

Stick and Slip

Overview: Friction is everywhere! Imagine what the world would be like without friction! Everything you do, from catching baseballs to eating hamburgers, to putting on shoes, friction is a part of it. If you take a quick look at friction, it is quite a simple concept of two things rubbing together.

What to Learn: When you take a closer look at friction, it's really quite complex. What kind of surfaces are rubbing together? How much of the surfaces are touching? And what's the deal with this stick and slip thing anyway? Friction is a concept that many scientists are spending a lot of time on. Understanding friction is very important in making engines and machines run more efficiently and safely.

Materials

- magnets (2, business-card sized)
- fingers

Lab Time

1. Take two business card magnets and stick them together, black magnet side to black magnet side. They should be together so that the pictures are on the outside like two pieces of bread on a sandwich.
2. Now grab the sides of the magnets and drag one to the right and the other to the left so that they still are magnetically stuck together as they slide over one another.
3. Did you notice what happened as they slid across one another? They stuck and slipped didn't they? This is a bit like friction. As two surfaces slide across one another, they chemically bond and then break apart. Bond and break, bond and break as they slide. The magnets magnetically "bonded" together and then broke apart as you slid them across one another. The chemical bonds don't work quite like the magnetic "bonds" but it gives a decent model of what's happening.

Exercises Answer the questions below:

1. What is the difference between static and kinetic friction? Which one is always greater?
2. Design an experiment where you can observe and/or measure the difference between static and kinetic friction.

Answers to Exercises: Stick and Slip

1. What is the difference between static and kinetic friction? Which one is always greater? (Static friction is always greater, since it takes more energy to start an object moving from rest. Static friction is the friction you need to overcome in order to start an object sliding. Kinetic friction is the friction after an object is in motion.)
2. Design an experiment where you can observe and/or measure the difference between static and kinetic friction. (Place an object on a ramp. Raise the ramp until the object starts to slide (static friction). Notice that you have to lower the incline just a bit to keep it sliding at a constant rate (kinetic friction). You can also take a rubber band and attach it to an object at rest on the ground. Measure the rubber band's length the moment the object starts to slide, and then also when it's sliding at a constant rate. You'll notice that the rubber band is longer when it's overcoming static friction and starting to slide.)