



## CLASSROOM ACTIVITY

# What's the Angle?

How does the angle of the Sun affect temperatures around 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 are the poles so cold?
- ▶ Why is the equator so warm?
- ▶ How do the Sun's rays strike the Earth at each of those locations?

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 temperature patterns in your town and around the globe. Use the questions below to structure your discussion and jot down your notes.

- ▶ How do temperatures vary during the day where you live? During each season? During the entire year? What patterns do you notice?
- ▶ What is the lowest temperature you have ever experienced? The highest? Describe where you were for each, and what it felt like.
- ▶ What do you think the temperature is in Antarctica right now? What do you think it was six months ago?

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.

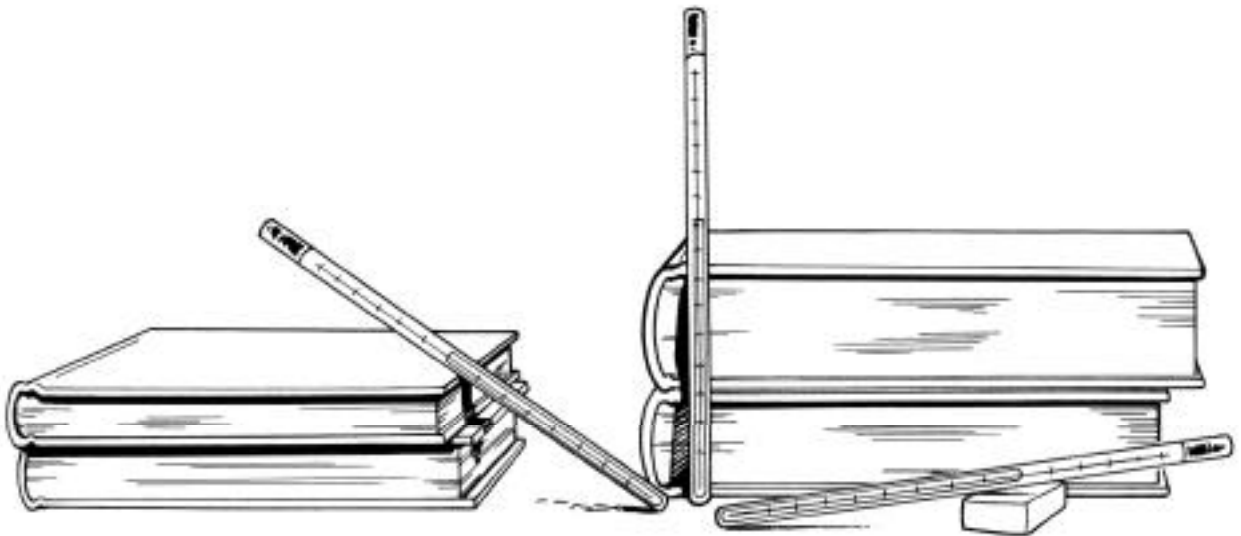
The note taker takes notes on the group's findings for your team. Remember to record your observations and explanations in your journal for your own research notes. Include drawings to illustrate your findings.

**CLASSROOM  
ACTIVITY****What's the Angle?****MATERIALS**

- ▶ 3 thermometers
- ▶ heat lamp
- ▶ flat surface
- ▶ scrap paper
- ▶ graph paper
- ▶ stopwatch
- ▶ books or other items to prop up thermometers

**PROCEDURE**

1. Position the heat lamp about two feet above the surface of your work table. Be careful—the bulb and shade can get hot enough to burn you!
2. Place the thermometers below the lamp so that each one is at a different angle to the light. For example, you can lay Thermometer A down flat, prop up the top end of Thermometer B with one book, and prop up Thermometer C with two or more books until it is nearly straight up and down, perpendicular to the table. Take initial temperature readings for each thermometer; record your findings on the worksheet. Next, fill out the prediction section and predict how quickly the different thermometers will heat up.



Picture these thermometers as points on a globe. If the heat lamp placed above represents the Sun, which thermometer corresponds to the equator? To the poles?

**CLASSROOM  
ACTIVITY****What's the Angle?**

Make sure the  
heat lamp is  
directly above your  
thermometers!



3. Turn on the lamp. Be careful—the bulb and the shade can get hot enough to burn you! Every two minutes, record the temperature of each thermometer on your worksheet. Continue taking readings for ten minutes.
4. Make a graph of the temperatures you recorded on the three thermometers over time. Use scrap paper to lay out your graph intervals and draw a rough sketch before creating a final graph.
5. Analyze the data with your team. Use the questions on your worksheet to guide your analysis.
6. As your group draws conclusion, remember to take notes in your own journal. Include illustrations to illustrate your ideas.



**GROUP MEMBERS** \_\_\_\_\_

**CAPTAIN** \_\_\_\_\_ **NOTE TAKER** \_\_\_\_\_

1. What are your hypotheses to explain temperature variations at different places on the globe? Why are averages different for summer and winter? Why do they vary with latitude?

2. Record starting temperatures for each of the three thermometers in the first column of the chart below.

THERMOMETER	ORIGINAL TEMP	2 MIN	4 MIN	6 MIN	8 MIN	10 MIN
<b>A</b>						
<b>B</b>						
<b>C</b>						

3. Make a prediction. Will all three thermometers heat up at the same rate? If not, which one do you think will heat up the fastest? Why do you think so?

4. Which thermometer registered the fastest rise in temperature? Which one registered the slowest rise? Why do you think this happened?



