

Names: Partner 1 _____

Partner 2 _____

Worksheet: Latitude, Angle of Sun and Solar Energy





Why is it hot in the summer (select the best answer)?


- A. Because it's summer.
- B. Because the earth is closer to the sun.
- C. Because the solar energy is stronger.
- D. Because the solar energy is concentrated over a smaller surface area.
- E. Because the winter snow melted.

Hold on to your answer. We'll come back to it later?


Let's try an experiment. Each lab team will use a flashlight that has been taped to one end of a meter stick.


Lab protocol:

1. Hold the meter stick perpendicular to the floor with the flashlight pointing down.
2. Turn the flashlight on and focus the beam so that you get a nicely defined small circle of light projecting on the floor.
3.  Measure and record the diameter of the circle.
4. Then tilt the meter stick so that it is at a 45° angle to the floor.
5.  Measure and record the longest distance across the oval.
6.  Estimate and record how much more surface area the 45° angle circle covers versus the 90° angle circle (2x, 3x, 3.5x?).
7.  Now compare the brightness of the light where it hits the floor surface by shining the light at 45° and 90°. Record which setting had a brighter area of light?

Whenever you see a , partners should record data in your data log or lab book




Gathering and analyzing data:

-  Let's look at some data to try to see patterns that might relate to the question as to why it's hotter in the summer. Open the file *latitudeangle.xls*. There are six columns of data: *City, State, Latitude, Angle of the sun (at noon on Spring Equinox day), surface area covered by a square meter of light energy and Elevation*.

Whenever you see a , a partner should do something with the spreadsheet file

Science is often driven by data. Huge amounts a data. Data that can look like this - messy and unwieldy. Let's try to organize it to see if any patterns emerge that might help us answer the question why it's hot in the summer.

There are a number of different data points associated with every city. We are interested in factors (there may be more than one) that might influence temperature. How can we organize the spreadsheet so that a pattern or patterns might emerge. Well, since we're interested in temperature, let's organize the data by temperature.

-  Click on any cell (box) in the spreadsheet and hold the command key (apple key for Macs) and push "A" to select all.
-  Go to the *Data* menu and pull down to *Sort*.
-  Pull down the *Sort by* options menu and choose *Avg. Annual Temp.* and then select descending radio button and click *OK*.