# Exploring Forces—Static Electricity

*Can static electricity beat gravity?*

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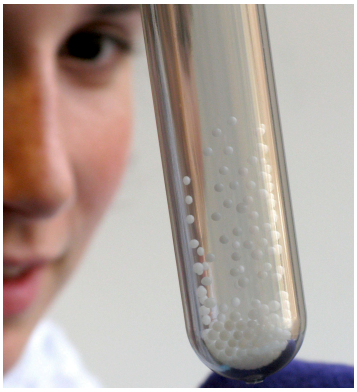
## Try this!

1. Hold the tube of small balls by the cap.
2. Use the piece of fleece to rub the sides of the tube.
3. Stop rubbing, and hold the tube right side up. What happens? Look closely at the balls.
4. Now hold the tube of large balls by the cap, and rub it with the fleece. Does the same thing happen?



## What's going on?

Many of the small balls are suspended inside the tube, but most of the larger ones fall to the bottom. That's because size can affect the way a material behaves. The size of the balls determines which force is more important, gravity or static electricity.

When you rub the tubes with fleece, the two forces work against each other. Gravity pulls the balls down to the bottom of the tube. Static electricity pushes the balls apart, and makes them cling to the sides of the tube.

The force of the static electricity has a big effect on the small balls, but it barely affects the larger balls. That's because static electricity builds up on the surface—or outside—of the balls.

Each of the tubes contains the same volume of balls, but the smaller balls have a lot more surface area. This means that more static electricity can build up on the small balls. The larger balls have a lot less surface area for the same volume—so the force of gravity pulls them down.

You also see static electricity at work when your hair stands on end after you pull off a fleece, or when you get a shock after walking across a carpet.

**Static electricity builds up on slides**

## How is this nano?

**A material can act differently when it's nanometer-sized.** Different physical forces dominate when things get very, very small. For example, gravity is very apparent to us on the macroscale, but it's hardly noticeable at the nanoscale. In the nano world, static electricity is much more important!

The small balls are pretty little, but they're still much, much bigger than things measured in nanometers. One small ball is about two millimeters across, which is two million nanometers! (A nanometer is a billionth of a meter.)

Nanotechnology takes advantage of the different physical forces at the nanoscale to make new materials and tiny devices. Nanotechnology allows scientists and engineers to make things like smaller, faster computer chips and new medicines to treat diseases like cancer.