HOME DEMO NO. 23

Orbiting Marbles

When the Space Shuttle orbits the Earth, it goes really fast -- about 11 kilometers (7 miles) every second. A moving thing like the Space Shuttle will keep moving in a straight line until something slows it down, speeds it up, or makes it change direction. When an object (like the Shuttle) is in orbit, the Earth's gravity pulls it so that it's constantly changing direction. If it weren't for gravity, the Shuttle would fly off in a straight line out into space. There would be no force to pull it in its nearly circular orbit.

You can make a marble ORBIT like the SPACE SHUTTLE!

What you need:

1. A paper plate
2. A marble
3. A pair of scissors

What you do:

1. Put the marble on a table and give it a gentle push. You can see that it keeps going pretty much in a straight line. (The smoother the table, the straighter the roll.)
2. Set the marble on the plate up against the plate's rim.
3. Give it another gentle push. The plate pushes the marble so that it follows the plate and moves in a circle. For every little bit the marble rolls forward, the rim of the plate is there pushing it toward the middle, so the marble follows a curve instead of going straight.
4. Now cut out about a quarter of your plate as though you were cutting a big slice of cake.
5. Set your marble on the rim again, and give it another push.

What's happening?

As the marble goes around the rim, it curves, but as soon as it gets to the edge where the plate is cut away, it stops curving and rolls straight across the table. Things go straight, unless there's something there to change their direction, slow them down, or speed them up. Any of these things can push (or pull) a moving object away from a straight line – off course. Of course!