



3. Place each of the three containers under a heat lamp or in a sunny place. If you use a heat lamp, be sure to place each container exactly the same distance from the bulb. Every four minutes, stir the water vigorously and measure the temperature in each container.

Repeat this procedure for 24 min.

- a) Record these measurements on your data table.



Be careful not to stir with the thermometer as it can break. Be careful of the lamp—it will get hot and can cause burns.

4. After 24 minutes of temperature measurements have been recorded (or longer if necessary), review your data.
- How can the data you gathered be used to test the prediction you made in **Step 2**?
  - Which container got the hottest?
  - Which container heated the quickest?
  - Were your predictions correct?
  - Do the reasons you gave for your prediction seem sound? If not, can you find an alternative explanation for what happened?
  - What evidence do you have that shows a connection between color and the absorption of sunlight (or light from a heat lamp)?
  - In your group, discuss your findings and what they show.
  - Can you think of any other examples where color of materials and heat are involved?
  - What variables did you control in this experiment?
  - What variable did you manipulate or change?

### Part B: Designing a Water Heater

1. As a group, you will design a device to heat water contained within rubber tubing. The goal is to produce the hottest water. You must use the equipment provided.



### Inquiry

#### Variables

*A variable is anything about an experiment that can be changed by the investigator or changes naturally. Usually in a scientific experiment, all variables are kept the same except for one—the variable that is being tested. Variables that are kept the same are said to be controlled.*

#### Materials Needed

For this part of the investigation your group will need:

- tubing
- funnel
- insulated container like a small Styrofoam® cooler for collecting water
- cardboard lid or box trimmed to a 3-cm height
- masking tape
- black construction paper
- scissors
- school glue
- plastic wrap
- tubing clamping
- newspaper
- ring stand