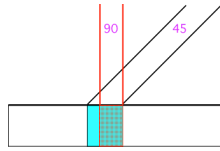


Student Activity:
Angle of Insolation



Name	_____
Date	_____
Period	_____ Table _____

Comparing the Angle of Insolation and Temperature Changes

Introduction

The sun shines on each part of the Earth for the same total number of hours every year but there are some areas of the Earth that receive more of the sun's energy than other areas do. Because the Earth is tilted on its axis and it is a sphere, the sun's rays strike different parts of the Earth at different angles. The angle for a given area is called *the angle of insolation*. In this investigation you will see how the angle of insolation affects the amount of heat and light energy reaching the Earth.

Problem

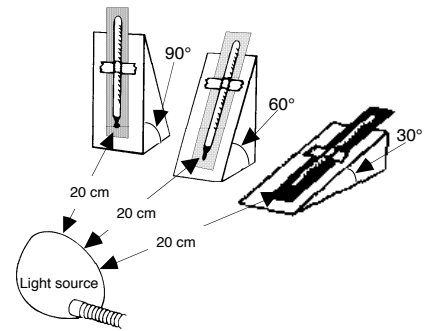
How does the angle of insolation of a surface affect the amount of light received and rate of temperature change.

Materials

- | | | |
|-------------------------|---------------|------------|
| 3 30/60/90° wood blocks | metric ruler | 200 W lamp |
| 1 clock | 250 ml beaker | |
| 3 Celsius thermometers | tape | |

Procedures

1. Tape a thermometer to 30° angle of one block, the 60° angle of the next, and the 90° angle of the last block.
2. Place all three blocks 20 cm from the light as shown
3. Record the temperatures of each thermometer in the table below. Switch on the light. Read the thermometers once each minute **without moving them**. Enter the data below. Record temperatures for 15 minutes and then turn the light off.
4. Graph your data for the three angles on the graph provided. (Time is x-axis, and Temperature is y-axis)
5. Use a different colored pen for each angle of insolation.



(Data was taken during a class demonstration. Graph the given data and use to answer conclusions.)

		TIME (minutes)															
Angle		0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
30°	Temp °C	22	24	26	27	29	31	31	32	33	33	34	34	34	34	35	35
60°	Temp °C	22	25	27	29	32	34	34	35	36	36	37	38	38	28	39	40
90°	Temp °C	22	25	28	30	34	36	36	37	38	39	41	42	43	44	45	46

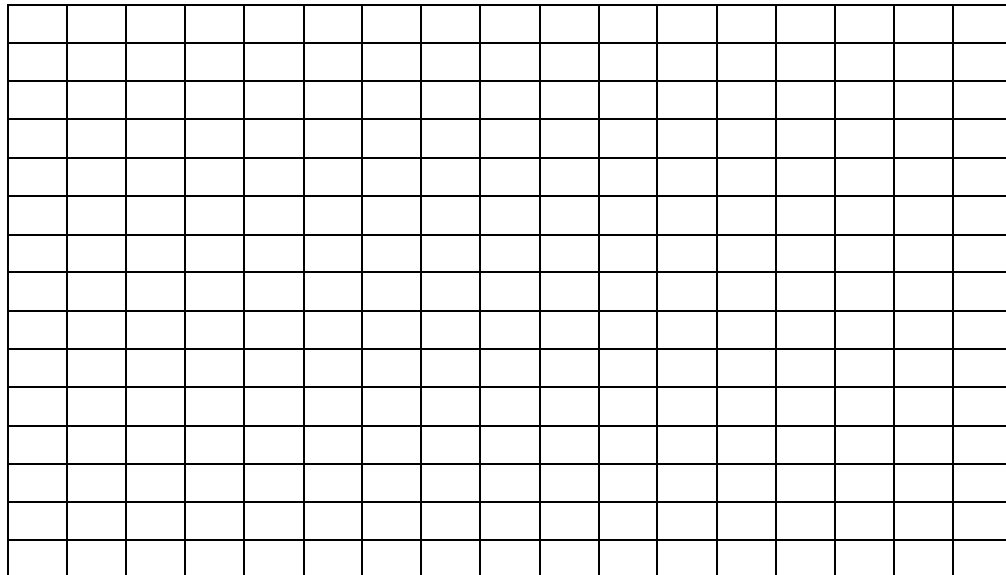
key - graph each angle in a different color

30° angle

60° angle

90° angle

Angle of Insolation



Conclusions:

1. Which angle showed the greatest increase in temperature? What region of the Earth would this correspond to?
2. Which angle showed the least increase in temperature? What region of the Earth would receive sunlight at this angle?
3. What region of the blueprint paper showed the greatest amount of exposure? What region of the Earth would this represent?
4. Even though the North Pole is tilted toward the sun in the summer, its temperatures are still very low. How can you explain this?
5. How are the blueprint paper results and the temperature results related?