

Objective: to observe how your shoes are built for friction. You will observe starting friction, forward stopping friction, and sideways friction. You will also be able to measure the force required to overcome friction.

Hypothesis: I think \_\_\_\_\_ friction has more frictional **force** than \_\_\_\_\_ friction.  
(shoe type) (shoe type)

NEWTON= \_\_\_\_\_

Spring Scale Conversion: \_\_\_\_\_

If your spring scale is reading 250 g, then that equals \_\_\_\_\_ N ?

Materials:

2 different brands of shoe 1 Spring scales (2000g) tape paperclip mass

Procedure: follow procedures from textbook page 378

1. Sneakers are designed to deal with various friction forces.
  - a. Starting friction - \_\_\_\_\_
    - i. I will attach the paper clip at \_\_\_\_\_
  - b. Forward-stopping friction - \_\_\_\_\_
    - i. I will attach the paper clip at \_\_\_\_\_
  - c. Sideways-stopping friction - \_\_\_\_\_
    - i. I will attach the paper clip at \_\_\_\_\_
2. Copy the data table ON THE BACK of this sheet from page 378 in your book.
3. Put mass in each sneaker so that the total mass of the **sneaker plus the masses is 1000 g**. Use a spring scale to measure 1000 g. You must spread the masses out evenly. Put the sneaker back on the table - you're ready!
4. You need to attach the spring scale to the shoe (use tape and paperclip).
5. To measure **starting friction**, pull the sneaker backwards AT A SLOW AND CONSTANT RATE until it starts to move.
6. At this point when the sneaker begins to move, that is when you read the spring scale.
7. The force necessary to make the sneaker start moving is equal to the friction force.
8. To measure **stopping friction**, use the spring scale to pull each sneaker at a slow, constant speed. Record the stopping friction in your data table.
9. Repeat for **sideways friction**.
10. Repeat steps #3 - # 9 for another different shoe to compare with the first shoe.

DATA TABLE: (from the textbook)

Sneakers	Starting (N)	Sideways (N)	Forward (N)

Which sneaker had the most starting friction? Forward stopping friction? Stopping friction?

- a. Starting friction: \_\_\_\_\_ with \_\_\_\_\_ N
- b. Forward stopping friction: \_\_\_\_\_ with \_\_\_\_\_ N
- c. Sideways Friction: \_\_\_\_\_ with \_\_\_\_\_ N

## Science Friction!

In this experiment you will investigate 3 types of friction - static, sliding and rolling - to determine which is the largest force and which is the smallest force.

Ask a question: Which type of friction is the largest force - static, sliding, or rolling?

Materials:

- ❖ Scissors
- ❖ String (1 meter)
- ❖ Textbooks
- ❖ Spring Scale (conversion: \_\_\_\_\_ = \_\_\_\_\_)
- ❖ 3 plastic PVC (polymer) tubing.

## Procedures

- i. Get a piece of string, and tie it in a loop that fits in the textbook. Hook the string to the spring scale.
- ii. Measure Static, Sliding, and Rolling friction - 3 trials.

Trial	Static	Sliding	Rolling
1.			
2.			
3.			

Which force was greatest? \_\_\_\_\_

Extension: Add one more book, and measure the \_\_\_\_\_ force. Add 2 books. Draw a data table like the one above to record your results.