

CHAPTER 10**REAL-WORLD LAB***You, the Consumer*

Sticky Sneakers

The appropriate sneaker for an activity should have a specific type of tread to grip the floor or the ground. In this lab you will test different sneakers by measuring the amount of friction between the sneakers and a table.

◆ Problem

How does the amount of friction between a sneaker and a surface compare for different types of sneakers?

◆ Skills Focus

forming operational definitions, measuring, controlling variables

◆ Materials

three or more different types of sneakers	spring scale, 20 N	mass set(s)
large paper clip	spring scale, 5 N	balance
tape		

◆ Procedure 

- Sneakers are designed to deal with various friction forces, including these:
 - starting friction, which is involved when you start from a stopped position
 - forward-stopping friction, which is involved when you come to a forward stop
 - sideways-stopping friction, which is involved when you come to a sideways stop
- Use the data table on page 56 to record your data.
- Find the mass of each sneaker. Then put masses in each sneaker so that the total mass of the sneaker plus the added masses is 1,000 g. Spread the masses out evenly inside the sneaker.

REAL-WORLD LAB *(continued)*

4. You will need to tape the paper clip to each sneaker and then attach a spring clip to the paper clip. To measure
 - ◆ starting friction, attach the paper clip to the back of the sneaker
 - ◆ forward-stopping friction, attach the paper clip to the front of the sneaker
 - ◆ sideways-stopping friction, attach the paper clip to the side of the sneaker
5. To measure starting friction, pull the sneaker until it starts to move. Use a 20-N spring scale first. If the reading is less than 5 N, use a 5-N scale. The force necessary to make the sneaker start moving is equal to the friction force. Record the starting friction force in your data table.
6. To measure either type of stopping friction, use the spring scale to pull each sneaker at a slow, constant speed. Record the stopping friction force in your data table.
7. Repeat Steps 3 and 4 for the remaining sneakers.

◆ Data Table

Sneaker	Starting Friction (N)	Sideways-Stopping Friction (N)	Forward-Stopping Friction (N)
A			
B			
C			
D			
E			
F			

REAL-WORLD LAB *(continued)*

◆ Analyze and Conclude

Answer the following questions on the back of this sheet or on a separate sheet of paper.

1. What are the manipulated and responding variables in this experiment? Explain. (See the Skills Handbook for a discussion of experimental variables.)
2. Why is the reading on the spring scale equal to the friction force in each case?
3. Do you think that using a sneaker with a small amount of mass in it is a fair test of the friction of the sneakers? (Consider the fact that sneakers are used with people's feet inside them.) Explain your answer.
4. Draw a diagram that shows the forces acting on the sneaker for each type of motion.
5. Why did you pull the sneaker along at a slow speed to test for stopping friction? For starting friction, why did you pull a sneaker that wasn't moving?
6. Which sneaker had the most starting friction? Which had the most forward-stopping friction? Which had the most sideways-stopping friction?
7. Can you identify a relationship between the type of sneaker and the type of friction you observed? What do you observe about the sneakers that would cause one to have better traction than another?
8. **Apply** Wear a pair of your own sneakers. Start running and notice how you press against the floor with your sneaker. How do you think this affects the friction between the sneaker and the floor? How can you test for this variable?

◆ Getting Involved

Go to a store that sells sneakers. If possible take a spring scale and, with the clerk's permission, do a quick friction test on sneakers for different activities. Also, note the materials they are made of, the support they provide for your feet, and other features. Then decide whether it is necessary to buy specific sneakers for different activities.