Computer
4

The Sole Purpose!

Have you ever wondered how shoe companies decide what kind of sole to put on the bottom of their shoes? This activity explores the heat produced by friction on different sole materials. You will rub a Go!Temp temperature probe back and forth across several different shoe soles to collect temperature data. Then you will compare and analyze your results to decide why different shoes have soles made from different materials.

OBJECTIVES

In this activity, you will

- Predict which shoe sole will get the hottest and which will stay the coolest.
- Compare the temperatures of different line graphs and analyze your data.
- Discuss the purpose of each type of shoe, and why the sole is made from that material.

MATERIALS

computer with Logger Lite software installed
Go!Temp temperature probe
4 shoes with different types of soles

KEY QUESTION

Does the type of sole on a shoe affect the amount of friction (heat) you can produce by rubbing a Go!Temp on it for 20 seconds?

HYPOTHESIS

I believe that the _____ shoe with the _____ sole will get the hottest

because _____.

I believe that the _____ shoe with the _____ sole will stay the coolest

because _____.

PROCEDURE

1. Make sure the Go!Temp is connected to the computer. Put the Go!Temp on the table and don't touch it until you are told to do so later on.
2. Start Logger Lite on your computer.
3. Open the file for this activity by doing the following:
   a. Click the Open button, .
   b. Open the folder called "Elementary Science."
   c. Open the file called "04 The Sole Purpose."
4. Choose 4 shoes with different types of soles.
5. Fill in the first two empty columns in the Data Table, below.

Data Table		Room temperature: _____ °C	
Shoe	Description of shoe and sole	Main use of shoe	Final temperature
1			°C
2			°C
3			°C
4			°C

6. Do the following to find the temperature of the classroom:
   a. Make sure the Go!Temp is still on the table and has not been touched.
   b. Look at the temperature displayed in the digital meter on the screen.
   c. The temperature readings should be constant; that is, they should stay just about the same as you read the meter. This temperature is important because the Go!Temp must be at room temperature before each test you do.
   d. Record the room temperature in the Data Table, above.

7. Collect data while you rub a Go!Temp on the sole of a shoe by following these steps:
   a. Pick up Shoe 1.
   b. Click Collect and start to rub the Go!Temp back and forth across the sole of the shoe during the whole data-collection period.
   c. When you are done, put the Go!Temp on the table and don't touch it until you are told to do so later.

8. To label your graph, do the following:
   a. From the Insert menu, select Text Annotation.
   b. In the text box that appears, type: Shoe 1. If you have a question about how to do this, ask your teacher.
   c. Move the box and arrow so they are close to the line of the data for this shoe.
9. Follow these steps to determine the final temperature of the run and store your data:
   a. In the table on the screen, scroll down through the data of this run to find the final temperature.
   b. Write down the final temperature in the Data Table in Step 5.
   c. Click the Store button, , to store your data.
10. Repeat Steps 7-9 for each of the 3 other shoes. Each time, be sure to
    - Make sure the Go!Temp is at room temperature before you start.
    - Rub the Go!Temp at the same speed that you rubbed the first shoe.
    - When you type in the text box, type the correct number for the shoe.

ANALYZE YOUR DATA

1. What did you notice about the beginning temperatures of each graph? Were they the same? Why or why not?

2. What did you notice about the ending temperatures of each graph? Were they the same? Why or why not?

3. How close was your hypothesis? Which shoe got the hottest and which shoe was the coolest?

4. Which shoe would be the easiest to slide around on (and so has the lowest friction) ?

5. How does the temperature increase relate to the friction on the sole of the shoe?

6. For what kind of activity would you want shoes with high-friction soles? For what kind of activity would you want low-friction soles? Explain your answers.

Good job!

Vernier Lab Safety Instructions Disclaimer

THIS IS AN EVALUATION COPY OF THE VERNIER STUDENT LAB.

This copy does not include:

- **Safety information**
- **Essential instructor background information**
- **Directions for preparing solutions**
- **Important tips for successfully doing these labs**

The complete *Elementary Science with Vernier* lab manual includes 43 labs and essential teacher information. The full lab book is available for purchase at:

www.scientrific.com.au