Directions:

**Daily Directions**
1. Read each passage.
2. Complete the following comprehension questions.
3. Students should complete approximately 5-6 pages per day.

Note- The work increases difficulty throughout the week.

Contact Information:

**Teacher Contact Information**

**School Contact Information**
How Do Eclipses Occur?

Phases of the Moon

The moon is a satellite of Earth. A satellite is an object that orbits a planet. Scientists have made artificial satellites that orbit Earth.

The moon is Earth’s natural satellite. Earth’s gravity keeps the moon in its orbit around Earth. Together, Earth and its moon orbit the sun.

The moon does not give off its own light. Instead, the moon reflects the light of the sun. The sun lights the half of the moon that is facing it. As the moon orbits Earth, different parts of the moon’s near side are lit by the sun. That is why the moon’s shape seems to change from night to night. Each different shape of the moon is called a phase of the moon. Phases change in a cycle that repeats about once a month.

<table>
<thead>
<tr>
<th>New Moon</th>
<th>Full Moon</th>
<th>Last Quarter</th>
</tr>
</thead>
</table>

The Moon

<table>
<thead>
<tr>
<th>Temperature (at the equator)</th>
<th>Noon: 127°C (260°F)</th>
<th>Night: -173°C (-279°F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rotation</td>
<td>27 days, 7 hours, 43 minutes</td>
<td></td>
</tr>
<tr>
<td>Revolution (time to orbit around Earth)</td>
<td>27 days, 7 hours, 43 minutes</td>
<td></td>
</tr>
</tbody>
</table>

Lunar Eclipse

When an object blocks a path of light, a shadow forms. Earth’s shadow has two parts. The umbra is the darkest part of the shadow. The penumbra is the lighter part. It surrounds the umbra.

A lunar eclipse occurs when the moon passes through Earth’s shadow. Earth is between the sun and the moon and blocks the sun’s light from reaching the moon’s surface.
There are three types of lunar eclipse. A total lunar eclipse occurs when the whole moon passes through the umbra. A partial lunar eclipse occurs when part of the moon passes through the umbra. A penumbral eclipse occurs when the moon passes only through the penumbra.

**Solar Eclipse**

Sometimes the moon blocks the sun’s light and casts a shadow. The moon’s shadow also has an umbra and a penumbra.

A solar eclipse occurs when the moon passes between Earth and the sun. The moon blocks the path of the sun’s light and casts a shadow on Earth. In a full or partial solar eclipse, the moon’s shadow covers only a small part of Earth’s surface.

During a total solar eclipse, the sky gets dark as the moon moves in front of the sun. The corona is a shining ring of light from the sun’s outside edge. It is all you can see of the sun during a total eclipse.

**Planetary Transits**

Sometimes a planet passes between the sun and Earth. This is called planetary transit. From Earth, only Venus and Mercury have planetary transits because they are the only two planets between Earth and the sun.

Planetary transits occur much less often than eclipses. Why? It takes much longer for a planet to orbit the sun than it does for the moon to orbit Earth.
How Do Eclipses Occur?

Write answers to the questions on the lines below.

1. Why does the moon appear to change shape from night to night?

2. What are the two regions of Earth’s shadow during an eclipse?

3. What part of the sun is visible during a total solar eclipse?

4. What is planetary transit?

5. From Earth, what two planets have planetary transits?

6. Main Idea Explain the difference between a solar eclipse and a lunar eclipse.
7. **Vocabulary** Define the terms *umbra* and *penumbra*.

8. **Reading Skill: Sequence** The word *wane* means "to decrease gradually in power or intensity." Sketch and label four of the waning moon phases starting with a full moon.

9. **Critical Thinking: Analyze** Explain why you won’t see the moon at night during its new moon phase.

10. **Inquiry Skill: Infer** A transit of a certain planet is never visible from Earth. What can you infer about the orbit of that planet around the sun?

11. **Test Prep** What would you observe in a location where the moon’s penumbral shadow falls on Earth?
   - A a partial lunar eclipse
   - B a partial solar eclipse
   - C a planetary transit
   - D a full moon
What Causes Tides?

Tides

At low tide, a beach may be very wide. Six hours later, the beach may be very narrow. At high tide, ocean waves may cover the beach.

A tide is a daily change in the level of the ocean along a coast. Every seashore in the world is affected by tides. Tides are caused mainly by the moon's gravity. The moon is much smaller than Earth. But it still has gravity that pulls on Earth's oceans. The pull of the moon's gravity, with the pull of the sun's gravity, causes tides to rise and fall.

Tides cause the ocean to stick out, or bulge, on the sides of Earth facing toward and away from the moon. Each is called a tidal bulge. As Earth rotates, different parts of its surface are under tidal bulges. The pull of the moon's gravity is strongest on a tidal bulge that is facing the moon. The pull is weakest on the side of Earth farthest away from the moon.

Most ocean shores have two high tides and two low tides. Two times each day, the water along the shore rises. Two times each day, the water falls. During ebb tides, the water level drops from high to low. During flood tides, the water level rises from low to high. The times of high tides and low tides are different each day.

The cycle of tides changes in other ways, too. Sometimes the sun, the moon, and Earth are all in a line. When this happens, the sun and the moon pull on Earth in the same direction. This causes a spring tide. Spring tides usually have higher high tides and lower low tides than normal. Spring tides happen during the full moon and new moon phases.
Sometimes the moon and the sun pull on Earth from different directions. When the sun and the moon are at right angles to Earth, tidal bulges become smaller. This causes a neap tide. Neap tides occur during the first quarter and third quarter phases of the moon.

### Tracking the Tides

The tidal range is the difference between the water level at high tide and the water level at low tide. The shape of the land and the depth of the water affect a place’s tidal range.

The Bay of Fundy, in Canada, has the greatest tidal range on Earth. The bay is shaped like a funnel. This shape gives the Bay of Fundy its tidal range of 50 feet. Each day, the water level at high tide is 50 feet higher than the water level at low tide.

Other places have lower tidal ranges. Grand Isle, Louisiana, has a tidal range of only 1 foot. It has only one high tide and one low tide each day. People who live or work near the coast must be aware of the tide cycle. Tide charts tell them when high tides and low tides will occur.
What Causes Tides?

Write answers to the questions on the lines below.

1. What are the bulges of the oceans at the sides of Earth facing toward and away from the moon called?

2. How often do most ocean shorelines experience two high tides and two low tides?

3. What tides are produced when the sun, the moon, and Earth are all in a line?

4. What tides are produced when the sun and the moon are at right angles to each other relative to Earth?

5. What is the difference in the water level between high tide and low tide called?

6. What two things affect a location’s tidal range?

7. Main Idea What are tides and how are they caused?
8. Vocabulary  Write a sentence using the terms *tidal range*, *spring tides*, and *neap tides*.

9. Reading Skill: Cause and Effect  Sometimes, an area experiences extra-high tides and extra-low tides. What causes this?

10. Critical Thinking: Apply  The moon’s mass is about 1.2 percent of Earth’s mass. If the moon were less massive, what would the effect be on Earth’s tidal bulges?

11. Inquiry Skill: Compare  Is the difference between high and low tides greater for spring tides or neap tides? Explain.

12. Test Prep  Tides that are receding from high tide to low tide are
   A  ebb tides.
   B  flood tides.
   C  spring tides.
   D  neap tides.
What Are Static and Current Electricity?

Electric Charges

Remember that all matter is made of atoms. Atoms are the basic building blocks of matter. They are very tiny. Yet atoms are made of even smaller particles. Two of these are protons and electrons. They carry electric charges. Protons carry positive charges, and electrons carry negative charges.

Look at the chart. A positive and a negative charge attract, or move toward, each other. Two positive charges repel, or move away from, each other. Two negative charges also repel each other. They attract or repel without touching. Charged particles and the forces among them are the source of electricity. Electricity is the movement or interaction of electric charges.

The word *static* means "at rest." Static electricity is a buildup of electric charges. The charges in static electricity are not moving.

To see static electricity at work, rub a balloon against a carpet. Then put the balloon next to a wall. The balloon will stick to the wall. This happens because the rubbing knocks electrons from the carpet to the balloon. The balloon now has a negative charge. It will attract the positive charges on the wall.

The force between two charged things is called electrostatic force. This force is greater when the charges of the objects are greater and when many charges are close together.

Current electricity happens when charges are moving. Current electricity is the continuous net flow of electric charges from one place to another. The electric charges in current electricity are usually electrons, which move through a circuit, or closed loop. A switch turns the circuit on and off. A power source, such as a battery, sends electricity moving through the wires. Resistors change electrical energy to light or heat.
Volts and Amperes

Batteries supply voltage, the electric potential energy per unit charge. The greater a battery’s voltage, the greater the electric current it can supply to the circuit. Voltage is measured in units called volts. The unit of measure for electric current is the ampere.

Types of Circuits

Electric circuits can be put together in different ways. In a series circuit, charges flow along one path and pass through each resistor. The current will stop if one of the resistors, such as a light bulb, breaks. The voltage is divided among the bulbs, so they are not very bright. Each receives only some of the voltage.

In a parallel circuit, electric charge can flow along more than one path. If a resistor in the circuit breaks, the charge can still flow along the other paths. The resistors in each pathway receive the full voltage of the circuit. So bulbs in a parallel circuit are all quite bright.

DC and AC

There are also different kinds of electric currents. Direct current, or DC, flows in one direction only. Direct current is produced by batteries and by some generators, which are machines that change energy into electricity.

In alternating current, or AC, the charges move rapidly back and forth through the circuit. Electricity delivered to homes is alternating current. Transformers are machines that are used to increase or decrease voltage.

Electric Circuits in the Home

How does current enter a home? Power plants send high voltage electricity through power lines. Transformers near homes decrease the voltage to a safe level. The low-voltage current travels to a circuit box inside a house. This box controls the flow of electricity to different circuits.

Wall switches and electric outlets are used in a house to control the flow of electricity. When a switch is turned on, electric current flows to a device. In most homes, the circuit box contains switches called circuit breakers, which open a circuit when too much current is flowing through it. This stops current from flowing and making circuits too hot.

Conductors and Insulators

A conductor is any material that allows electric charges to pass through it easily. Water and most metals are good conductors. A material that does not conduct electricity well is called an insulator. Wood, rubber, and plastic are insulators. The power cords of lamps are made of copper wire conductors wrapped in plastic or rubber insulation. This keeps the electricity flowing safely inside the wire.
What Are Static and Current Electricity?

Write answers to the questions on the lines below.

1. What does the word static mean?

2. What is the unit of measure for electric current?

3. Which circuit above would still have current flowing even if one of the resistors breaks?

4. Why would light bulbs in circuit A be dimmer than bulbs in circuit B?

5. How do circuit breakers prevent circuits from overheating?

6. What devices can reduce high-voltage current to safer, low-voltage current before it is used?
7. **Main Idea** What is the difference between static electricity and current electricity?

8. **Vocabulary** Write a sentence about electrical current using the terms conductor and insulator.

9. **Reading Skill: Compare and Contrast** How are direct current and alternating current alike? How are they different?

10. **Critical Thinking: Apply** A hair dryer that is plugged into an electric outlet is lying in a puddle of water. What would happen if you tried to pick up the dryer? Explain your answer.

11. **Inquiry Skill: Research** Is it possible for a circuit to be connected both in series and in parallel? Explain.

12. **Test Prep** Which statement describes the electrostatic force between two charged objects?
   - A It is greater when two objects are farther apart.
   - B It is greater if two objects have the same charge.
   - C It is greater when the charges of the objects are greater.
   - D It is zero if the charges of the objects repel one another.
Chapter 1
Earth's Place in the Universe

Standards Covered: 6-MS-ESS1-1, 6-MS-ESS1-2, 6-MS-ESS1-3

Essential Questions:
- What is the Sun's role in the solar system?
- What is the difference between planets and plutoids?
- How do stars and planets differ in motion?
- What is a constellation?

Key Term Activity at the end of the chapter

Our Solar System

The Sun is at the center of our solar system. Despite its massive size, the Sun is a star, not a planet. It looks different than the stars you see in the night sky. The tiny lights twinkling in the sky are a contrast to the bright, yellow Sun. The reason is not that the Sun is genuinely different, but because of the Sun's distance from Earth.

The distance from the Earth to the Sun is 92.96 million miles. That's a long way for something that seems so close. If you flew to the Sun in a regular airplane, it would take 19 years to reach it. The Sun feels closer because of the warmth we can feel on Earth. Most of the stars, like the Sun, are millions of miles away. The light of many stars, including the Sun, takes a long time to reach the Earth. The time is based on their distance from the Earth. The farthest star you can see in the night sky is V762 in the constellation Cassiopeia at 16,308 light-years away (or 9.58686 x 10^16 miles). The Sun you see now is about eight minutes old because that is how long it takes for the Sun's light to reach the Earth. The closest stars to Earth are Alpha Centauri A and B, which are 4.22 light-years away (2.4808 x 10^13 miles).

The Solar System

Our solar system is the part of our galaxy which revolves around the Sun. The Sun is the center of our solar system. The objects in our solar system revolve (move) around the Sun. The Sun's gravitational force keeps the planets revolving in a regular pattern. This gravitational force is the attraction that any object of mass has for other objects. The Sun's huge mass gives it a tremendous gravitational force. The force of gravity has a significant impact on many aspects of the solar system.

Each object in the solar system uniquely revolves around the Sun. Their paths are called orbits. The shape of an orbit depends on the size of the object. The orbit of a planet is slightly oval (almost circular). Other objects in the solar system have elliptical orbits.
Planets and Other Objects

The largest objects in the solar system are planets. Objects are called planets when they have enough mass to have gravity. The force of gravity makes a planet rounder over many millions of years. Dwarf planets are much smaller than other planets in the solar system. Their gravitational force is also lower. This means they are less round than familiar planets like Earth and Mars. In 2008, scientists developed a new category for objects in the solar system, plutoids. This category is based on planetary shape and orbit. Plutoids must be round. They must also revolve around the Sun in orbit beyond Neptune. Pluto and Eris are now considered plutoids.

The planets in our solar system are shown in Figure 1.3.

Looking at this figure, you should notice three important things:

1. **The Sun is much larger than anything else in our solar system.** It has the most mass. This mass means it has the largest amount of gravitational pull in the solar system. The result is that everything in our solar system revolves around it.

2. **Our solar system has eight planets.** Pluto and Eris are plutoids. Ceres is a unique object and may be the only one of its kind.

3. **The first four planets are much smaller than the last four planets.** The first four planets called terrestrial planets (Mercury, Venus, Earth, and Mars) make up the inner planets. The outer planets are called Jovian planets or Gas Giants (Jupiter, Saturn, Uranus, and Neptune).
Class Discussion

Science changes a lot. There are many times when scientists do not agree. This is part of the nature of science. Many scientists disagree over what to call Pluto. When Pluto was discovered in the 1930s, it was called a planet. Then it was called a dwarf planet. Now, it is called a plutoid.

In small groups, discuss what you think Pluto should be called. Why do you think scientists need to change the classification of objects in the solar system? What factors might scientists use to classify objects? What role do scientific instruments (like telescopes and probes) play in the classification of objects in our solar system?

Science Journal

Objective: Use Figure 1.3 to make a model of the solar system. Be sure your model correctly shows the size and location of the twelve recognized objects in our solar system. You can use objects like marbles, Ping-Pong balls, tennis balls, pasta, foam, or wads of paper for your model.

The Motion of Stars vs. Planets

Because stars are very far from Earth, their movements are not noticeable to us on Earth. The stars appear to remain in the same positions relative to each other. You can think of the stars as a background of lights in the night sky. The planets can be seen moving against the backdrop of stars. The stars will also "move" in constellations, but more slowly.

Planets cannot be seen at the same time each night or even all the time. Each planet moves at a different speed. Whether they can be seen depends on where they and the Earth are in their orbits. If you look at the night sky for several nights, you should be able to spot a planet by its movement. Because the planet is close to Earth, it appears to move very fast. It changes its position in the sky each night.
Look at Figure 1.4. This picture shows the motion of Mars from 6/15/05 to 3/15/06. You can see how it moves while the constellations (Pisces, Cetus, Taurus, and Perseus) remain in place for that short period.

![Figure 1.4 Motion of Mars, March to April 2005](image)

The **North Star** marks true north in the Northern Hemisphere (the northern half of the planet). Each night, the entire sky can be seen rotating around the North Star. The North Star, also called **Polaris**, is almost directly overhead if you are standing anywhere in the Northern Hemisphere. People in the Southern Hemisphere cannot see the North Star.

**Galaxies and Constellations**

A **galaxy** is a vast system of stars. The shape of a galaxy results from the location of the stars. Stars are not spaced evenly, so the shape of a galaxy can be a little strange. Most of the stars visible in the night sky are located in other galaxies.

Our galaxy is the **Milky Way Galaxy**. It is a flattened disk of billions of stars. Our Sun is just one of those stars. It is located on an outer arm of the galaxy.

![Figure 1.5 Milky Way Galaxy](image)
We can see our galaxy from Earth. It looks like a milky band of stars in the night sky. This band divides the night sky in half. All the other stars that we see are from different galaxies very far away.

We built our first map of the stars using just our eyes. These maps were of the constellations. A constellation is a group of stars that form an imaginary shape. For example, the constellation Leo is named for the shape of a lion. The North Star is part of the constellation is called "the Little Dipper."

As the entire sky appears to move each night, constellations appear to move with it. That means the night sky looks different from month to month. The constellations can be seen for a few months at a time. They move in a predictable pattern across the sky. The position of stars relative to each other stays the same, so when it is visible, a constellation can always be recognized. In other words, the shapes of the constellations never change. Ancient people used the constellations to measure time, so they knew when to plant crops and when to harvest. For example, when the constellation Orion became visible in northern regions, they knew winter was coming. Early sailors used constellations for navigation. Because they sailed close to shore, they measured the height of constellations from the horizon (where the land or sea meets the sky). Out on the ocean, Christopher Columbus experimented with using constellations to navigate.

Science Journal

**Objective:** Observe the difference between planets and constellations in the night sky.

**Notes:** Summarize what you know about planets and constellations.

**Data:** With an adult, find a constellation in the sky in the early evening. Try to find a planet. Then look for them again a few hours later. Write the time of each observation and its location in your journal. Draw your own "map" of the night sky.

**Summary:** Describe how the constellation and the planet moved.

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**Practice 1: Our Solar System**

1. What is the distance between the Sun and the Earth?
   - A  88 million miles
   - B  92.96 million miles
   - C  100.98 million miles
   - D  72.87 million miles
Chapter 1 Earth's Place in the Universe

2. What keeps the planets revolving around the Sun?
   A  magnetic fields
   B  the Sun's polarity
   C  gravitational force
   D  the moons of each planet

3. Explain why the Sun feels closer to Earth even when it's millions of miles away.

4. Which phrase best describes the Milky Way?
   A  a round disk of stars
   B  a vortex of stars
   C  a black hole of stars
   D  a flattened disk of stars

5. Describe the difference between a plutoid and a dwarf planet.

6. Which of the following is not a terrestrial planet?
   A  Mars
   B  Neptune
   C  Venus
   D  Mercury

**Essential Questions:**
- What are the moon's phases?
- What causes day and night?
- What happens during a lunar eclipse?

**The Moon's and Earth's Rotation**

**Phases of the moon**
Most of the planets in our solar system have moons. Moons are smaller objects that revolve around a planet. Moons revolve around the planet to which they are closest. They are smaller than their planet.
They are caught by planet's gravitation pull. Some planets have no moons. Some planets have many. For example, Jupiter has 63 moons. Earth's moon, Luna, is our only moon.

As the moon revolves around the Earth, its shape appears to change. These changes are called phases of the moon. The phases of the moon are produced by the alignment of the moon and the Sun. Earth's shadow does not cause them. This is a common misunderstanding. Earth's shadow causes lunar eclipses. We see an eclipse when our view of the moon or Sun is blocked. The Earth's shadow has nothing to do with the moon's phases. The side of the moon facing the Sun reflects sunlight. Therefore, the moon is illuminated. The part of the moon visible to us depends on the moon's position relative to Earth.

**Moon Phases**

On its journey from new moon to full moon, the moon is **waxing**. Waxing means it looks bigger. It is moving farther away from the Sun. We can see more of its surface because it is farther from the Sun, and more light is being reflected. As it moves from the full moon back to the new moon, it is **waning**. This means it looks smaller. It is moving closer to the Sun. We see less of its surface because the angle between the Sun and moon is very small and less light is reflected. Look at Table 1.1 to better understand the phases of the moon.
Chapter 1 Earth's Place in the Universe

The positions of the Sun and Luna determines the phase of the moon. Follow Table 1.1 and Figure 1.6 as we describe the positions of the moon and Sun for the four major phases.

<table>
<thead>
<tr>
<th>Position</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase</td>
<td>new</td>
<td>first quarter</td>
<td>full</td>
<td>third quarter</td>
</tr>
<tr>
<td>Visibility</td>
<td>tiny crescent</td>
<td>half moon</td>
<td>full</td>
<td>half moon</td>
</tr>
</tbody>
</table>

*Table 1.1 Phases of the moon*

The angle between the Sun and moon changes with each phase. It is smallest at the new moon. This is position 1 in Figure 1.6.

During the new moon, the moon is almost directly between the Sun and the Earth, so no light can be reflected for us to see. At first quarter (position 2), the moon is half full. It has moved 1/4 of the way around its orbit.

At full moon (position 3), the moon shines the brightest and is completely lit. It is the farthest from the Sun and is 1/2 of the way around its orbit. You can see from Figure 1.6 the entire surface of the moon is exposed to sunlight. So, lots of light is reflected. Finally, at last quarter (position 4), the moon is 3/4 of the way around its orbit. Again, it appears half full in the sky. The moon increases its brightness from right to left. It increases until the moon reaches full. Then, the bright part decreases from right to left until the new moon. There is about a week between each major phase of the lunar cycle. So, there are 7 to 8 days between the new moon and first quarter, between first quarter and full moon, and so on.

How the Earth moves in space may seem unimportant. You might think it doesn't affect you very much, but it affects you every day and every night. You see, how the Earth moves in space determines days, nights, and seasons. This is because of the Earth's relationship with the Sun. An eclipse occurs when one object in space casts a shadow on another object. A lunar eclipse happens when the Earth comes between the Sun and the moon. The shadow of the Earth falls on the moon, because the Earth is in a position where it blocks the light from the Sun. When the moon passes between Sun and Earth, the lunar shadow is seen as a solar eclipse on Earth.

The gravity of the moon impacts the ocean tides. The ocean waves bulge out towards the direction of the moon's pool. As the Earth rotates, the tides are pushed and pulled. When the moon waxes and wanes, it affects the high and low tides. A high and low tide happens once each day.
Rotation Causes Day and Night

The Earth rotates (spins) around an imaginary line called an axis. The axis goes from the North Pole through the Earth to the South Pole. It is like a spinning top. If you have ever spun a toy top around, you probably noticed that it spins around on a fixed point, or on its axis. As it rotates, it wobbles. It is a lot like the Earth's rotation on its axis.

The shape of the Earth is a sphere. As the Earth rotates, different parts of the Earth face the Sun at different times. The part of the Earth that is facing the Sun is experiencing daytime. The part that is facing opposite the Sun is in darkness. This part is experiencing nighttime. The locations experiencing day and night change as the Earth rotates. It takes the Earth 24 hours to make one complete rotation. Therefore, one day is equal to 24 hours.

On sunny days, you can see your shadow clearly on the ground. Do you notice that at different times of day your shadow gets larger or smaller? The position of the Sun increases or decreases the size of shadows. If you go outside at 12:00 pm, you will see that your shadow is tiny. This is because the Sun is at its peak height in the sky. Your shadow will get larger as the Sun makes it way towards the horizon. If you go outside before or at sunset, you will see that your shadow is large. As a fun experiment, go outside at noon and sunset and look at the size of your shadow. Figure 1.9 diagrams the position of the Sun and the length of the shadows.
Most recently, on August 21, 2017, a full solar eclipse happened. During a solar eclipse, the moon passes in front of the Sun. The shadow during a solar eclipse is cast by the Sun, like a crescent moon shape. If you look at the ground during a solar eclipse, you can see a crescent and half-moon shaped shadows on the ground. The light during an eclipse passes through any openings in the environment. A shadow band is a light which moves in wave pattern during an eclipse.

Revolution Causes Seasonal Changes

The Earth revolves in a fixed orbit around the Sun. It takes Earth 365 days to make one trip around the Sun. Therefore, one year is equal to 365 days.

Earth's axis is not straight up and down. It is inclined or tilted. The axis always points toward the North Star. The tilt of the axis causes the Sun's rays to strike the surface of the Earth at different angles. This is the reason we experience different seasons in a year. If Earth's axis were not inclined, there would be no change of seasons.
Figure 1.11 shows the relationship between the Earth and the Sun throughout the year. Notice how Earth’s axis always points in the same direction in its orbit. In this figure, the size of the Earth is enlarged to help you learn about the tilt of the Earth’s axis.

Sometimes the Earth’s axis is tilted toward the Sun. This is when it is summer in the Northern Hemisphere. During summer, the hours of daylight are longer than the hours of nighttime. The increased sunlight makes temperatures warmer. It is hotter during the summer than in the winter.

During the same time, the Southern Hemisphere is pointing away from the Sun. The decreased sunlight means that part of the Earth experiences cooler temperatures. It is experiencing winter.

When the axis is tilted away from the Sun, it is winter in the Northern Hemisphere. During winter, the hours of nighttime are longer than the hours of daytime.

When the Earth is halfway between summer and winter in its revolution, it is fall or autumn in the Northern Hemisphere. When it is halfway between winter and summer, it is spring in the Northern Hemisphere. During fall and spring, the length of day and night is nearly equal.

### Journal Activity

**Objective:** Describe the seasons on Earth where you live.

**Notes:** Summarize what you know about Earth’s revolution and its axis to explain the seasons.

**Summary:** Write a short paragraph or draw a picture describing each season in your hometown.

### Practice 2: The Moon’s and Earth’s Rotation

1. If the lit part of the moon is getting larger, it is
   A waxing.
   B waning.
   C a full phase.
   D in the third quarter.

2. The Earth _________ on its axis one time every 24 hours, producing day and night.
   A revolves
   B rejuvenates
   C rotates
   D changes orbit

3. The Earth _________ around the Sun one time every 365 days.
   A revolves
   B rotates
   C rejuvenates
   D changes orbit
Chapter 1 Earth's Place in the Universe

4. Explain what happens to the Sun and Earth during a solar eclipse.

5. When the Earth's axis is tilted away from the Sun in Louisiana, the season there is
   A summer.
   B winter.
   C spring.
   D fall.

6. At what time of day is a person's shadow the largest?
   A 12:00 p.m.
   B 6:00 p.m.
   C 9:00 a.m.
   D 3:00 a.m.

Chapter 1 Key Term Activity

Fill in the blank with the correct word.

<table>
<thead>
<tr>
<th>luna</th>
<th>waxing</th>
<th>waning</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sun</td>
<td>gravitational force</td>
<td>Milky Way</td>
</tr>
<tr>
<td>solar system</td>
<td>solar eclipse</td>
<td></td>
</tr>
</tbody>
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Understanding the 1. __________________________ is knowing how the gravitational force works. The closest star to our planet is the 2. __________________________. Because of 3. __________________________, planets orbit the Sun. The galaxy we live on, called the 4. __________________________, is where our Earth resides.

Another important part of the solar system is moons. Our moon is called 5. __________________________. Our moon goes through phases. When the moon is 6. __________________________, it is going from the new moon to the full moon. On the journey from the full moon to the new moon, the moon is 7. __________________________. One last fact to know is when there is a 8. __________________________, the moon passes through the Earth's shadow.

Key terms are defined in the book's glossary. Answers to Key Term Activities and review tests are found in the Teacher's Guide.