

# 1 How Does the Earth Move?

## LESSON GOALS

You will learn

- how the earth's rotation causes nighttime and daytime.
- how the earth moves around the sun.
- what causes the seasons.

**axis** (ak'sis), an imaginary line through a spinning object.

**rotation** (rō tā'shən), one full spin of an object around an axis.

A ball spins on an axis.

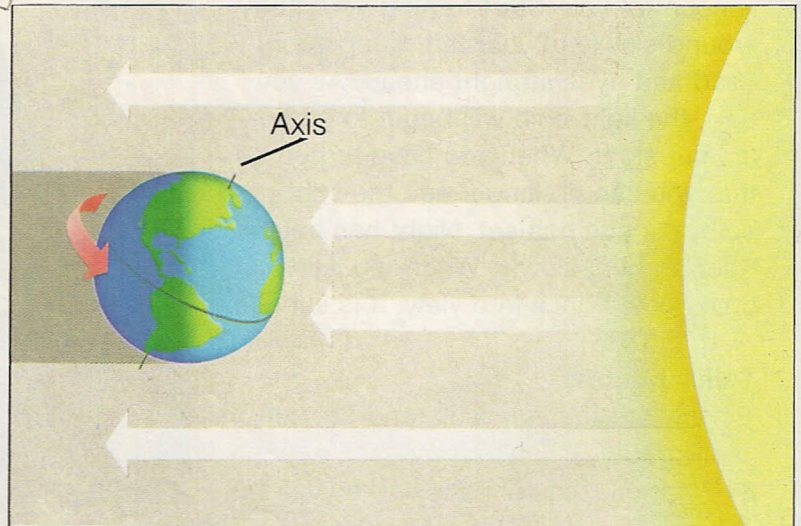
Long ago, people watched the sun rise, move across the sky, and then set. They thought that the earth was not moving and that the sun moved around the earth. If you did the activity on page 291, you know that the sun only appears to rise and set. The turning of the earth causes sunrises and sunsets.

## Spinning on an Axis

The ball in the picture is spinning—or rotating. Imagine a line drawn from the finger up through the ball. The ball is rotating around this line, called an **axis**. Each time the ball makes one full spin around its axis, it has made one **rotation**.

The earth is like the ball that spins on an axis. As the earth spins, the part of the earth that faces the sun is lighted by the sun and has daytime. Find what part of the earth has daytime in the picture. The part of the earth that faces away from the sun has nighttime. What you know as one daytime and one nighttime together make one full day. The length of time for one rotation is one day. On the earth, the day is divided into twenty-four hours.

The earth spins on an axis.



## Revolving Around the Sun

As it spins, the earth also moves around the sun. This moving of the earth around the sun is called revolving. The earth's **orbit** is the path the earth takes as it is revolving around the sun. One full orbit around the sun is one **revolution**. The earth takes one year or about 365 days to make one revolution. Find the path of the earth's revolution in the picture.

The earth revolves around the sun because of gravity. This force keeps the earth from moving straight ahead into space. The sun's gravity pulls the earth back toward the sun.

## Movement and Tilt Combined

If the earth's axis were straight up and down, sunlight would always hit the earth at the same angle. Sunlight also would hit different parts of the earth the same way. However, the earth's axis is tilted. Notice in the picture on page 292 how sunlight hits the earth. The northern part of the earth is getting more direct sunlight than the southern part. Since sunlight is the source of energy that heats the earth, the northern part of the earth in the picture has summer while the southern part has winter.

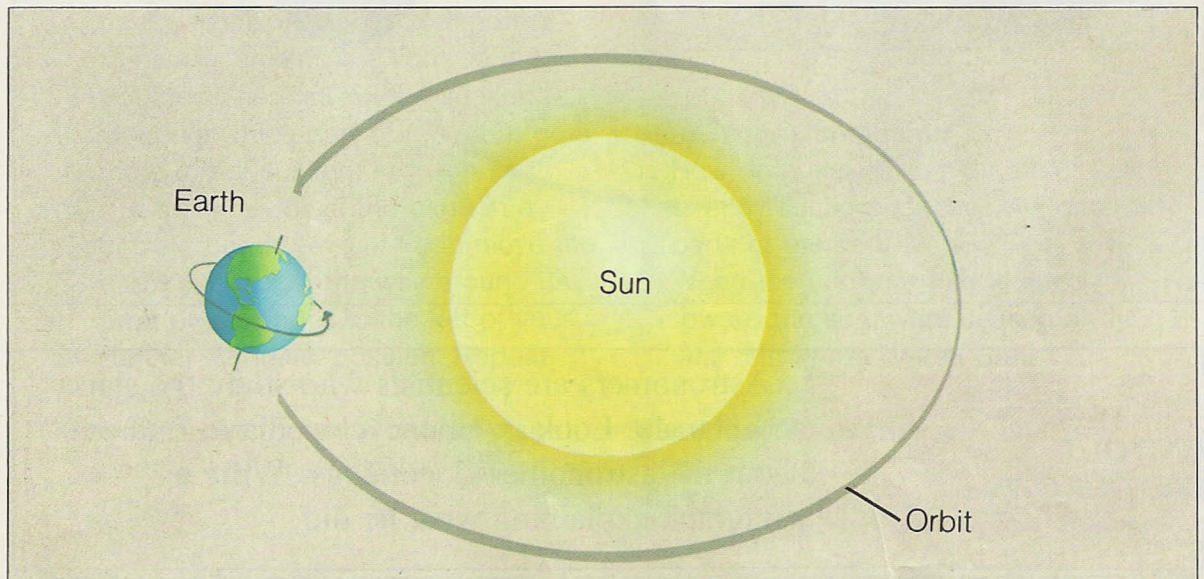
## SCIENCE IN YOUR LIFE

One year on a calendar is usually 365 days long. However, the earth really rotates  $365\frac{1}{4}$  times during every revolution. After four years, the earth has made one extra rotation. If the calendar always had 365 days, New Year's Day would be one day earlier every four years. One extra day is added to the calendar every four years. This day is February 29. The year with an extra day is called leap year.

**orbit** (ôr/'bit), the path of an object around another object.

**revolution** (rev/'ə lü/'shən), the movement of an object around another object.

The earth revolves around the sun.



## INVESTIGATE!

Find out what the effect would be if the earth's North Pole always tilted toward the sun. You might use a ball and flashlight to make a model. Write a hypothesis and test your hypothesis with an experiment.

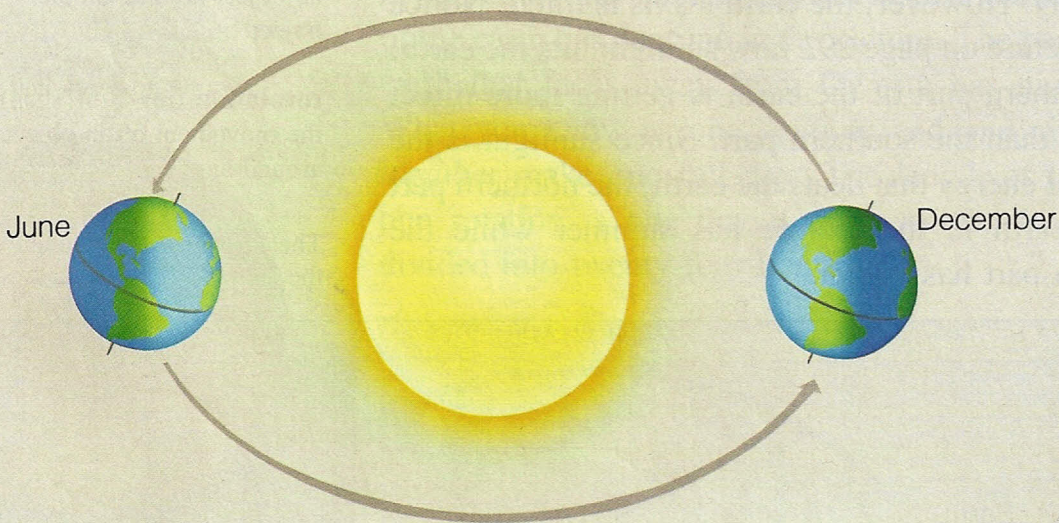
Sunlight hitting the earth at two times of the year

The picture shows how sunlight hits the earth at two times during a year. How many months apart do you think these times are? Notice the earth stays tilted in the same direction. As the earth revolves around the sun, different parts of the earth get the most direct sunlight. Which picture of the earth shows the northern part during its summer?

## Lesson Review

1. How does the earth's rotation cause days?
2. What causes the earth to revolve around the sun?
3. What causes summer and winter?
4. **Challenge!** Suppose the earth rotated only once during each revolution instead of  $365\frac{1}{4}$  times. How many days would one year have?

Study on your own, pages 398–399.



## EARTH SCIENCE

### FIND OUT ON YOUR OWN

Astronomers are scientists who study the stars and planets. Look in an encyclopedia to find out about the astronomer Copernicus. Write a paragraph explaining what he did.

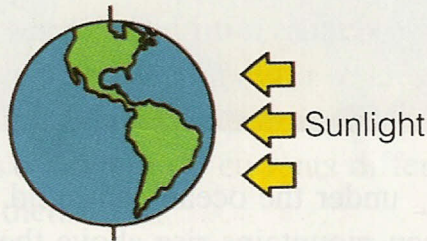
## Chapter 12 Study Guide

On a separate sheet of paper, write the word or words that best complete the sentence or answer the question.

### LESSON 1

pages 292–294

1. A part of the earth is always facing the sun as the earth spins on its     .
2. The part of the earth that faces away from the sun has     .
3. The earth makes one      every twenty-four hours.
4. What is the earth's orbit?
5. The earth makes one revolution around the sun in about      days.
6.      is the force that keeps the earth from moving straight ahead into space.
7. The earth's axis is not straight up and down, it is     .
8. What would happen to the seasons of the year if the earth moved around the sun the way you see in the picture below?



### LESSON 2

pages 296–298

1. Moonlight is sunlight      from the moon.
2. An object that revolves around another object is a     .
3. How much of the moon is lit by sunlight?
4. The different shapes of the moon are its     .
5. What phase of the moon appears as a full circle?
6. When the dark side of the moon faces the earth, it is called a     .
7. The changes from a full moon and back to another full moon take about      days.
8. During a     , the moon makes a small shadow on the earth.