Name: _____ Date: _____

Angles of Light Energy*

Purpose

This activity will help us collect evidence to answer our focus question: *Why are places closer to Earth's equator hotter than places farther away from the equator?*

The Task

Describe what happens to light when it shines on graph paper at different angles. Be prepared to share your ideas.

Materials for Each Pair of Students

- 1 tray
- 3 sheets of graph paper
- 1 flashlight
- 1 ruler
- 1 pair of scissors
- Tape
- 2 pencils
- Science notebooks

Directions—Part 1

1. Tape one sheet of graph paper to the tray.
2. Decide who will hold the flashlight and who will hold the tray.
3. Follow these steps to see what happens when light shines on a flat surface at different angles:
   a. Turn on the flashlight. Stand far enough apart so that the flashlight and the tray are about 1 foot (12 in or 30.48 cm) from each other. (Use your ruler to check the distance.)
   b. Point the flashlight directly toward the graph paper. Your partner should hold the tray lengthwise, with the flat surface facing you (see diagram below).

*Activity adapted from BSCS. (1999). *Investigating weather systems*. Dubuque, IA: Kendall Hunt Publishing.

c. Observe the shape and size of the image that the light projects on the graph paper and describe this to your partner.

d. While you hold the flashlight steady, have your partner trace the pattern on the graph paper **without moving the tray**. (Your partner will need to take his or her time.)

e. Cut out this pattern and label it “Straight On.” (Write the label on the back of the image.)

f. Next, tape a new sheet of graph paper to the tray.

g. Have your partner tilt the tray so the light shines on the graph paper at an angle or a slant. Remember to hold the flashlight about 1 foot from the tray at all times. (Use your ruler to check the distance.)

h. Observe the shape and size of the image the light projects on the graph paper and describe this to your partner.

i. Have your partner trace the new pattern on the graph paper **without moving the tray**. (Your partner will need to take his or her time.)

j. Cut out this pattern and label it “At an Angle.” (Write the label on the back of the image.)

k. Next, tape a new sheet of graph paper to the tray.

l. Have your partner tilt the tray at different angles as you continue shining the light on the graph paper.

m. Observe the size and shape of the images the light projects on the graph paper and describe this to your partner. (Your partner doesn’t need to trace these images on graph paper. Just observe what happens to the light image when your partner changes the angles of the tray.)

4. Talk about these questions with your partner:

   a. What happened to the light when you shined it directly at the tray?

   b. Describe how the light image changed when the tray was tilted at different angles.

c. Did you observe any changes in the brightness of the light? Describe your observations.

d. When your partner tilted the tray at different angles, did you notice any change in the **amount** of light energy hitting any particular square on the graph paper?

Directions—Part 2

1. Set your two graph-paper cutouts side by side and compare them.
   a. Which light image is bigger: the one labeled “Straight On” or “At an Angle”?
   b. Which image is smaller: the one labeled “Straight On” or “At an angle”?
2. Now count the number of squares on each of your cutouts.
   a. On each cutout, write the number of squares that the light covered. (Don’t count any partial squares at the edges, only whole squares.)
   b. Which cutout has the most squares?
   c. How many more squares does it have than the smaller cutout?
3. Put away all your supplies except for the two cutouts.
4. **Think about this question:** Does your data (your evidence) give you any ideas about whether the **amount** of energy from a light source is different when it strikes a surface at an angle?