



Relationship of the Sun and Earth

Prep Time: 15 minutes

Grades: 5-8

Lesson Time: 55-60 minutes

Essential Questions:

- What causes daytime and nighttime?
- What causes a year?
- What causes seasons?

Objectives:

- Students will be able to understand the relationship between the Earth's orbit, its axis, and the Sun.
- Students will be able to determine what causes seasons, daytime, and nighttime.

Standards:

- MS-ESS1-1 Develop and use a model of the Earth-Sun-Moon system to describe the cyclic patterns of lunar phases, eclipses of the sun and moon, and seasons.
- 5-ESS1-2 Represent data in graphical displays to reveal patterns of daily changes in length and direction of shadows, day and night, and the seasonal appearance of some stars in the night sky.

Teacher Prep:

- Materials: an object to put in the center of a circle (ball, chair, etc.), globe, scissors, tape, paper plates, brass fasteners, pens/pencils, small stickers, pipe cleaners, included worksheets.
- Print out and make sure your students have the materials available for the activity. They will be constructing a model of Earth's revolution around the Sun, along with its rotation on its axis.
- If possible, print out figure #2 on cardstock or allow students to glue it to a thicker piece of paper. This will make the model sturdier.

Teacher Notes/Background:

- This lesson was adapted from [Lie Back Look Up's Earth-Moon-Sun Relationship](#) model.
- It takes the Earth 365.25 Earth days to orbit around the Sun once.
- The quarter of the day is why we have leap year every four years.
- Axis: imaginary line that goes through the Earth at the North and South Poles.
- It takes 23 hours and 56 minutes for Earth to complete one full rotation on its axis.
- When your side of Earth is facing the Sun, it is daytime; when it faces away, it is nighttime.
- Since the Earth is tilted on its axis, the part that is tilted closer experiences summer, and the part that is tilted away experiences winter.
- Opposite hemispheres experience opposite seasons.
- The climate around the equator stays relatively the same throughout the year.

Relationship of the Sun and Earth

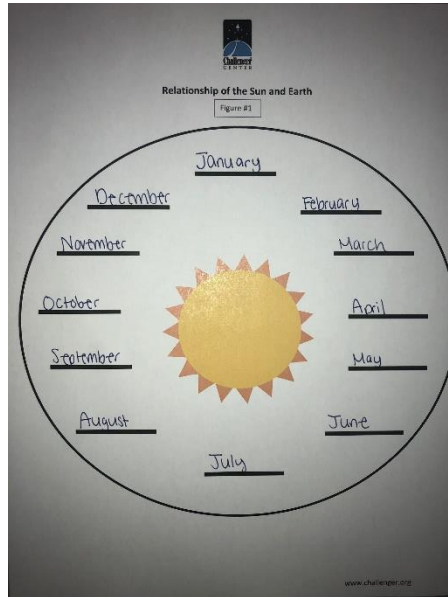
Engage (5 minutes)	Opening Demonstration: <ul style="list-style-type: none">• Students complete a warm up activity.• Rotation vs. Revolution: Have students stand up. Instruct them to spin in a circle in place. Ask them, "Did you rotate or revolve?"• Next, have the entire class form a circle around the room. Put an object in the center of the circle (a chair, a ball, etc.) Instruct the class to move clockwise around the object. Ask them "Did you rotate or revolve around the object?"• The distinction between revolution and rotation is important for explaining the difference between seasons and days. Make sure your students have a solid understanding of this concept.	Materials: <ul style="list-style-type: none">• An object to put in the center of a circle (ball, chair, etc.)
Explore (5 minutes)	Recap: <ul style="list-style-type: none">• Briefly recap main ideas from Sun and Stars video about how the Earth's axis and rotation affect days, years and seasons.• Use a globe as a physical representation of the Earth's tilt. Give students an opportunity to examine the globe to build an understanding of how the earth spins on its axis.	Materials: <ul style="list-style-type: none">• Globe

Relationship of the Sun and Earth

Explain
(35 minutes)

Build a Model:

- Directions and worksheets are included for students to build a model that will represent the Earth's revolution around the Sun and rotation on its axis.
- Prepare materials ahead of time so students have ample time to answer questions and review the lesson afterwards.
- Pictures of the model are included to help your students in their building process.



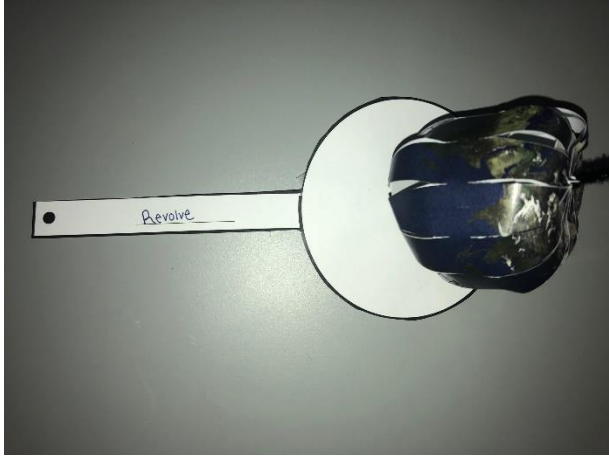
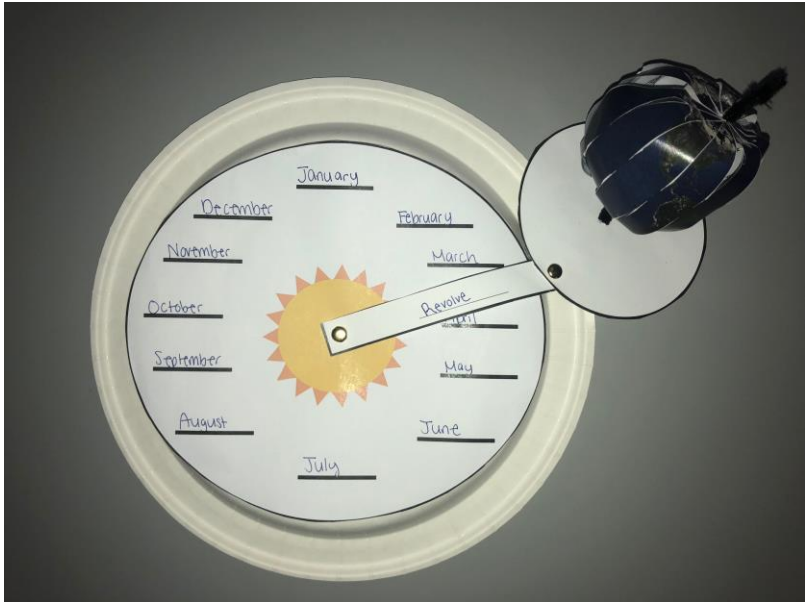
- The pieces of the globe glued together at a point on Figure #3



Materials:

- Scissors
- Tape
- Paper plates
- Brass fasteners
- Pipe cleaners
- Pens/pencils
- Small stickers
- Included worksheets

Relationship of the Sun and Earth

	 <ul style="list-style-type: none"> • Completed model 	
Elaborate 10 minutes	Partner Quiz: <ul style="list-style-type: none"> • Have students partner up and use the model to quiz each other on what position it should be in for different months. • For an additional challenge, add on more criteria, like if it is day or night in a specific location. • Circulate to ensure accuracy. 	Materials: <ul style="list-style-type: none"> • Completed models
Evaluate (5 minutes)	Wrap-up Questions: <ul style="list-style-type: none"> • What causes the seasons? • What is the difference between rotation and revolution? • What causes night and day? 	Materials: N/A

Relationship of the Sun and Earth

Extensions and Enrichment:

- Display student models and have them present to other classes

Additional Resources:

- See attached worksheets
- http://www.dahkai.com/post_paper-globe-print-out_185976/

Relationship of the Sun and Earth

You will be constructing a model that explains why we experience night and day and the seasons of the year. Follow the directions to build your model. Be sure to read each step all the way through before you start the construction process.

Materials:

- Scissors
- Tape
- Paper Plate
- 2 brass fasteners
- Pipe cleaners
- Pen/pencil
- Sticker

Relationship of the Sun and Earth

Directions:

1. Find the worksheet with a picture of the Sun. Around the Sun, there are **12** blank lines. What do you think these lines represent? Label the lines. *Hint: Remember, seasons happen during certain times of the year! How do we keep track of the different times of year on a calendar?*
2. Find your paper plate. On the front of the paper plate, write down and answer the following questions:
 - a. How many days does it take for the Earth to orbit the Sun once?
 - b. Why do we have leap year?
 - c. What is Earth's axis?
 - d. How many hours does it take the Earth to rotate on its axis one full time?
3. Cut out the circle around the sun diagram (Figure #1). Glue the circle you cut out to the back of the paper plate.
4. Next, cut out Figures #2-5
5. Cut out the circle along the black line on Figure #2 so that the rectangle and circle are separate.
6. Punch a small hole in the center of Figure #3 large enough that a pipe cleaner will fit through. This hole should be small enough so eventually the circle will fit tightly around the pipe cleaner. Once you have cut out the small hole, set this circle to the side.
7. Cut out Figure #4. Make a hole for a brass fastener to go through on the black dot.
8. Find Figure #5. Start by cutting out all the blank white spaces on the page. Glue all the edges of the figure together around the hole you have punched in the small white circles in Figure #3 and #4, so that they form a circle around it. Do this for each side of the figure.
9. Insert a small piece of pipe cleaner into the hole you punched in the hole you made in Figure #3 to represent Earth's axis.
10. Attach the bottom side of Figure #5 to the circle of Figure #2. Attach those pieces with a brass fastener at the hole you made in Figure #4. Remember, the Earth is on a tilt, so you should angle your globe slightly to represent the Earth's axis.
11. The line at the top of the circle on Figure #2 is to label the motion of the Earth. What is the motion called when Earth spins on its axis? Write your answer on the line.
12. There is a small black dot located at the bottom of Figure #2. Attach Figure #2 to Figure #1 with a brass fastener at that black dot. What motion will this part of the model represent? Write down that motion on the line in the rectangular portion of Figure #2.
13. Attach the circle from Figure #2 to the rectangle from Figure #2 with a brass fastener by overlapping the area with the 2 black dots.
14. Find your small sticker. Use the sticker to mark where you live on the Earth.
15. Revolve your model Earth around the Sun. Rotate your model Earth on its axis. How would your model Earth look if you wanted to represent summer time during the day? What about winter time during the night?
16. Once you have constructed and observed your model answer the questions below.

Relationship of the Sun and Earth

Wrap-up Questions: Now that you have built a model about the seasons and day and night, answer the questions below.

1. Why do you think the areas near Earth's equator experience less seasonal change than other areas?

2. What do you think would happen if the Earth was more tilted? How would that affect the seasons?

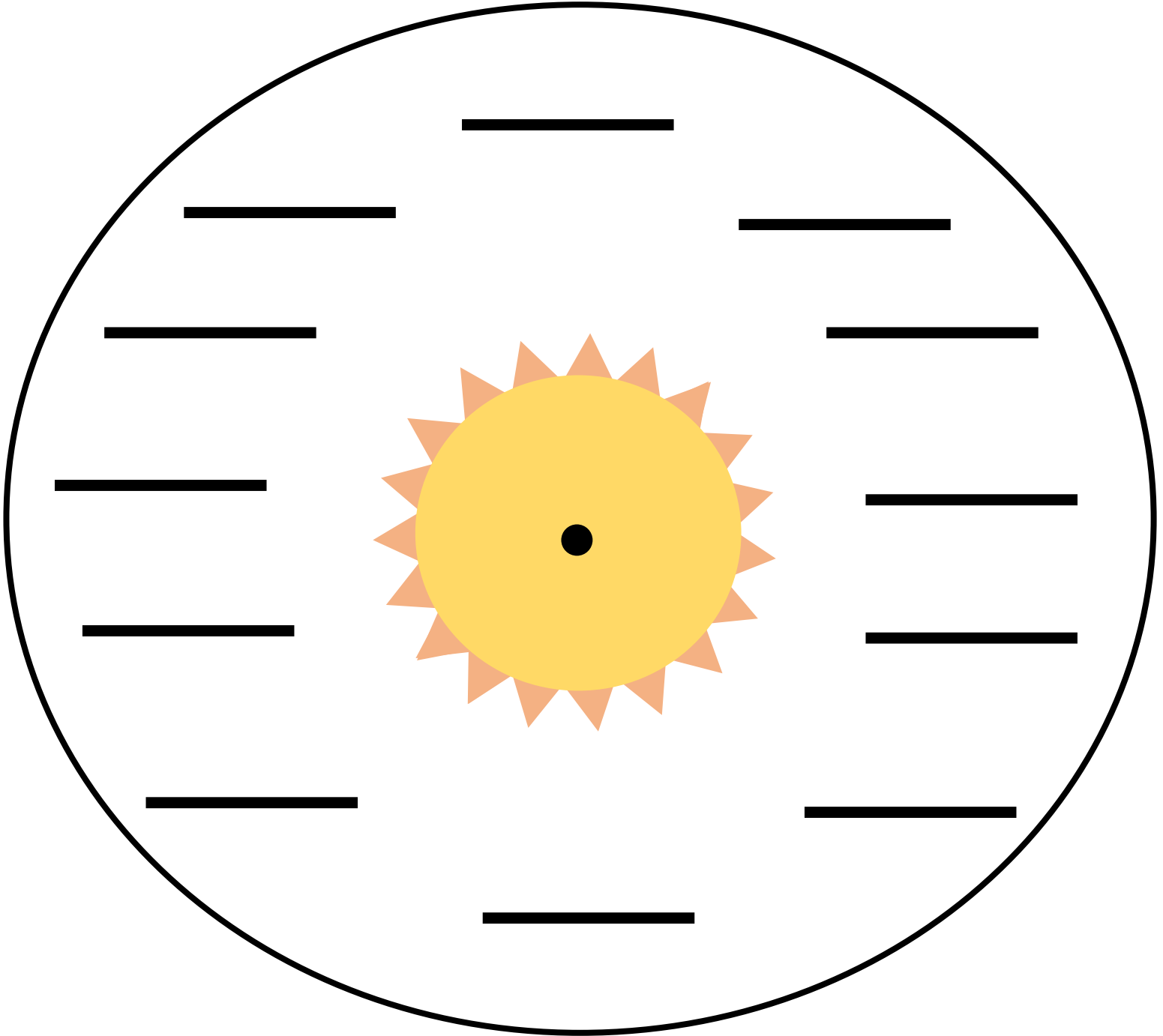
3. Do you think all planets take the same amount of time to revolve around the Sun? Why or why not?

4. Why does the Sun always rise in the East and set in the West?

5. Why do opposite hemispheres experience opposite seasons?

Relationship of the Sun and Earth

Figure #1



Relationship of the Sun and Earth

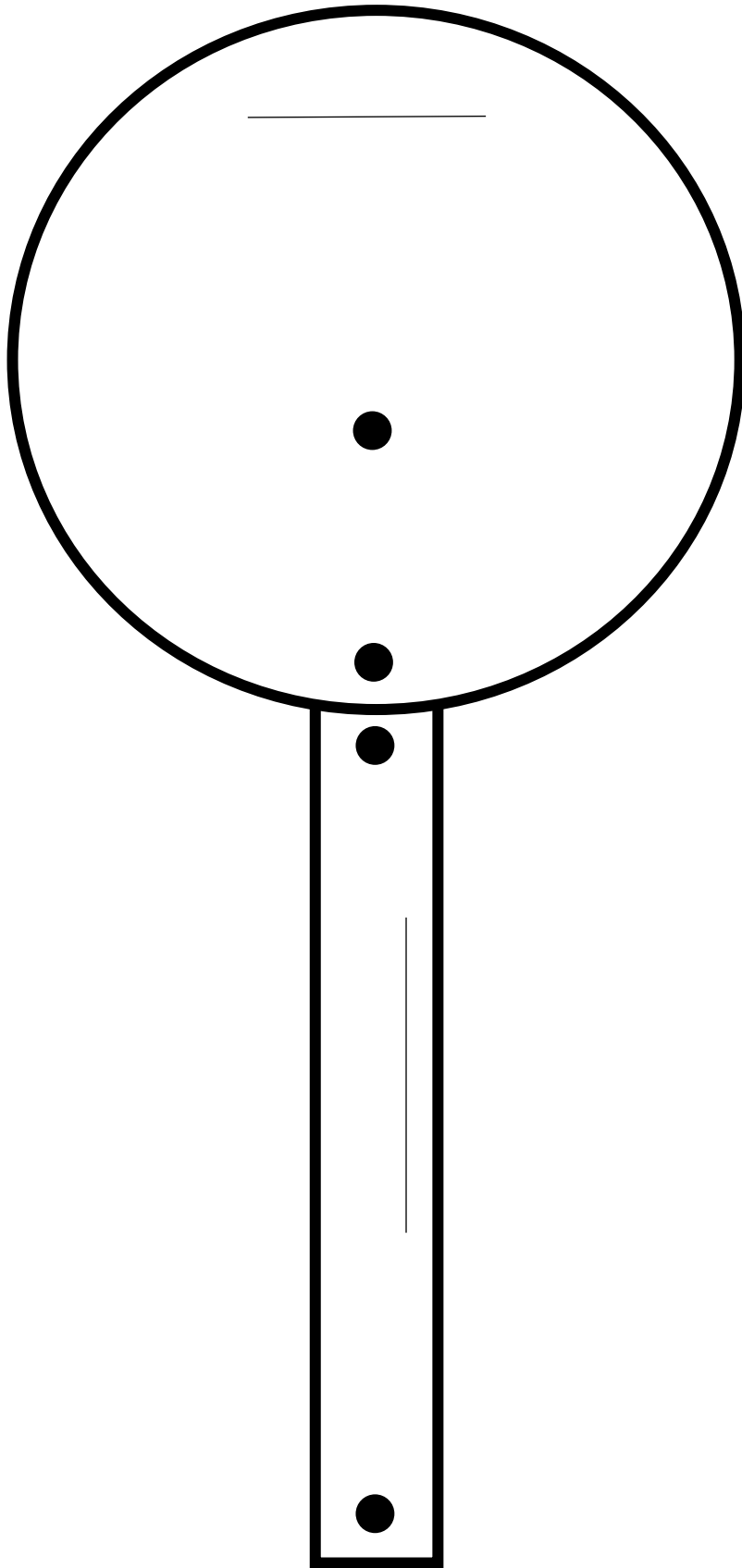


Figure #2

Figure #3

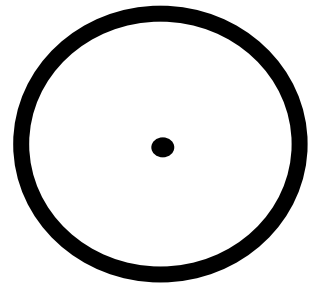
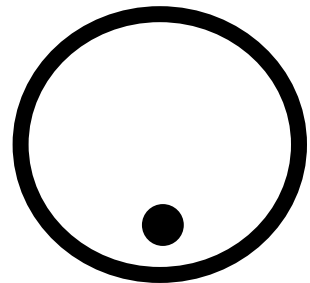


Figure #4



Relationship of the Sun and Earth

Figure #5

