

Are We Cool or What?

Is your hand always cool? Is it always warm? What makes it change? The temperature of your own hand is just one of many things you will be able to measure with your Go!Temp temperature probe.

OBJECTIVES

In this experiment, you will

- Learn to use the Go!Temp temperature probe and Logger Lite software.
- Measure the changing temperature of your hand under different conditions.

MATERIALS

computer with Logger Lite software installed
Go!Temp temperature probe

PROCEDURE

Part I Measure the Temperature of Our Hands

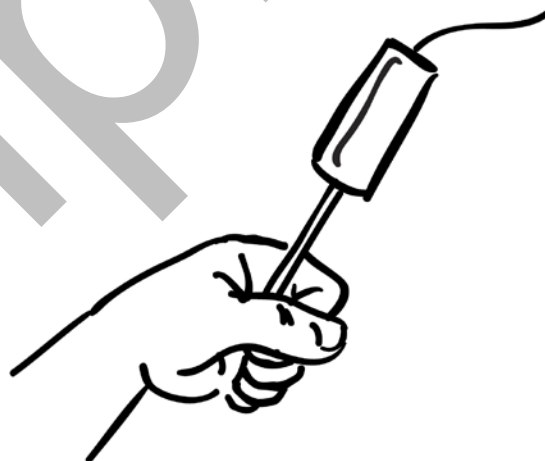
1. Fill in the names of your group members in the table below.

Part I Data Table		
Group member number	Group member name	Maximum hand temperature
1		°C
2		°C
3		°C
4		°C

2. Make sure the Go!Temp temperature probe is connected to the computer.
3. Start the Logger Lite program on your computer.

Activity 1

4. Open the file for this activity by doing the following.
 - a. Click the Open button, .
 - b. Open the folder called "Investigating Temperature."
 - c. Open the file called "Act 01 Are We Cool."
5. You should see a graph, a data table, a thermometer, and a meter showing temperature values on the computer screen. The thermometer and meter are showing live temperatures readings.
6. Give the temperature probe to the first group member. They should be ready to hold the tip of the probe as soon as data collection is started. For now, hold onto the plastic part of the probe, so the temperature of the probe does not start to adjust to the temperature of your hand.
7. When everything is ready, start collecting data by clicking the Collect button, .
8. The first group member should now hold the tip of the probe. Watch the temperature on the computer screen.
9. Data collection will last 60 seconds. It is important to hold the tip of the probe for the entire 60 seconds so that it has enough time to adjust to the temperature of your hand.
10. How hot was your hand? You can probably tell from the graph, but to find out exactly, do the following.
 - a. Click the Examine button, , and the Examine box will appear on the screen. As you move the cursor across the graph, the temperature and time values will be displayed in the Examine box.
 - b. Move the cursor around the graph until you find the highest temperature.
 - c. Record this temperature in the Part I Data Table.
 - d. Close the Examine box by clicking the upper-left corner of the box.
11. Store this run by clicking the Store button, .
12. Repeat Steps 6 - 11 for each group member. Make sure the temperature probe has cooled back down to room temperature between runs.



Part II Changing the Temperature of Our Hands

Think of some ways that you could change the temperature of the palm of your hand. How would the temperature change if you rubbed your hands together? What if you placed your hand on the window and held it there for five seconds? What if you placed it near a heater? Each person in your group will try a different way of changing the temperature of his or her hand.

13. Choose the way you will try to change the temperature of your hand.
14. Write your hypothesis about what will happen. For example, a hypothesis about soup would be: "If I put my bowl of hot soup on the porch for five minutes, and then measure the temperature of the soup, I think the temperature will go down a lot."

Hypothesis:

If I _____

and then measure the temperature of the palm of my hand, I think the temperature will

15. Write the names of the members of your group and the action each plans to take.

Part II Data Table				
Group member name	Action taken	Starting temperature (from Part I)	Ending temperature	Increase or decrease? (+ or -)
		°C	°C	°C
		°C	°C	°C
		°C	°C	°C
		°C	°C	°C

16. Write the starting temperatures of the members of your group in the column marked "Starting temperature." These temperatures can be found in the Part I Data Table.

Activity 1

17. Clear the Part I data by choosing "Clear All Data" from the Data menu.
18. The first group member should now:
 - a. Do the action you have planned to change the temperature of your hand.
 - b. Grab the tip of the Go!Temp and click the Collect button, .
 - c. When the data collection is finished, click the Examine button, .
 - d. If you were trying to cool down your hand, use the cursor to find the coldest temperature. If you were trying to heat up your hand, use the cursor to find the warmest temperature. Record this temperature in the "Ending temperature" column of the Part II Data Table.
19. Store this run by clicking the Store button, .
20. Each group member should repeat Steps 18 and 19.

ANALYZE YOUR DATA

1. Subtract the starting and ending temperatures to find out how much the temperature increased or decreased. Write your answer in the last column of the Part II Data Table. If the temperature increased, write a "+" in front of the number. If it decreased, write a "-" in front of the number.
2. Were you able to change the temperature of the palm of your hand? _____
3. Was your hypothesis correct? _____ Why or Why not? _____

4. Which action caused the greatest temperature change? _____

5. If you had a chance to try this experiment again, what action would you take to get an even greater temperature change?

6. Why couldn't you hold the probe for just 10 seconds instead of 60 seconds?

Good job!!

Sample

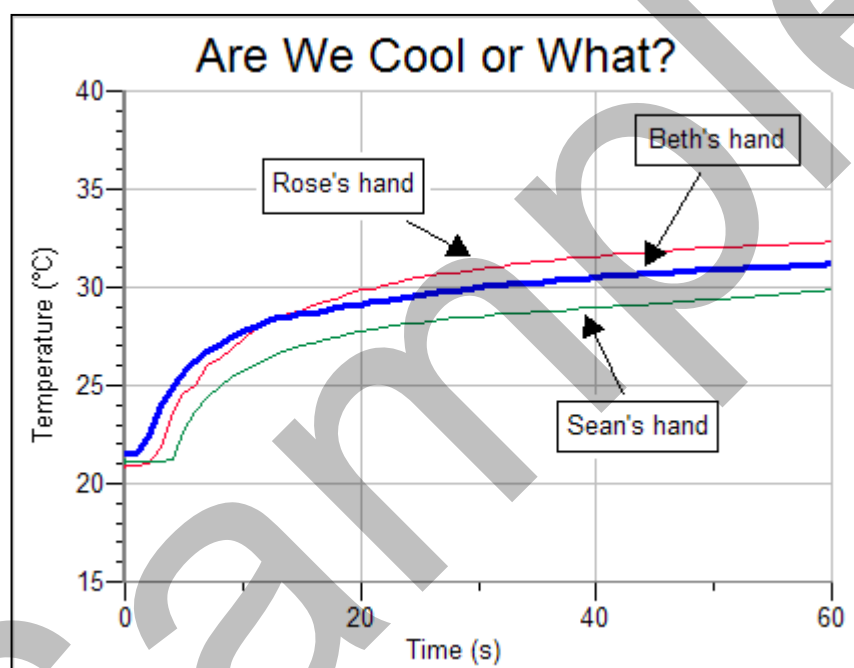
TEACHER INFORMATION

Are We Cool or What?

1. This experiment should be done first, as we have included more detailed directions for using the software than we have in other activities.
2. Each student should fill out a table for the whole group so comparisons can be made and so they can practice keeping track of their data.
3. In the second part of the activity, the students are asked to try to change the temperature of their hands. Rubbing hands together, placing them against a cold window or under hot or cold water, sitting on them, and holding an ice cube, a cold cup, or a hot cup, are all different options that work well. If they can't come up with enough different activities for each member of the group, they can try to vary the time they spend rubbing their hands or holding their hands in the cold water.
4. You might have the groups share the procedures that worked best at raising or lowering the temperature of their palms. Have them share ideas of what they might try if they had had the opportunity to redo the activity. Encourage students to ask questions of each other, to stimulate discussion, and to question their own assumptions.
5. You might want your students to label their graphs using Text Annotation from the Insert menu, as shown in the sample graph on the next page.
6. As written, this activity does not direct students to print or sketch a copy of their graph. If you have a printer available, you can instruct them to print the entire screen or just the graph. A simple way to print just the graph is to choose Print Graph from the File menu. Similarly, if you want students to print a copy of the data table, they can choose Print Data Table from the File menu. If you do not have a printer available, you can have the students sketch a copy of the graph. If desired, they can use the values in the data table on the screen to make more accurate graphs.

SAMPLE RESULTS

Part I Data Table		
Group member number	Group member name	Maximum hand temperature
1	Rose F.	32.2°C
2	Beth Q.	31.1°C
3	Sean B.	29.8°C



Students' hand temperatures recorded during the Part I procedure.

ANSWERS TO QUESTIONS

1. Answers will vary.
2. Answers will vary.
3. Answers will vary depending on their hypothesis.
4. Answers will vary.
5. Answers will vary.
6. In 10 seconds, the probe would not yet have warmed up to the hand temperature.