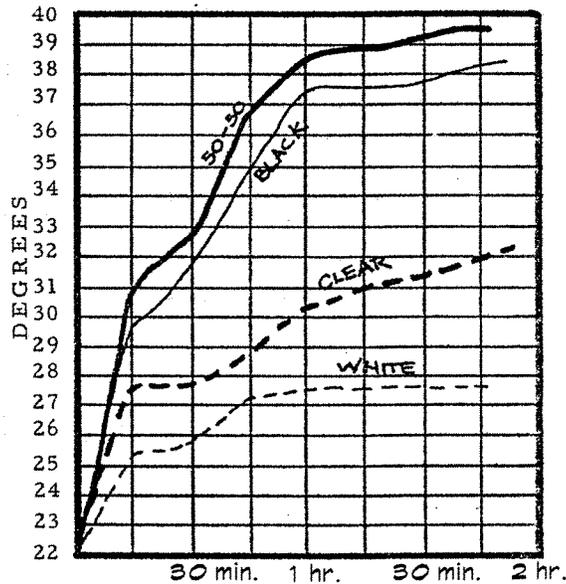


The plans to build your own Energy House and the experiments to do can be found at Design Coalition's website at [www.designcoalition.org](http://www.designcoalition.org)

# the Energy House Graphing

by: Lou Host-Jablonski, AIA



Here's how to make the graphs for your experiments with the Energy House.

Find out how a solar-heated house really works.

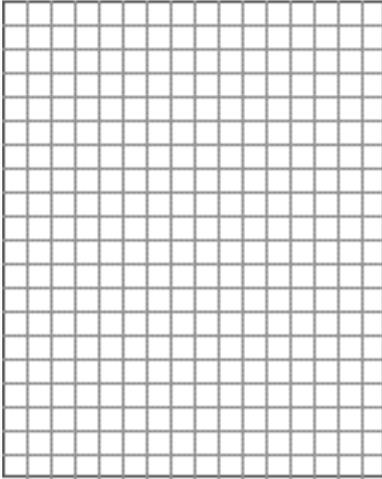
You build the Energy House in stages. Each time you do an experiment you change it a little. That way you can see how each change makes the house work a little differently.

**design coalition**

**Design Coalition Inc., Architects**

Madison, WI, 53704 USA

©2000

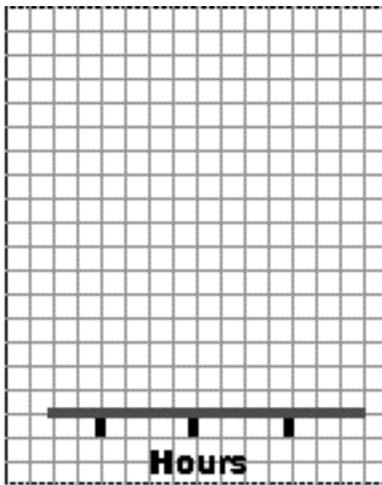


When you do the Energy House experiments, you'll need to write down the results so that you can figure out what happened and why. **Graphing** is a good way to write down your results.

Here's how you do it....

Start with a blank piece of graph paper. Graph paper is just paper that has lines up-and-down (vertical), and lines across (horizontal), making many little rectangles.

If you don't have any graph paper, you can easily make some by drawing lines on a paper. Make the squares as evenly-sized as you can.

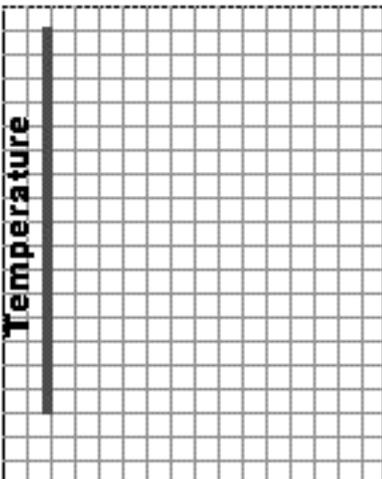


Near the bottom of the paper, draw a horizontal line for Hours.

The space between the vertical lines represent an amount of time. Decide how often you want to check the thermometer, whether every 5 minutes, or 10, or 15.

Each space will stand for the amount of time that you decide.

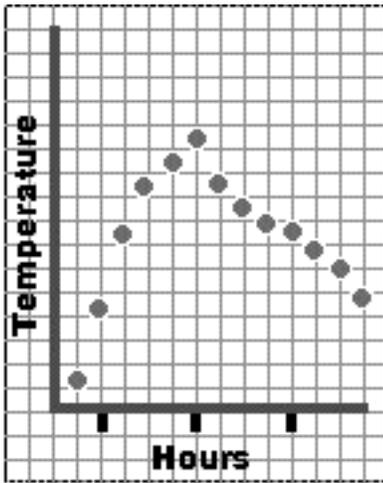
Make sure that you have enough spaces on the paper for about 3 hours of time.



Near the left edge of the paper, draw a vertical line for Temperature. The space between the horizontal lines represent an amount of temperature. Each space stands for one degree of temperature.

Make sure that you have enough spaces on the paper for about 18 degrees (if you're using a Centigrade thermometer) or about 30 degrees (if you're using a Farenheit thermometer).

Now you're ready to graph your measurements from an experiment.

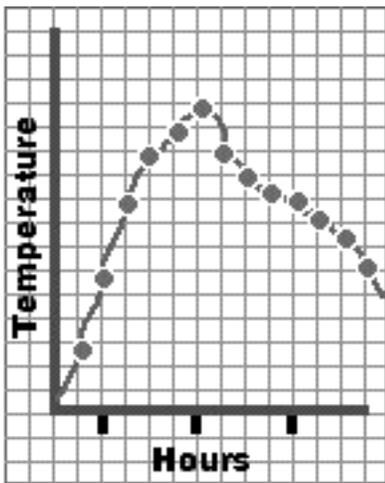


Set up the Energy House for the experiment. Begin the experiment.

Read the thermometer every 5, 10 or 15 minutes.

Then mark the temperature with a dot.

Make sure that you mark the dots on the correct vertical time line.



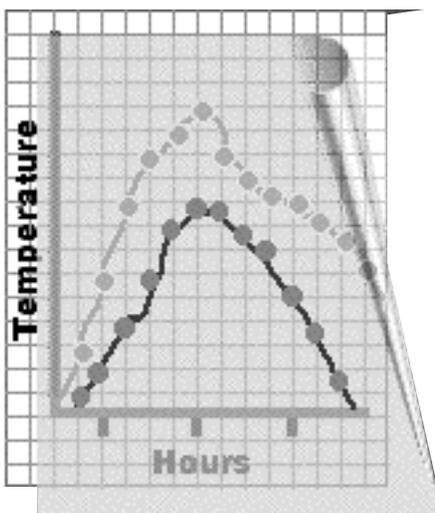
When the experiment is all done, connect the dots with a line. That line is called the "**time-temperature curve**". It is a picture of what happened during the experiment.

You could also have written down your temperature readings as numbers on a scrap of paper. But a graph gives you a picture that is easier to understand.

Can you tell what happened in this experiment by looking at the graph?

You can see that the temperature rose steadily for a period of time, reached a certain point, then the temperature fell. The shape of the graph and the slope of the lines tells the story of the experiment.

So if you're trying to compare this stage of the Energy House with a different stage, you want to compare the graphs of the experiments. You want to put the graphs together.



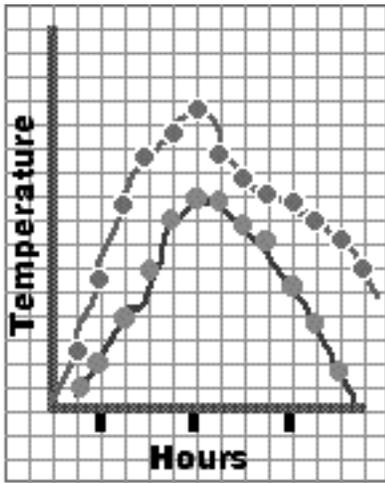
An easy way to transfer your graphs is with tracing paper or carbon paper.

What if you drew the graphs for two experiments on one piece of graph paper?

Then it would be very easy to see the difference between the two experiments.

HINT: Graph each experiment in a different color. That way it's even easier to see the differences.

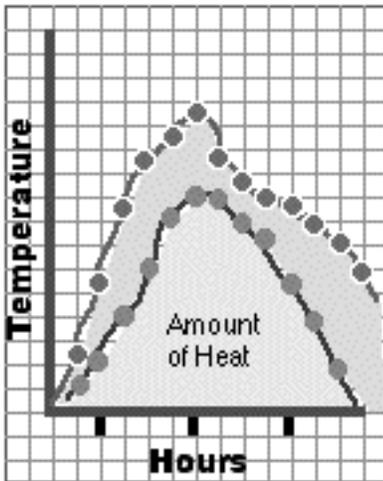
IMPORTANT!!! Make sure that you line up the graphs exactly, so that the time and temperature scales are the same for every experiment.



What does this double graph say? There is an upper time-temperature curve and a lower one.

(Hint: the upper dots show higher temperatures than the lower dots, which are lower on the Temperature scale.)

In the Upper experiment, the Energy House got warmer than in the Lower experiment, and stayed warmer longer, right?



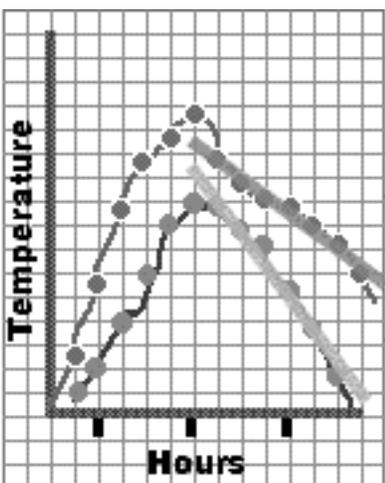
### The meaning of the Area of the Curve...

You can even tell HOW MUCH more heat stayed in the Energy House in the Red experiment. How do you do that?

Just count all the squares under each curve!

The number of square under the upper curve is the total units of heat saved in the Upper experiment. The number of squares under the lower curve is the total units of heat saved in the Lower experiment.

So, the upper squares minus the lower squares equals the difference between the two stages of the Energy House in the Upper and Lower experiments.



### the meaning of Slope of the Curve...

Look at the slope of the lines of your graph. Notice how steeply sloped the lines are. Do you think this means anything?

A steeply sloped line means heat is gaining or losing faster. A more shallow-sloped line means heat is not losing or gaining quite so fast.

Can you tell which line shows the heat going out of the Energy House more slowly?

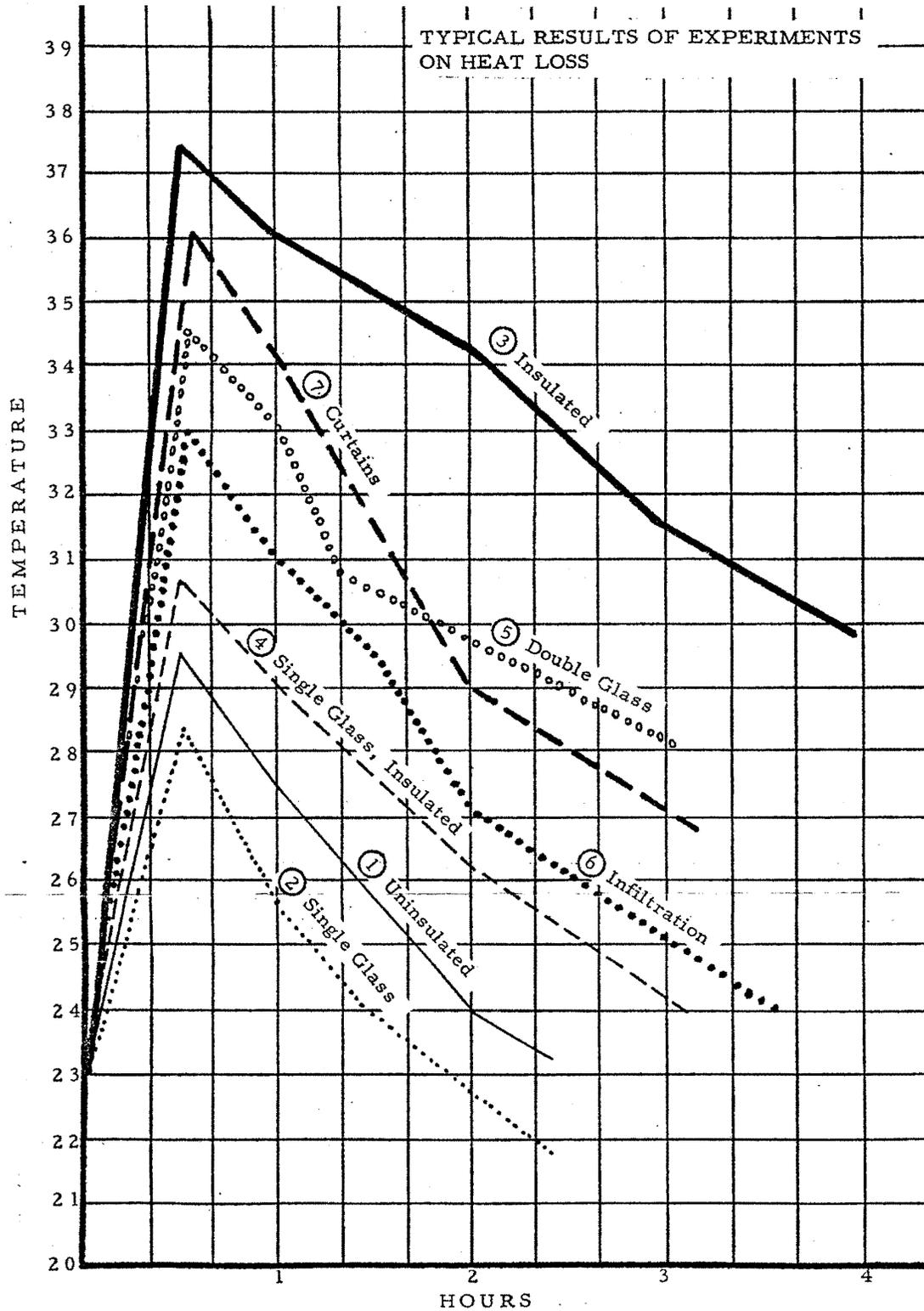
ANSWER: The Upper line shows heat is being lost more slowly than the Lower line.

Here are the graphs that we made when we did the experiments with our own Energy House.

When you draw the graphs all together on the same sheet of paper, you can easily see the differences between the stages.

The temperatures shown here are in Centigrade.

This graph is for the experiments on **Heat Loss**



.Here's the graph below is for the experiments on **Heat Gain** from the sun  
(Experiments 10, 11 and 12)

