



CLASSROOM ACTIVITY

Seeing the Light

How do day and night cycles vary across the globe? Focus your investigation on the questions below. After you and your team have completed the activity, respond to these questions directly in your journal.

- ▶ Why does the length of the day vary over the course of the year?
- ▶ Why are there sometimes longer periods of daylight, sometimes shorter periods?
- ▶ What causes the changes in the amount of light?
- ▶ Why do some areas experience greater changes within one day than others do?

Gather with your team and choose a captain and a note taker for today, as well as an artist to illustrate the group's findings. Before you begin your investigation, consider what you already know about day and night cycles. Use the questions below to structure your discussion and jot down your answers.

- ▶ When are the days longest where you live? When are they shortest? When do you begin to notice the changing patterns of day and night cycles? Why might the lengths of day and night vary during the year?
- ▶ Do you think light and dark patterns in your home town will be different from those in Antarctica? Why or why not? How might you test your hypotheses?

The captain appoints group members to collect the required materials while the rest of the group reviews today's procedure. Before beginning, the captain makes sure that the group has all required materials, and that everyone knows the day's procedure.

The note taker takes notes on the group's findings for your team. Remember to record your observations and explanations in your journal for your own research notes. Include drawings to illustrate your findings.



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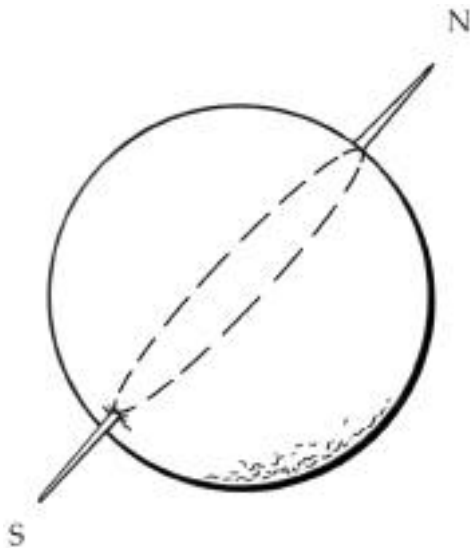
Seeing the Light

MATERIALS

- ▶ 1 Styrofoam ball about 7.5 cm (3 in.)
- ▶ 2 toothpicks
- ▶ 1 flashlight
- ▶ 1 marker

PROCEDURE

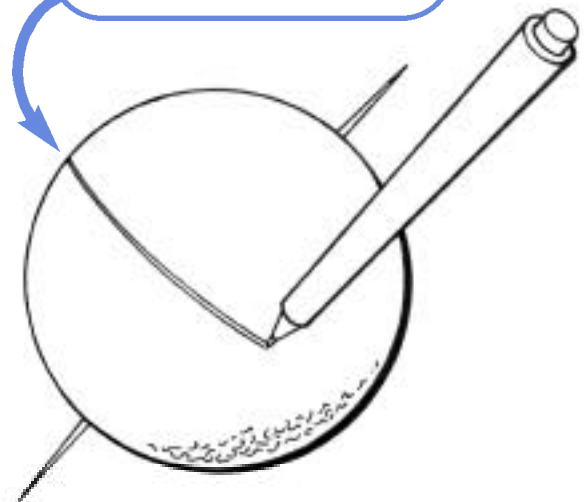
1. Prepare the model. Use the Styrofoam ball to represent the Earth and the flashlight to represent the Sun. Since the Earth's axis is tilted, look at a globe to get an idea of how much you should tilt your model of the Earth.



- ▶ Insert the toothpicks at the poles to represent the Earth's axis.
- ▶ With a marker, draw a line around the center of ball for the equator.
- ▶ Draw two more lines around the ball to represent the Tropic of Capricorn and the Tropic of Cancer.
- ▶ Draw in the Antarctic continent.
- ▶ Make a dot to represent your home location.

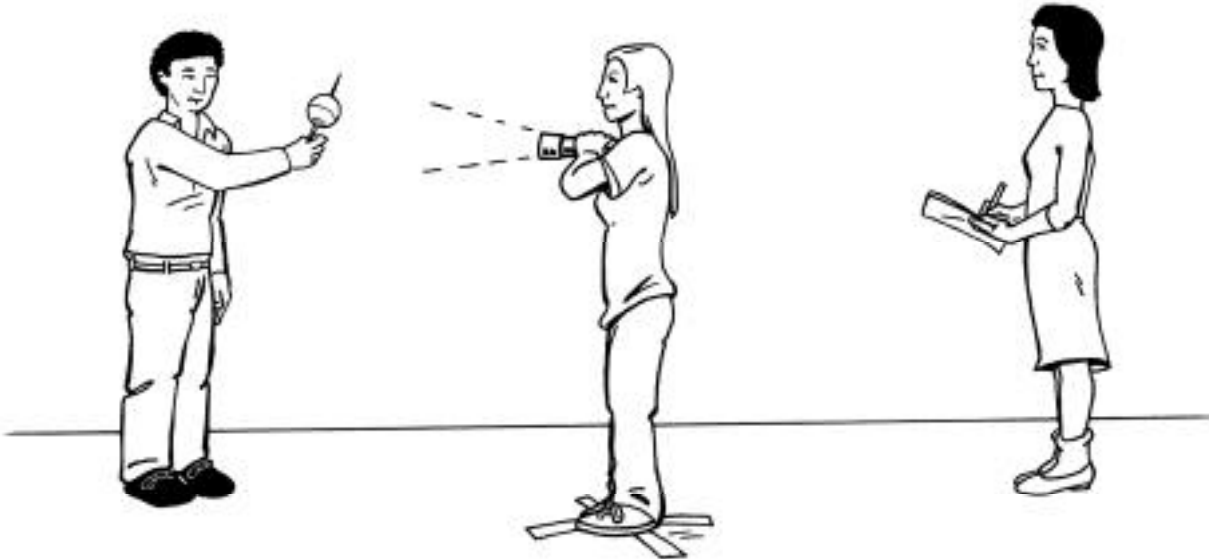
Draw a line for the equator, and then draw one each to represent the Tropic of Capricorn and the Tropic of Cancer.

Does your model show the tilt of the Earth's axis? It's the key factor in explaining Antarctica's light and dark patterns!




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Make sure that the person holding planet Earth keeps the tilt of the axis. Choose a point at one side of the room and keep the toothpick-axis pointed towards it throughout the cycle.



2. One group member holds and moves the Sun (flashlight) while another holds and moves the Earth (Styrofoam ball) to show how the Sun hits the Earth at different times of the year. Of course the Sun does not rotate relative to the Earth; for this experiment the flashlight needs to rotate in order to approximate the fact the Sun shines light in all directions. Examine the light and dark patterns where you live created by your demonstration. Can you reproduce day and night cycles where you live? Can you reproduce seasonal cycles? Do the theories your group developed hold up? Why or why not? The note taker records the findings on the Seeing the Light Group Worksheet.
3. Keep an eye on Antarctica as you demonstrate the rotation of the Earth on its axis and the revolution of the Earth around the Sun. Can you reproduce daily cycles? Can you see the difference between daily day and night cycles at the pole, where you live, and at the equator? Use your observations to explain why Antarctica does not have daily changes in its light and dark pattern. If you used the Earth Viewer interactive, consider how this pattern is like what you saw there. Check the interactive again to verify your findings.
4. As your group discusses and records the day's findings, remember to take notes in your own journal. Record your explanation of why Antarctica has one long day and one long night. Include drawings to illustrate your explanation.



GROUP MEMBERS _____

CAPTAIN _____ NOTE TAKER _____

1. What are your theories about the reasons for the light and dark patterns at different places on the globe?
2. How long does one complete revolution of the Earth around the Sun take? How long does one complete rotation of the Earth take?
3. What did you observe about day and night patterns as you modeled the rotation and revolution of the Earth? Explain what you noticed about both daily and seasonal changes in the day and night patterns. Compare those patterns at the poles to those at the equator.
4. Did your theories from Question 1 hold up? Why or why not?
5. What did the team decide about why Antarctica does not have daily changes in its light and dark pattern?

