

# ***Sticky Sneakers***

Unit IV Force & Motion

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Per: \_\_\_\_\_

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?

## **Materials:**

Three different types of sneakers, spring scale (20 N), paper clip, tape, balance

## **Procedure:**

1. Sneakers are designed to deal with various friction forces, including these:
  - a. Starting friction-which is involved when you start from a stopped position.
  - b. Forward-stopping friction-which is involved when you come to a forward stop.
  - c. Sideways-stopping friction, which is involved when you come to a sideways stop.
2. Find the mass of each sneaker. Then put masses in each sneaker so that the total mass of the sneaker plus the masses is 1,000g. Spread the masses out evenly inside the sneaker.
3. You will need to tape the paper clip to each sneaker and then attach a spring clip to the paper clip. To measure:
  - a. Starting friction-attach the paper clip to the back of the sneaker.
  - b. Forward-stopping friction-attach the paper clip to the front of the sneaker.
  - c. Sideways-stopping friction-attach the paper clip to the side of the sneaker.
4. To measure starting friction, pull the sneaker backward until it starts to move. Use the 20-N spring 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.
5. 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.
6. Repeat steps 3 and 4 for the remaining sneakers.

## **Data:**

Sneaker	Mass (g)	Starting Friction (N)	Sideways-stopping friction (N)	Forward-stopping friction (N)

**Analyze & Conclude**

1. What are the manipulated and responding variables in this experiment? Explain (See Straw Rocket Lab for definitions of experimental variables.)

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2. Why is the reading on the spring scale equal to the friction force in each case?

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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.

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4. Draw a diagram that shows the forces acting on the sneaker for each type of motion.

5. Why did you pull the sneaker at a slow speed to test for stopping friction?

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For starting friction, why did you pull a sneaker that wasn't moving?

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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? \_\_\_\_\_