

## LAB: Angle of Incidence and Solar Insolation

**PURPOSE:** To observe the effect that angle of incidence has on solar insolation.

### MATERIALS:

- ⇒ Pencil
- ⇒ Three pieces of graph paper
- ⇒ 12 Inch Ruler
- ⇒ Tape

### PROCEDURE:

1. Place a piece of graph paper on a table or other flat surface and tape it down so that it will not move.
2. Measure a distance 12 inches above the center of the graph paper by standing the ruler vertically in the center of the paper.
3. While holding the flashlight at the top of the ruler (12 inches above the paper) shine it on the paper at a  $90^\circ$  angle – directly perpendicular to the paper.
4. Using the pencil outline the circle of light created by the flashlight and note the brightness or intensity of the light. You may want to work with a partner so you can trace the outline of the light while your partner holds the ruler and flashlight.
5. Count the number of squares on the graph paper that are inside the circle you traced.
6. Record your observations in the data table.
7. Remove the first piece of graph paper.
8. Repeat steps 1-7 for the second piece of graph paper but adjust the ruler so that it is at approximately a  $60^\circ$  angle to the paper.
9. Repeat steps 1-7 for the third piece of graph paper this time adjusting the ruler so that it is at approximately a  $30^\circ$  angle to the paper.

### OBSERVATIONS:

Angle of Ruler to Paper	# Squares in the Traced Circle	Intensity of the Light
$90^\circ$		
$60^\circ$		
$30^\circ$		

### QUESTIONS:

1. How do your numbers change as your angle of incidence changes?
2. How does the intensity of the light change as your angle of incidence changes?

3. If you had been using a heat lamp rather than a flashlight what do you expect your observations would have been in terms of the temperature of each piece of graph paper?
4. How can this be related to the angle at which the sun's rays hit the surface of the earth?