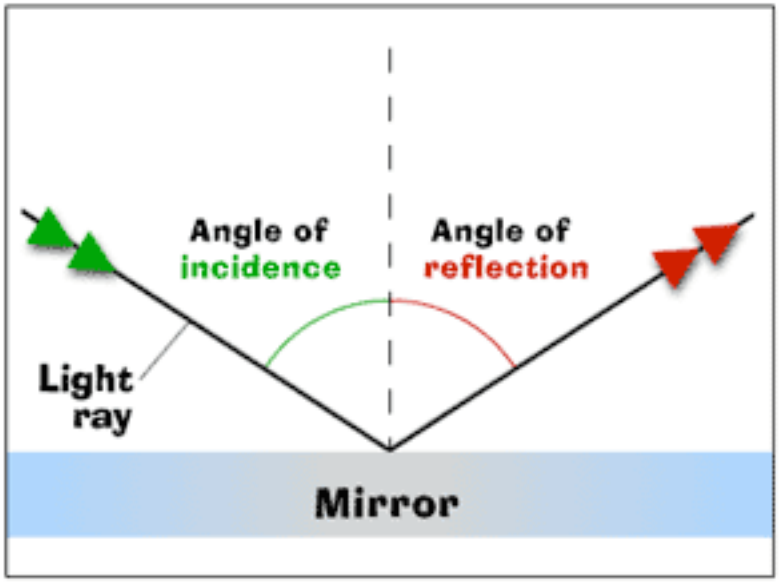
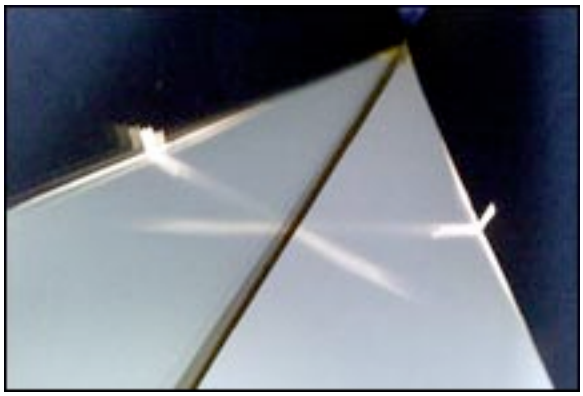
Reflecting Light Experiment

Reflection is most likely the property of light that we experience most often. Looking at yourself in a mirror, seeing the reflection of the sun in the ocean at sunset, and the sight of a mirage on the hot desert sand are all examples of reflection. In fact, everything you can see is the result of a complex pattern of light reflecting off the surface of something. In the next set of experiments, you will be studying the nature of reflection from a smooth surface.



The Angle of Reflection

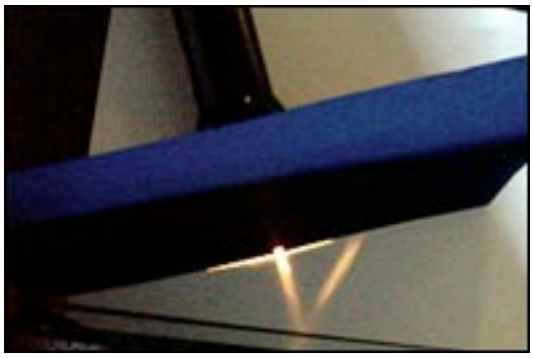
When light reflects off of a surface such as a mirror, two angles are created from the light's path and the surface of the mirror: the angle of incidence and the angle of reflection. Are the angles the same size? Conduct the following experiment to find out.



What You Will Need:

A mirror about 10 cm x 10 cm
A flashlight
A cardboard box, such as a shoebox big enough to hold the flashlight
A protractor to measure angles
A ruler
Enough modeling clay to hold up the mirror on a table top
8 1/2" x 11" plain white paper

Begin by making a narrow slit (no more than 3 mm) in the end of the box. Place the flashlight inside the box so that a narrow shaft of light emerges from the slit and runs along the tabletop. Using the clay, place the mirror so that the beam of light strikes the center of the mirror.



Place a sheet of paper on the table in front of the mirror then use the ruler to trace the pathway of the beam to and from the mirror. Label the incidence beam and the reflective beam. Using a protractor, measure these angles in degrees. How do they compare? Create a table and record your results. Repeat the experiment four additional times, changing the angle of incidence with each trial.

Using what you have learned, can you arrange a series of mirrors in the classroom such that light can make a complete circuit around the room? Perhaps

your teacher has a laser pointer that can be used with a series of mirrors in the classroom.

That Which Is Not Reflected is Absorbed

Can the lightness or darkness of your clothes help to keep you warm on a cold clear day? To find out, conduct the next simple experiment in a sunny window of the classroom.

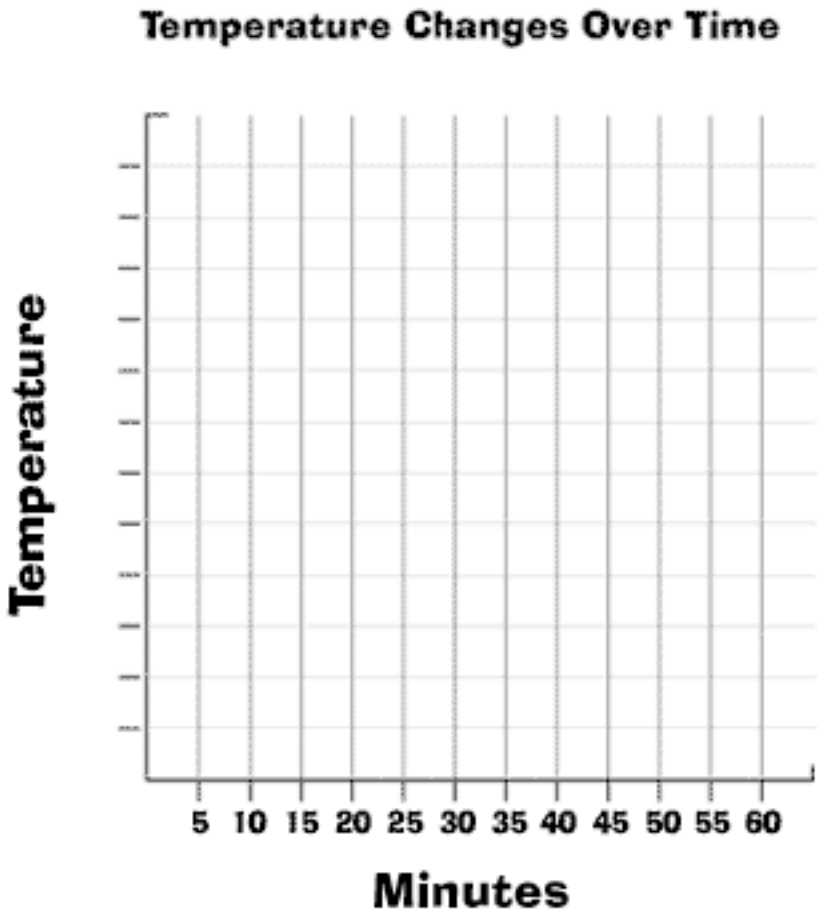
What You Will Need:

- 3 small jars (small peanut butter jar size)
- Vegetable oil (enough to just about fill each jar)
- Thermometers (one for each jar would be best)
- Construction paper or poster paint, in black, white, and one other color of your choosing

To begin, paint (or wrap) the outside of each jar with different paper. Now, fill each jar with the oil and place them in a sunny window. Take the initial temperature of the oil in each jar and record the results. Can you predict which jar if any warms the fastest? Why do you think oil was used instead of water?

Take temperature readings every 5 minutes until 1 hour has passed. Record the results in a table. Under each jar color, write the temperature at each interval. Prepare a line graph showing the changes in oil temperature over the entire sample period. How do the three jars compare in terms of the speed in which they warmed up?

Do you think the color of the jar affects its rate of cooling as well? Find the answer to this question by repeating the experiment, but now place the jars in the shade. Compare your observations with your prediction. How well did your prediction hold up against your data?


Temperature Changes Over Time
Temperature
5 10 15 20 25 30 35 40 45 50 55 60
Minutes