

# Tracking Treads

**Overview:** Now let's talk about the other ever-present force on this Earth, and that's friction. Friction is the force between one object rubbing against another object. Friction is what makes things slow down. Without friction things would just keep moving unless they hit something else. Without friction, you would not be able to walk. Your feet would have nothing to push against and they would just slide backward all the time like you're doing the moon walk.

**What to Learn:** Today you get to discover how friction is a complicated interaction between pressure and the type of materials that are touching one another.

## Materials

- shoes (about 5 different ones)
- board, or a tray, or a large book at least 15 inches long and no more than 2 feet long.
- ruler or yardstick
- protractor
- pencil
- partner

## Lab Time

1. Put the board (or whatever you're using) on the table.
2. Put the shoe on the board with the back of the shoe touching the back of the board.
3. Have a partner hold the ruler upright (so that the 12-inch end is up and the 1-inch end is on the table) at the back of the board.
4. Slowly lift the back of the board, leaving the front of the board on the table. (You're making a ramp with the board). Eventually the shoe will begin to slide.
5. Stop moving the board when the shoe slides and measure the height that the back of the board was lifted to.
6. Test each shoe three times to verify your data.
7. Look at the 5 shoes you chose and test them. Before you do, make a hypothesis for which shoe will have the most friction.
8. On a scale from 1 to 5 (or however many shoes you're using) rate the shoes you picked. 1 is low friction and 5 would be high friction. Write the hypothesis next to a description of the shoes on a piece of paper. The greater the friction the higher the ramp has to be lifted. Test all of the shoes.
9. Analyze the shoes. Do the shoes with the most friction show any similarities? Are the bottoms made out of the same type of material? What about the shoes with very little friction?

# Tracking Threads Data Table

Item/Object Description	Guess First! Rank each: 1 for lowest friction, 5 for most friction.	Height of Board when Shoe Starts to Slide

## Reading

Since friction is all about two things rubbing together, the more surface that's rubbing, the more friction you get. Ever notice how the tire on a car has treads, but a race car tire will be absolutely flat with no treads at all?

The race car doesn't have to worry about rain or stuff on the road, so it gets every single bit of the tire to be touching the surface of the track. That way, there is as much friction as possible between the tire and the track. The tire on your car has treads to cut through mud and water to get to the nice firm road underneath. The treads actually give you less friction on a flat, dry road.

You can opt to use a skateboard shoe for this experiment. Notice that a skateboard shoe has very a flat bottom compared to most other shoes. This is because a skateboarder wants as much of his or her shoe to touch the board at all times, having as much contact friction as possible.

**Exercises** Answer the questions below:

1. What is friction?
2. What is static friction?
3. What is kinetic friction?

## **Answers to Exercises: Tracking Treads**

1. What is friction? (the resistance that happens when two surfaces come into contact with each other)
2. What is static friction? (the resistance that must be overcome for an object to move )
3. What is kinetic friction? (the resistance that occurs when the objects are in motion, but still in contact)