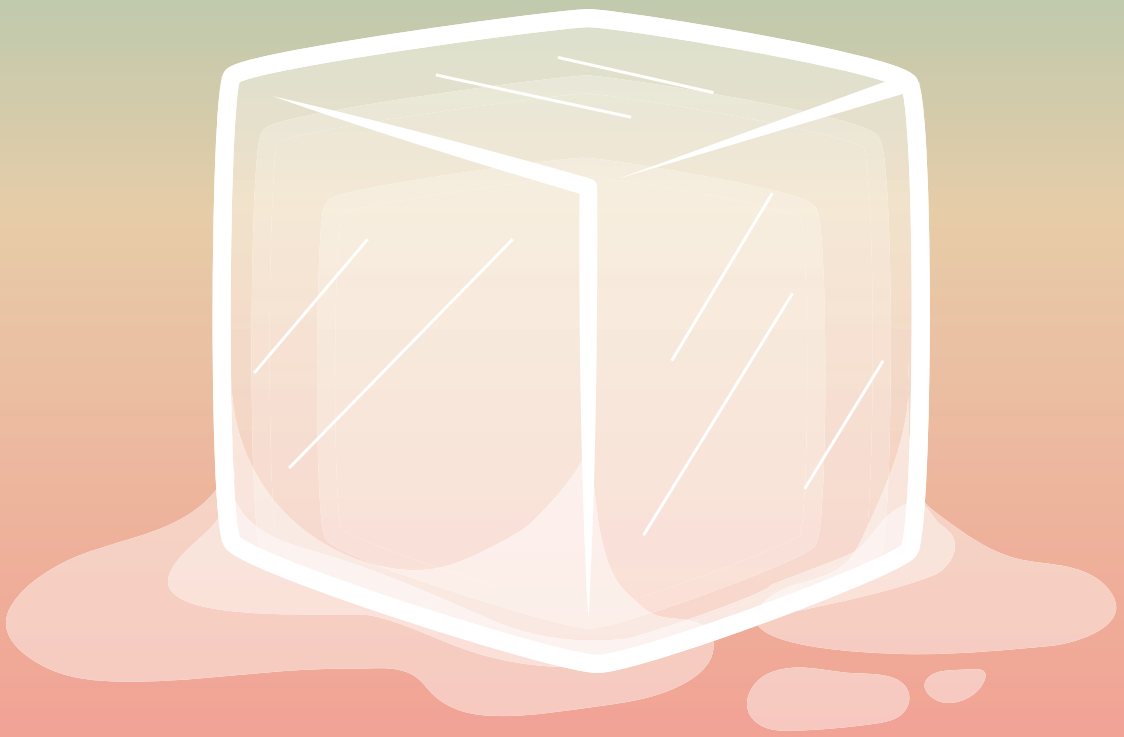
E

Investigating Temperature

4th Edition

By
Patricia D. Morrell
Trudy Mitchell



ELB-TEMP

Vernier

Contents

Name: _____

Why Do We Need Thermometers?

Do you ever feel really cold in your classroom while everyone else is hot? Do you sometimes feel really warm outside, even though you are told that you need to wear a coat because it's cold? The temperature your body senses does not always match the temperature that would be recorded by a thermometer. It is possible that on the day you felt warm outside, even though it was cold, you had been running around and were already warm. When you do this activity, you will see if previous conditions affect the ability of your hands to measure temperature.

Figure 1

OBJECTIVES

- Determine if touch is adequate to determine temperature.
- Be able to explain the need for a thermometer.

MATERIALS

Chromebook, computer, **or** mobile device
Graphical Analysis 4 app
Go Direct Temperature
3 cups
warm water, cold water, room-temperature water
paper towels

PROCEDURE

1. Launch Graphical Analysis. Connect the Temperature Probe to your Chromebook, computer, or mobile device.

2. Line up the cups of water in front of you on the desk so the room-temperature water is in the middle and the warm and cold are on either side.

3. Each group member will have a chance to do the experiment. Decide who will go first. Have that person place two fingers of one hand in the warm water and two fingers of their other hand in the cold water. Hold them there for about 30 seconds. It is important to leave your fingers in the water baths for the whole 30 seconds.

4. The person with his or her fingers in the water should estimate (make a best guess at) the temperature of the water in the two cups, in °C. Record these values in the Data Table.

Data Table			
	Estimated temperature (°C)	Measured temperature (°C)	Temperature difference (°C)
Cold water			
Room-temperature water			
Warm water			

5. The person with his or her fingers in the water should now put their fingers in the room-temperature water (the one in the middle). Record the estimated temperature of the room-temperature water in the Data Table.

6. Record your observations about what your fingers were feeling when they were placed in the room-temperature water.

Observations

7. While the person who tested the water first records their observations, dispose of the water as directed by your teacher, and then obtain new amounts of all three types of water.

8. Repeat Steps 2–7 for each person in the group.

9. You will now measure the temperatures of the water baths using the Temperature Probe.
   a. Place the probe in the cool water. Hold on to the probe so the cup does not tip over.
   b. Watch the temperature in the meter. When the temperature readings are the same for several seconds (stop increasing or decreasing for each reading), record the temperature value in your Data Table.

10. Repeat Step 9 two times. The first time, place the Temperature Probe in the room-temperature water, and the second time, place the probe in the warm water.

ANALYZE YOUR DATA

1. Subtract to find the difference between the estimated and measured temperatures for each of the water baths. Record these values in the Data Table.

2. How close were your estimates of the different baths? _____

   _____

3. Based on the observations you made earlier and the calculations you just performed, do you think that your hands are good at measuring the temperature of water? Why or why not?

   _____

   _____

   _____

   Do you need to use a thermometer to accurately measure temperature? _____

   Why or why not? _____

   _____

Name: _____

LabQuest App 9

Solid, Liquid, Gas: Water Can Do It All

As you have learned, materials can exist in three different states: solid, liquid, and gas. Water is a substance that we often see in all three states. You put solid water (ice) in your drinks to cool them down. You drink liquid water when you are thirsty. You breathe gaseous water when you take a breath. During this activity, you will watch your teacher melt and boil water, and make observations about what you see happening.

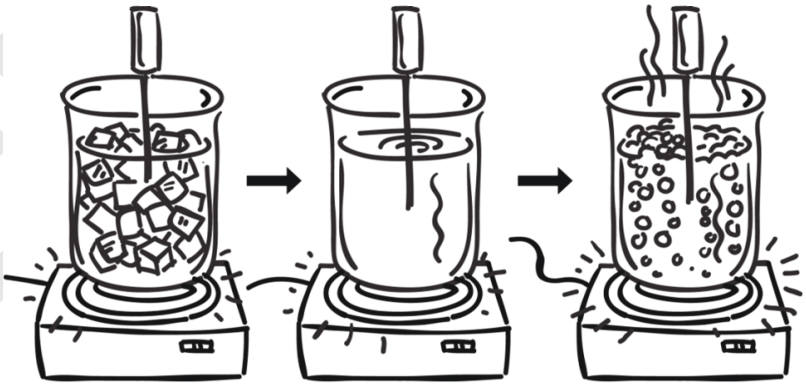
OBJECTIVES

- Determine the temperature at which ice melts.
- Determine the temperature at which water boils.
- Make observations about water as it goes from a solid to a liquid, and then to a gas.

MATERIALS

paper and a pencil

PROCEDURE



Your teacher will perform a demonstration using heat. Your job is to make observations about changes in the temperature and the object being heated. Record your Observations on the Observations Sheet. Be sure to answer all of the questions on the Observations Sheet.

Observations Sheet

1. What happens to the ice as heat is added?

2. What happens to the temperature as heat is added to the ice?

3. What happens to the temperature when the ice is completely melted?

4. What happens to water as heat is added?

5. What happens to the temperature as heat is added to water?

6. What happens to boiling water as heat is added?

7. What happens to the temperature as heat is added to boiling water?

ANALYZE YOUR DATA

1. At what temperature does ice melt? _____
2. At what temperature does water boil? _____
3. What do you need to do to turn steam back into water?

   _____

   _____

4. What do you need to do to turn water back into ice?

   _____

   _____