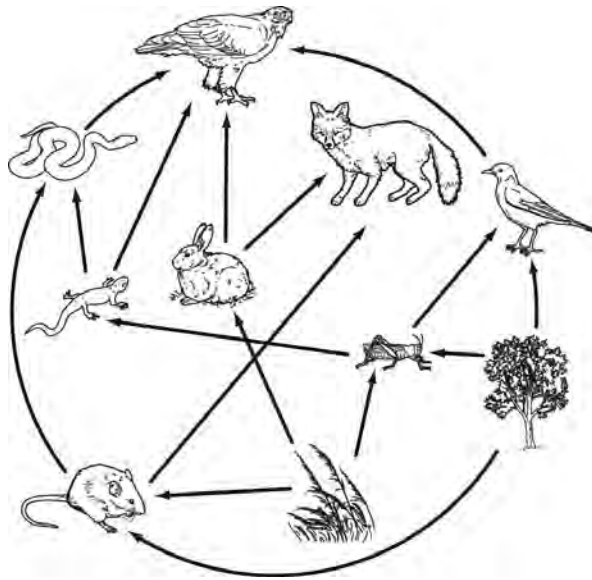
12. A stake was placed in the ground, and data were gathered about the lengths of its shadows and the temperature at its location over the period of one year. The stake was in the same position during the observation period. The data can be found in the table below.

Length of Shadow at Noon	Average Temperature
2 feet, 5 inches	25 °C
3 feet, 9 inches	6 °C
3 feet, 2 inches	20 °C
2 feet, 11 inches	19 °C





Based on the data, what season can you infer it was when the length of the shadow was 2 feet 5 inches and the average temperature was 25 °C?

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

Study the food web of the forest ecosystem. Use the diagram to answer questions 13 and 14.



13. Which animal is an omnivore?

- (A) 
- (B) 
- (C) 
- (D) 

14. What is the source of energy for the producers in this ecosystem?

- (A) grasses
- (B) nutrients
- (C) soil
- (D) sun

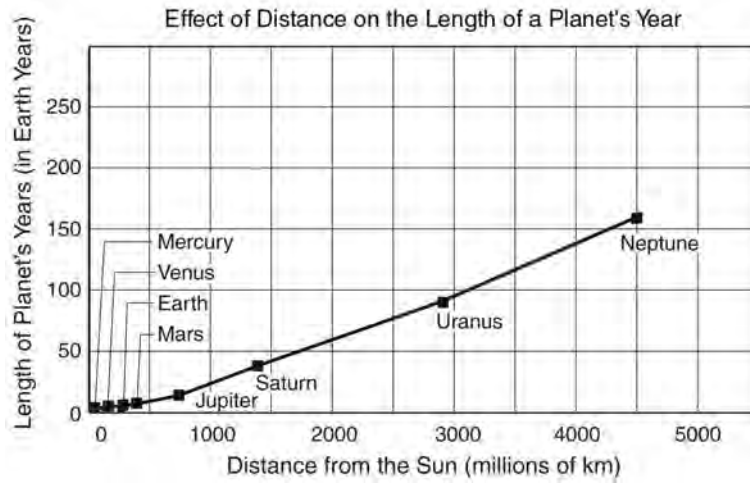
15. A plane flies from Chicago to Mexico City in 4 hours. What is the speed of the plane?

Miles Between Some Cities

From	To	Mileage
Montreal	Washington, D.C.	489 mi.
Chicago	Mexico City	1,690 mi.
Los Angeles	Chicago	1,745 mi.
Moscow	Cairo	1,803 mi.
Montreal	Madrid	3,448 mi.
Moscow	Washington, D.C.	4,876 mi.
Los Angeles	Cairo	7,520 mi.

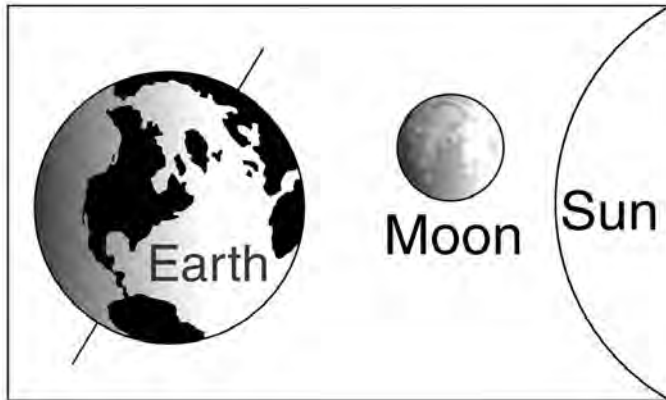
- (A) 422.5 mph
(B) 960.2 mph
(C) 4,225 mph
(D) 6,760 mph

16. What conclusion can you draw from the data in the graph?

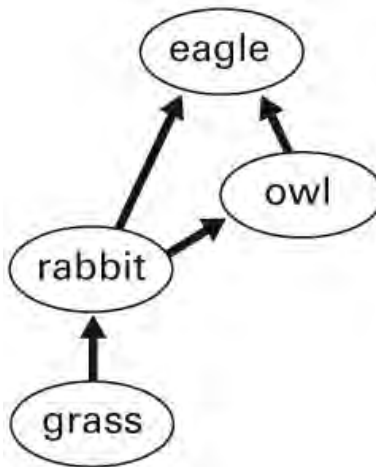


- Ⓐ A planet's period of rotation increases as the distance from the sun increases.
- Ⓑ A planet's period of revolution increases as the distance from the sun increases.
- Ⓒ The gravitational pull of the sun increases as the distance from the sun increases.
- Ⓓ The gravitational pull of the sun decreases as the distance from the sun increases.

17. Label the diagram below to illustrate which part of Earth is experiencing day and which part is experiencing night.



18. The food web shows the interaction of some animals in a forest ecosystem. Suppose a group of coyotes moves into the ecosystem. Draw how the coyotes might interact in this food web.



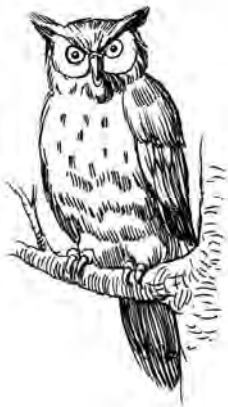
19. What pitch and rate of vibration is most likely made by the sound of the instrument shown?



- Ⓐ high pitch, high rate of vibration
 - Ⓑ high pitch, low rate of vibration
 - Ⓒ low pitch, high rate of vibration
 - Ⓓ low pitch, low rate of vibration
20. A student notices that the sun appears to move across the sky from dawn until dusk. Which of the following explains the sun's apparent motion?
- Ⓐ Earth's revolution
 - Ⓑ Earth's tilt on its axis
 - Ⓒ Earth's gravitational pull
 - Ⓓ Earth's rotation on its axis

21. A student has three identical toy dump trucks. The student investigates the effect of weights on the distance the trucks travel. The student places a 50 g weight in one of the trucks and launches the truck with a rubber band that is attached between two posts. The student repeats the procedure with the second truck and a 100 g weight and then with the third truck and a 200 g weight. Each time, the student pulls the rubber band back the same distance. Predict the results of the investigation. Explain your predictions.

22. Show the flow of energy through a food chain using the objects/organisms below. Use arrows to show the direction of energy.



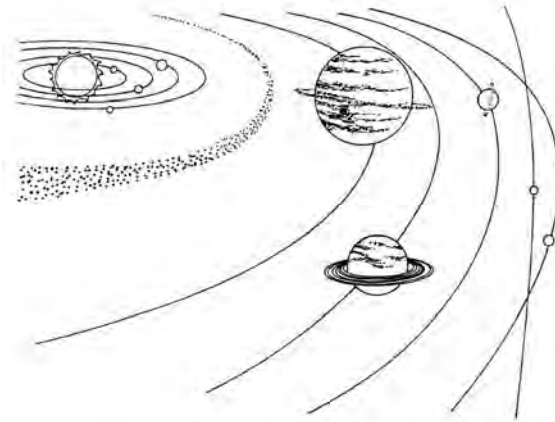
23. Label each picture with one of the following: producer, herbivore, carnivore



24. A student performs an experiment with colored cellophane paper and light. The student covers a flashlight with blue cellophane. The student then shines the flashlight on a red piece of paper. The paper appears black. Which of the following explains the result of this investigation?

- (A) The blue light is absorbed, and no light is reflected.
- (B) The blue light is reflected, and no light is absorbed.
- (C) The blue light is refracted, and no light is absorbed.
- (D) The blue light is absorbed, and black light is reflected.

25. Which of the following statements can be supported by the diagram?



- (A) The inner planets are all too hot to harbor life.
- (B) Only some planets of the solar system rotate.
- (C) Asteroids orbit the sun in the area between the inner and outer planets.
- (D) The outer planets are found in the region known as the Kuiper Belt.

26. Describe three things that may happen when the sound from this tuning fork reaches a medium.



27. The table below shows the feeding relationships in a grassland ecosystem.

Animal Feeding Habits	
Animal	Organisms it feeds on
elephant	grasses, trees, shrubs
cheetah	giraffe, gazelle, zebra
gazelle	grasses, trees, shrubs
lion	hyena, gazelle, zebra
zebra	grasses, trees, shrubs
hyena	gazelle, giraffe, zebra

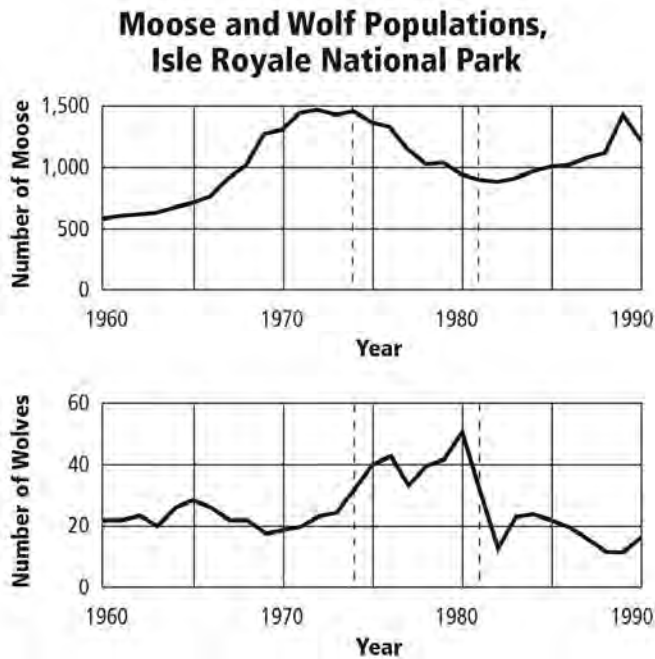
Which of the following illustrates how energy flows through a food chain in this ecosystem?

- (A) grasses → zebra → cheetah
- (B) shrubs → elephant → gazelle
- (C) trees → cheetah → lion
- (D) grasses → zebra → elephant

28. How is the composition of the sun similar to the planets shown in the diagram?



29. Which describes the relationship between the wolf and moose populations from the period of years between 1980 and 1990?



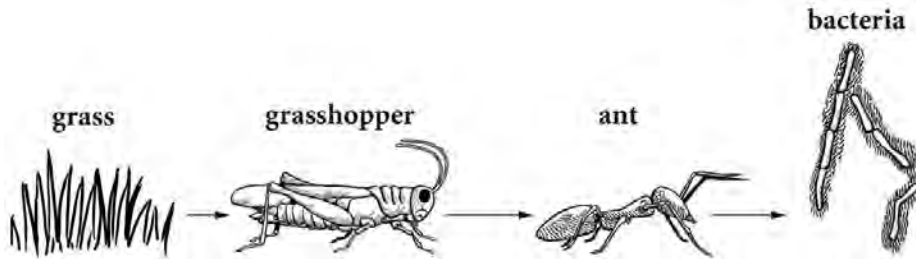
- (A) As the wolf population increased, the moose population decreased.
- (B) As the wolf population decreased, the moose population increased.
- (C) As the wolf population increased, the moose population increased.
- (D) As the wolf population decreased, the moose population decreased.

30. Draw an arrow to show how the direction of the ball changes once the force of the bat is applied.



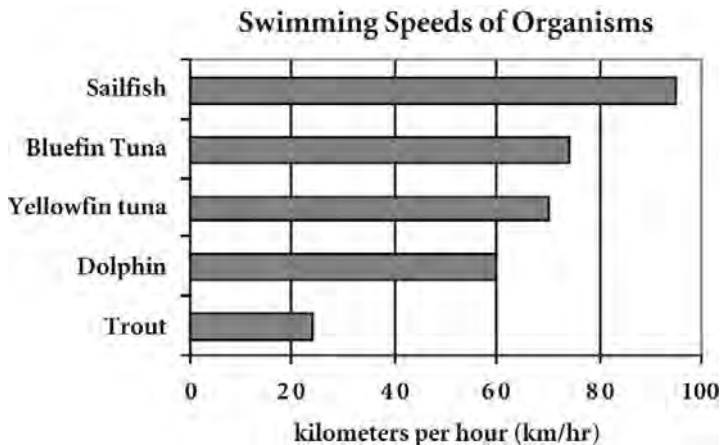
31. Stars vary in size, brightness, temperature, and color. A scientist calculated that two stars in the sky have the exact same brightness in space, but one star appears brighter from Earth. Which of the following explains why?
- Ⓐ The brighter star must be cooler.
 - Ⓑ The brighter star must be smaller.
 - Ⓒ The brighter star is closer to Earth.
 - Ⓓ The brighter star is farther from Earth.

32. Which organism in this food chain gets its energy through the process of photosynthesis?



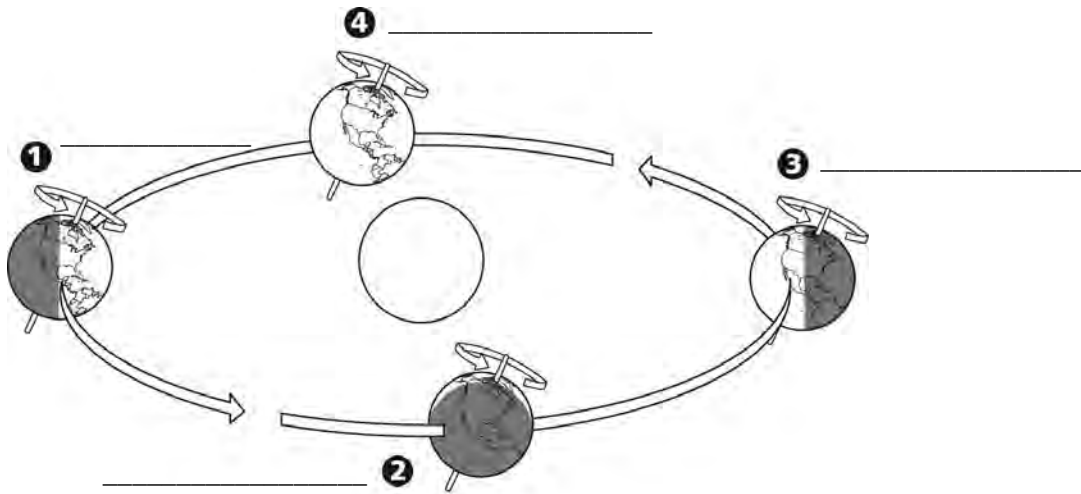
- (A) ant
- (B) bacteria
- (C) grass
- (D) grasshopper

33. Below is a table that shows the swimming speeds of various organisms. Suppose the dolphin swims at a constant speed. How long will it take the dolphin to travel 90 km?



- (A) 2 hours
- (B) $1 \frac{1}{2}$ hours
- (C) $1 \frac{1}{4}$ hours
- (D) 1 hour

The image below is a model of Earth's orbit around the sun. Use the diagram to answer problems 34 and 35.



- 34. Label each of Earth's positions in space from 1 to 4 with the correct season in the Northern Hemisphere.
- 35. Explain how you identified the seasons.
