

# SCIENCE

Student Book

► **3rd Grade | Unit 7**

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# SCIENCE 307

## TIMES AND SEASONS

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# **TIMES AND SEASONS**

When you wake up in the morning, you notice that it soon becomes lighter outside. The sun begins to shine. It gets brighter as the day goes on. Later in the day, the sun begins to sink or drop lower in the sky. The sky gets darker as the sun disappears from view. Finally, it becomes night and it is dark outside. Sometime in the night, you go to sleep. Your waking day ends. You have experienced the times of day and night. Tomorrow, you will start a new day again. What happens to cause day and night? How do we measure the times of day and night?

The sun does not come up at the same time as each day passes. You notice that during the winter, the sun comes up later in the day and goes down earlier. During the summer, it comes up earlier and goes down later. Why? What causes this to happen? What causes the seasons of the year, like summer and winter?

In this LIFEPAK®, you will learn the answers to the above questions. You will study the times of the day and seasons of the year. Our times and seasons are part of God's wonderful creation. You will learn that God has given an order to His creation that helps us to have the times of the day and seasons of the year.

## Objectives

**Read these objectives.** The objectives tell you what you will be able to do when you have finished this LIFEPAK.

1. Describe two main ways that the earth moves.
2. Explain what causes the day and night on Earth.
3. Describe how time is measured in hours.
4. Explain how there are time zones on the earth.
5. Explain how time is measured in weeks, months, and years.
6. Name the four seasons of the year.
7. Describe how the earth tilts.
8. Explain the cause of the four seasons of the year on Earth.





# 1. HOW THE EARTH MOVES

It may seem strange, but we have day, night, and seasons because the earth moves. When you stand still in a place outside for awhile, it seems as if the earth does not move. Yet, as you stand there, the earth is moving! In fact, it is moving very fast, and you are moving with it.

In this section of the LIFE PAC, you will learn about two of the main ways that the earth moves. First, you will learn how the earth **rotates**. This means that it spins around, like a spinning ball. The second main way that the earth moves is that it **revolves** around the sun. You will learn more about the way the earth revolves later in this section of the LIFE PAC.

## Vocabulary

**Study these new words.** Learning the meanings of these words is a good study habit and will improve your understanding of this LIFEPAK.

**axis** (ăk' sīs). An imaginary line that runs from the North Pole to the South Pole through the center of the earth.

**counterclockwise** (kount' ər klōk' wīz). The direction opposite the movement of the hands on a clock.

**globe** (glōb). A small model of the earth. It is in the shape of a ball with a map of the earth on it.

**imaginary** (i māj' ə nēr' ē). A mental picture or idea. It is not real, but it can help a person explain something else that is real.

**model** (mōd' l). A small or simple representation of something else that is larger or more complex.

**orbit** (ôr' bīt). The path of an object as it revolves around another object.

**orderly** (ôrd' ər lē). Well-arranged; neat, tidy.

**revolve** (rī vōlv'). To move in a path around something.

**rotate** (rō' tāt). To spin about a point or an axis.

**rotation** (rō tā' shən). The movement of turning around on an axis.

**Note:** All vocabulary words in this LIFEPAK appear in **boldface** print the first time they are used. If you are unsure of the meaning when you are reading, study the definitions given.

**Pronunciation Key:** hat, āge, cāre, fār; let, ēqual, tērm; it, īce; hot, ōpen, ôrder; oil; out; cup, pūt, rüle; child; long; thin; /FH/ for then; /zh/ for measure; /u/ or /ə/ represents /a/ in about, /e/ in taken, /i/ in pencil, /o/ in lemon, and /u/ in circus.

**Ask your teacher to say these words with you.**



**Teacher check:**

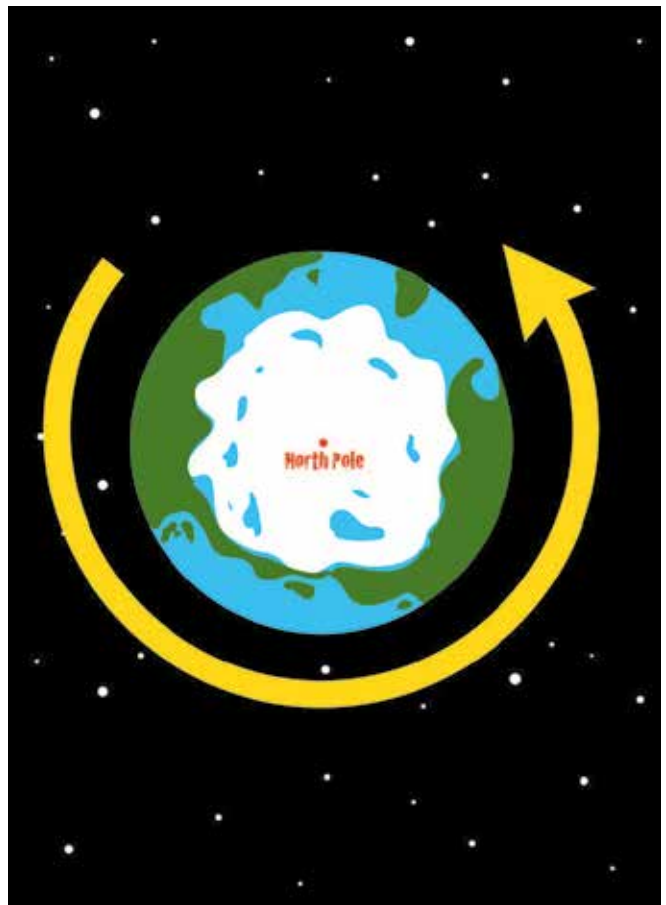
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## The Earth Rotates

The earth is round like a ball. From space, the earth looks mostly like a big blue ball. If you were in a spaceship looking at the earth from the direction of the sun, you would notice that the earth is slowly turning. This is one of the ways the earth moves. It rotates. If you flew your spaceship over the top of the earth, you would be over the North Pole. Looking down at the earth from the North Pole, the earth would rotate in a **counterclockwise** direction. The North Pole would stay in the same place. All of the other places that you could see would rotate around the North Pole.



| From space in the direction of the sun, the earth rotates from left to right.



| From above the North Pole, the earth rotates counterclockwise.



One of the ways that you can learn more about the way the earth rotates is to examine a **globe**. A globe is a very small **model** of the earth. A globe shows the earth as it appears from space. It shows the main oceans, lakes, rivers, and land areas of the earth. A globe is usually mounted on a stand to support it. Let's use a globe now to find out more about the earth's **rotation**.



## STUDY A GLOBE



### You will need these things:

- a globe of the earth
- a small star or dot sticker, about 1/4 inch or less in size  
(or make your own sticker using a small piece of tape)

**Follow these directions and answer the questions.** Put a check in the box when each step is completed. Circle the correct answers in each question or sentence and write it in the blank space.

- ☐ **1.** Notice the shape of the globe. This is the way the earth is shaped, too.
- 1.1** The earth and the globe are shaped like a \_\_\_\_\_ .  
ball / circle
- ☐ **2.** Locate the North Pole on the globe.
- 1.2** The North Pole is located near the \_\_\_\_\_ of the globe.  
top / bottom

*(Continued on the next page)*

- ☐ 3. Locate the South Pole on the globe.

**1.3** The South Pole is located near the \_\_\_\_\_ of the globe.  
top / bottom

- ☐ 4. Look down on the globe from a place directly above the North Pole. While looking down on the globe, turn the globe with your hand in a counterclockwise direction. This is the way the earth rotates in space.

**1.4** Looking down on the North Pole, the earth rotates in a \_\_\_\_\_ direction.  
clockwise / counterclockwise

- ☐ 5. Find the location of your home on the globe. Place the sticky star or dot on the globe where your home is located.

- ☐ 6. While looking at the location of your home on the globe from the side, slowly turn the globe in a counterclockwise direction. Turn the globe one full rotation until the location of your home is back where it began.

**1.5** During one full rotation of the globe, I could see the location of my home during \_\_\_\_\_ of the rotation.  
only half / all

- ☐ 7. Leave the sticky star or dot on the globe for other experiments in this LIFEPAK.



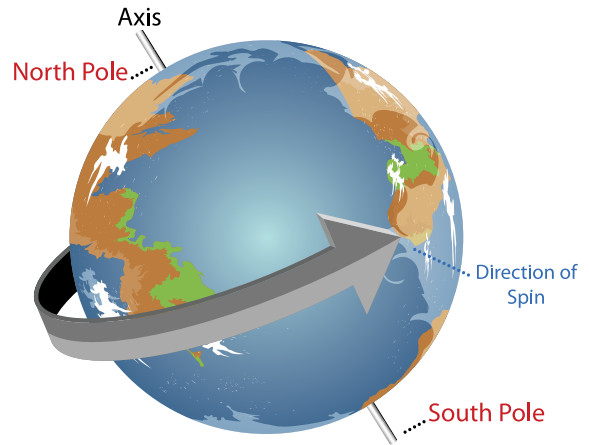
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The earth rotates around its **axis**. The axis is an **imaginary** line that runs through the center of the earth. It runs from the North Pole to the South Pole.

Notice that the globe used in the first experiment is supported near the top and bottom. These supports are at the North Pole and South Pole on the globe. The axis would be a line running through the center of the globe from the top support (North Pole) to the bottom support (South Pole). Notice that the globe spins, or rotates, about the axis.

The earth also rotates around its axis. If you saw the earth from space, it would appear to be rotating about its axis. You could not actually see the axis, but you could see the earth rotating about its axis. Do the next experiment to learn more about rotation and an axis.



| The earth rotates around its axis.

# SHOW ROTATION ABOUT AN AXIS



## You will need these things:

modeling clay or “play dough”  
two straight pins  
a pencil



**Follow these directions.** Check the boxes as you do each step.

- ☐ 1. Make a ball about the size of your fist (your closed hand) with the modeling clay.
- ☐ 2. Push the pencil into the clay ball until you can hold the ball up with the pencil.
- ☐ 3. Put a pin in the top part of the clay ball near where your town is on the earth (globe).
- ☐ 4. Hold the pencil and spin (rotate) the clay ball around. Look at the pin while the ball rotates.

**1.6** Does the pin rotate in a circle around the pencil? \_\_\_\_\_

- ☐ 5. Put another pin in the top of the clay ball opposite the place where you pushed the pencil into the clay. (If your pencil went all the way straight through the clay ball, it would push this pin out if you have this pin in the right place.)

*(Continued on the next page)*



- ☐ **6.** Hold the pencil and spin (rotate) the clay ball around again. Look at the top pin while the ball rotates.
- 1.7** Does the top pin rotate in a circle around the pencil like the first pin? \_\_\_\_\_
- 1.8** Does the top pin turn more like the pencil than it does like the first pin? \_\_\_\_\_
- ☐ **7.** Push your pencil through the clay ball until it hits the pin at the top of the ball and pushes the pin out of the clay. Now your pencil goes into the ball at the bottom and comes out of the ball at the top.
- ☐ **8.** Hold the pencil and spin (rotate) the clay ball around again. Look at the top of the pencil while the ball rotates.
- 1.9** Does the top of the pencil turn like the bottom of the pencil?  
\_\_\_\_\_
- 1.10** When the clay turned, did all of it rotate about the pencil?  
\_\_\_\_\_
- ☐ **9.** Store your clay ball in a safe place so that you can explain it to someone soon.

The clay ball you made is like the earth. The pencil running through the clay ball is like the axis of the earth. The place where the top pin was located (and where the pencil came out) was like the North Pole of the earth. The place where the pencil entered into the bottom of the clay was like the South Pole of the earth. The axis of the earth is an imaginary line running from the North Pole to the South Pole. The earth rotates about its axis.

One way to visualize how the earth turns is to hold out your right fist with your thumb extended and pointing straight up. If you visualize that your thumb points north, then your fingers are curling in the direction of Earth's rotation.

## North



**Draw a line to match each word with its meaning.**

- |             |            |   |                                 |
|-------------|------------|---|---------------------------------|
| <b>1.11</b> | rotates    | ● | a model of the earth            |
| <b>1.12</b> | axis       | ● | like a handle through the earth |
| <b>1.13</b> | North Pole | ● | bottom of the globe             |
| <b>1.14</b> | globe      | ● | turns around                    |
| <b>1.15</b> | South Pole | ● | top of the globe                |



### Explain your clay model to someone.

**1.16** Take your clay model and explain about rotation of the earth.

Explain:

- what the clay ball is like.
- what the pencil is like.
- where the poles are.
- how it rotates.



#### Teacher check:

Initials \_\_\_\_\_ Date \_\_\_\_\_

## Day and Night

The rotation of the earth allows us to experience day and night on the earth. This happens because of the relationship of the earth to the sun.

God made the sun to give light on the earth. If you were in a spaceship far enough away, you would see the

earth in relation to the sun. You would see that the sun's light falls on one half of the earth, but the other half of the earth is dark. The places on the earth where the sun is shining are experiencing the day. The places on the other side of the earth where the sun is not shining are experiencing the night.

Because the earth rotates, places on the earth can experience both day and night. You notice that the place where you live has both day and night. You can observe how this happens in the next experiment.



# OBSERVE DAY AND NIGHT ON EARTH



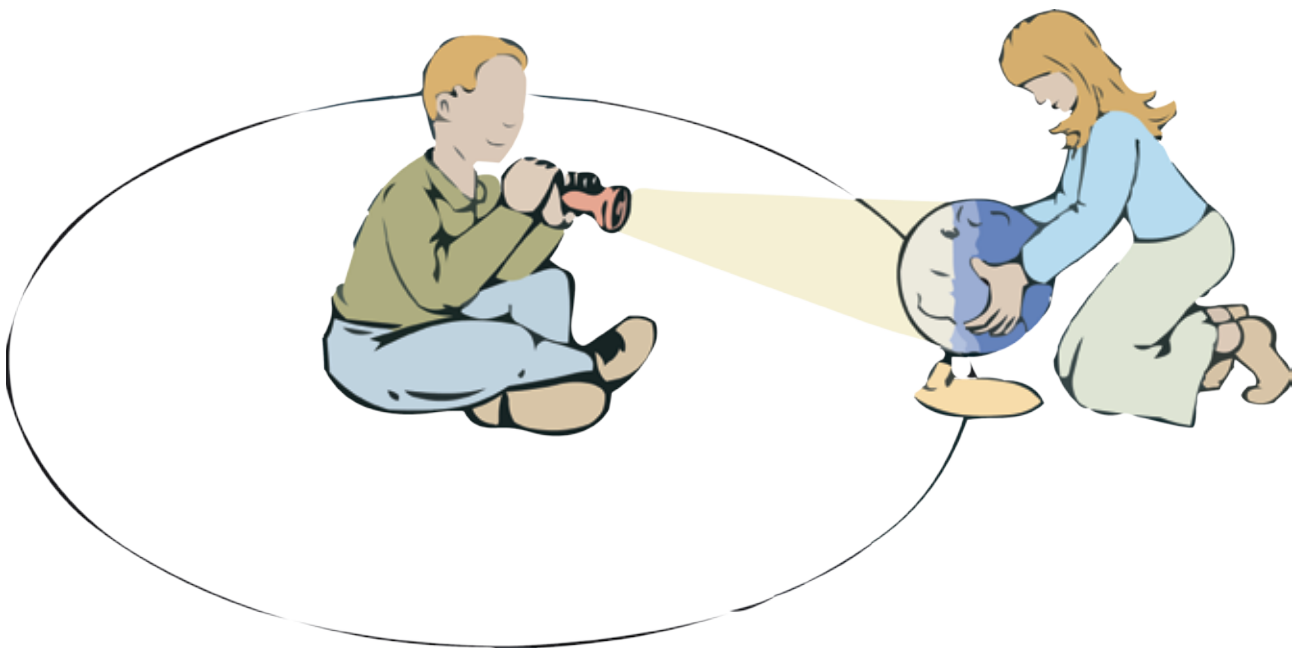
## You will need these things:

flashlight  
globe  
a friend

**Follow these directions.** Check the boxes as you do each step.

NOTE: You must do this experiment in a room that is dark.

- ☐ 1. Sit on the floor of a dark room and hold the flashlight.
- ☐ 2. Have a friend hold the globe in a position about 5 feet away from you.
- ☐ 3. Shine the flashlight toward the globe. The light represents the sun shining on the earth.



*(Continued on the next page)*



- ☐ **4.** Have your friend rotate the globe until the place where you live (represented by the sticky star or dot) is in the light from the flashlight. It should be in line directly toward you and the flashlight.

**1.17** As the light shines on the earth (globe) now, would it be day or night where you live? \_\_\_\_\_

- ☐ **5.** Have your friend rotate the globe around to the opposite side until the place where you live (the star or dot) is in the dark and in a line directly away from you. (The place where you live would be pointing toward your friend.)

**1.18** As the light shines on the earth (globe) now, would it be day or night where you live? \_\_\_\_\_

- ☐ **6.** Have your friend slowly rotate the globe in a counterclockwise direction (looking down on the North Pole) until the place where you live just becomes visible to you and begins to shine in the light.

**1.19** As the light shines on the earth (globe) now, would it be the beginning of the day (sunrise) or the beginning of the night (sunset) where you live? \_\_\_\_\_

- ☐ **7.** Have your friend continue to slowly rotate the globe in a counterclockwise direction (looking down on the North Pole) until the place where you live is just barely in the dark and is no longer visible to you.

**1.20** As the light shines on the earth (globe) now, would it be the beginning of the day (sunrise) or the beginning of the night (sunset) where you live? \_\_\_\_\_

- ☐ **8.** Have your friend continue to slowly rotate the globe in a counterclockwise direction (looking down on the North Pole) for five complete rotations of the earth. Notice how the place where you live (the star or dot on the globe) goes from night to day and over again as the earth rotates.

**Answer these questions.**

**1.21** What do you usually do during the night in the place where you live?

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---

**1.22** What do you usually do during the day in the place where you live?

---

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**1.23** When you are eating lunch during the day, what might a boy or girl your age be doing at the same time on the opposite side of the earth? \_\_\_\_\_

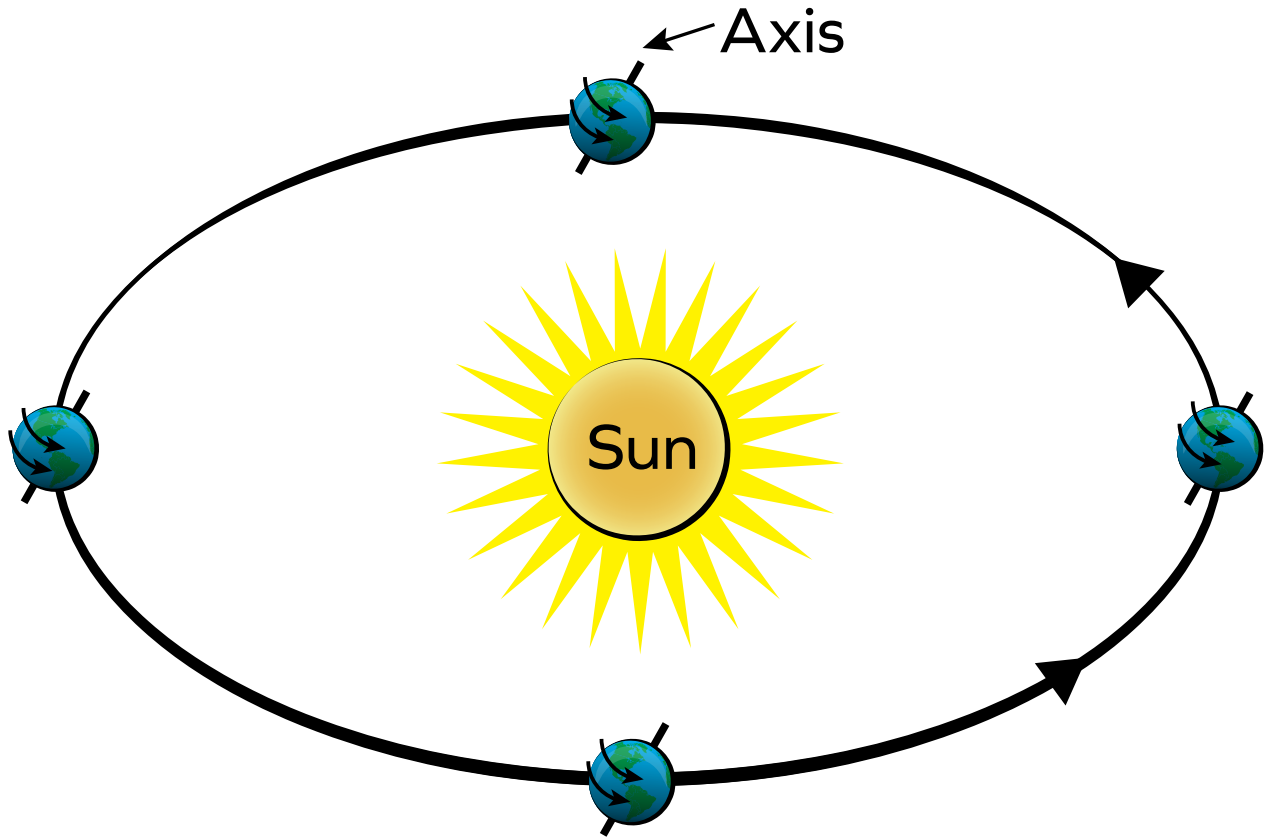
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**Complete this activity.**

**1.24** Explain to your teacher how the rotation of the earth causes day and night.

**Teacher check:**

Initials \_\_\_\_\_ Date \_\_\_\_\_



| The earth rotates about its axis and revolves around the sun in its orbit.

## The Earth Revolves

You have learned that one of the ways that the earth moves is to rotate about its axis. A second main way that the earth moves is to **revolve** around the sun. This means that the earth moves in the same path around the sun over and over again. This path is called the earth's **orbit**. The orbit of the earth around the sun is almost in the shape of a circle. The sun is located near the center of this circle.

The earth both rotates and revolves at the same time! It rotates about its axis, and it revolves around the sun in its orbit. God has designed the earth to move in these ways over and over again. Because of these **orderly** movements of the earth, we can measure changes in time. You will learn more about time changes in the next section of this LIFEPAK.



# LEARN HOW THE EARTH ROTATES AND REVOLVES

Learn how the earth rotates and revolves.

**You will need this:** a friend

**Follow these directions.** Check the boxes as you do each step.

- ☐ 1. Have a friend stand still and pretend to be the sun.
- ☐ 2. Stand about 8 feet from your friend. You are the earth. Walk in a circle around your friend (the sun), keeping about 8 feet apart as you walk. As you walk in the circle around your friend, you revolve around him. *Revolve* means to move around something. Your path around your friend is your orbit. As you complete a full circle around your friend, you complete one orbit.
- ☐ 3. Revolve completely around your friend (the sun) two more times. Take the same orbit (path) each time.

**1.25** How many orbits have you completed around your friend?

\_\_\_\_\_

- ☐ 4. Revolve around the sun again with the same orbit. This time, rotate as you walk. *Rotate* means to spin around completely. You are now going around your friend like the earth does around the sun. The path you take is an orbit. You rotate and revolve at the same time. The earth rotates and revolves in an orbit around the sun at the same time.

**1.26** What are two things the earth does as it moves?

a. \_\_\_\_\_

b. \_\_\_\_\_





**Write in the boxes the correct word from the list to finish each sentence.**

revolves

rotates

orbit

axis

**1.27** The earth \_\_\_\_\_ on its axis.

1

5

**1.28** The earth travels in an \_\_\_\_\_ around the sun.

2

**1.29** The \_\_\_\_\_ of the earth goes through the poles.

3

7

**1.30** The earth \_\_\_\_\_ around the sun.

4

6



**Write the letter from each numbered box above in these boxes below to finish this sentence.**

**1.31** The earth \_\_\_\_\_ in nearly a circle around the sun.

1

2

3

4

5

6

7



**Teacher check:**

Initials \_\_\_\_\_ Date \_\_\_\_\_



**For this Self Test, study what you have read and done.** The Self Test will check what you remember.

# SELF TEST 1

**Each answer = 1 point**

**Write the correct word from the list in each blank.**

model	earth	night	rotation
axis	clockwise	revolve	counterclockwise
day	orbit		

- 1.01** When your town has day, the people on the other side of the earth have \_\_\_\_\_.
- 1.02** Looking down at the North Pole, you would see the earth rotate in a \_\_\_\_\_ direction.
- 1.03** The word that means that the earth turns around its axis is \_\_\_\_\_.
- 1.04** A globe is a \_\_\_\_\_ of the earth.
- 1.05** An imaginary line through the earth from the North to South Pole is called the \_\_\_\_\_.

**Write *yes* or *no* in front of each sentence.**

- 1.06** \_\_\_\_\_ The earth moves in a path around the sun.
- 1.07** \_\_\_\_\_ The sun spins around the earth.
- 1.08** \_\_\_\_\_ Moving around something is called rotation.
- 1.09** \_\_\_\_\_ The earth revolves around the sun.
- 1.010** \_\_\_\_\_ Sunrise occurs as your location on Earth rotates from darkness to the light of the sun.

Draw lines to match the words with their meanings.

- |       |                  |   |                              |
|-------|------------------|---|------------------------------|
| 1.011 | top of the globe | ● | line through the earth       |
| 1.012 | axis             | ● | path of the earth around sun |
| 1.013 | rotates          | ● | to go around something       |
| 1.014 | revolve          | ● | model of the earth           |
| 1.015 | globe            | ● | North Pole                   |
| 1.016 | orbit            | ● | spins                        |
|       |                  |   | South Pole                   |



Teacher check:

Score \_\_\_\_\_

Initials \_\_\_\_\_

Date \_\_\_\_\_

