



Gravity Fail

Do small things behave differently?

Try this!



Fill the regular cup by dipping it in the water. Try to pour the water back into the container. What happens?



Now fill the miniature cup with water. Can you pour the water back out?

Size can affect the way something behaves. When things get really small, different forces become more important—leading to some surprising behavior!

What's going on?

It's easy to pour water out of a full-size cup, but not out of a miniature cup. The size of the cup—and the amount of water it holds—determines which force is more important, gravity or surface tension.

When you tip a cup of water upside down, the two forces work against each other. Gravity pulls the water down and surface tension holds the water together inside. (Surface tension is the natural tendency of water molecules to stick together.)

With a large cup, the force of gravity is much stronger than surface tension, so the water falls out. But with the tiny cup, there's a lot less water, and surface tension is strong enough to hold it together. When you tip the tiny cup, surface tension beats out gravity and the water stays in the cup.



Water striders use surface tension to walk on water

How is this nano?

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.



Water beads up into droplets because of surface tension

The miniature cup is tiny, but it's still much, much bigger than things measured in 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.