Heat It Up & Cool It Down!

Student Activity

Name _____

Class _____

In this experiment, you will increase the temperature of a Vernier Go Direct (GDX) Temperature Probe using the palm of your hand. This will produce an increasing graph. You will then be asked to produce a decreasing graph. In the process, you will learn how to use the data-collection equipment you will be using throughout the school year. You will also learn how to analyze a graph.

Figure 1.

OBJECTIVES

- Use a Go Direct (GDX) Temperature Probe to measure temperature.
- Produce an increasing and a decreasing graph.
- Analyze the slope of each graph.
- Compare results.

MATERIALS

- TI-Nspire™ CX II Handheld
- Vernier® GDX Temperature Probe
- Calculator Connection Cable (Mini-A to Micro-B USB)

PROCEDURE

1. Turn on the TI-Nspire™ CX II.
2. Connect the GDX Temperature Probe to the TI-Nspire CX II Handheld with the cable provided. The Vernier DataQuest App will automatically open.
3. Click Duration to open Time Settings. Set Duration to 60 s. Click OK.
4. Measure the temperature of the palm of your hand. (See Figure 1)
   a. Click the ( ).to start data collection.
   b. Pick up the Temperature Probe and hold its tip in the palm of your hand as shown in Figure 1. Data collection will end when 60 seconds have gone by.
5. Record your highest temperature.
   a. When data collection is complete, a graph of temperature *vs*. time will be displayed. To examine the data pairs on the displayed graph, click any data point. As you click each data point, the time and temperature values of the point are displayed on the left of the screen.
   b. Record your highest temperature.
   c. Choose [Menu], Analyze, Curve Fit, and Linear.
   d. Record the slope (m) with appropriate units.

e. Also record the r value to three decimal places

6. Click the Store Data button ( ) on the left to store Trial 1.

7. Discuss with your lab partner how to produce a graph with a decreasing temperature. Hint: *Waving the probe in the air is not effective.*

8. Once you have determined the method to produce a decreasing graph, press ( ).to start data collection.

9. Record your lowest temperature.

   a. When data collection is complete, a graph of temperature *vs*. time will be displayed. Click the graph to determine the lowest temperature.

   b. Record your lowest temperature.

   c. Choose [Menu], Analyze, Curve Fit, & Linear.

   d. Record the slope (m) with appropriate sign and units.

   e. Also record the (r) value to three decimal places.

10. Disconnect the GDX Temperature Probe and hold the on button until it turns off.

DATA

Trial	Temperature (°C)	Slope (m)	Correlation Coefficient (r)
1			
2			

QUESTIONS

1. In Trial 1, who in your class had the hottest hand? The coolest hand?

2. Comparing the slopes of the graphs from Trial 1 and 2, which had the steepest slope?

3. Compare the (r) values for both graphs. Which graph was most linear?

4. What is the significance of the (-) sign of the slope on trial 2?

EXTENSION

Criminal Scene Investigations (CSI) are a popular topic for students in Forensics Classes and the subject of several television shows. In the case of an unexplained death, investigators need to determine the time of death. Research time of death determinations and relate the result of your investigations to this experiment.