

SEE HOW

Satellites Stay in Orbit



What makes technology the size of a building stay high in the sky?
What keeps a satellite the size of a small television from floating off into space?

From probes keeping watch from the depths of space, to space stations zooming by a few hundred kilometres overhead, satellites are objects in orbit. The physics of orbits will spin you out!

WHAT YOU'LL DISCOVER

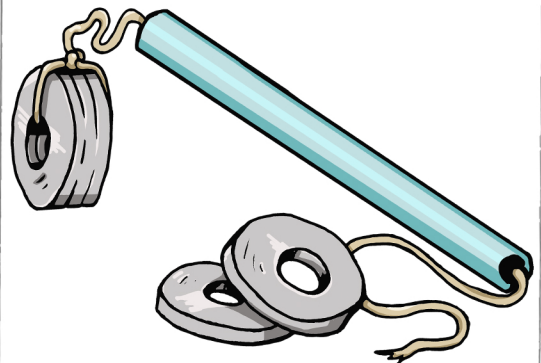
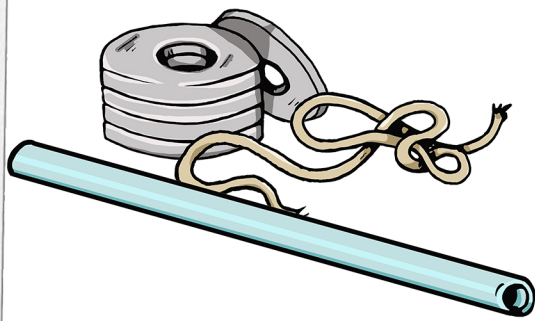
A satellite's orbit is a combination of its constant movement under the pulling force of gravity, in what's known as centripetal motion.

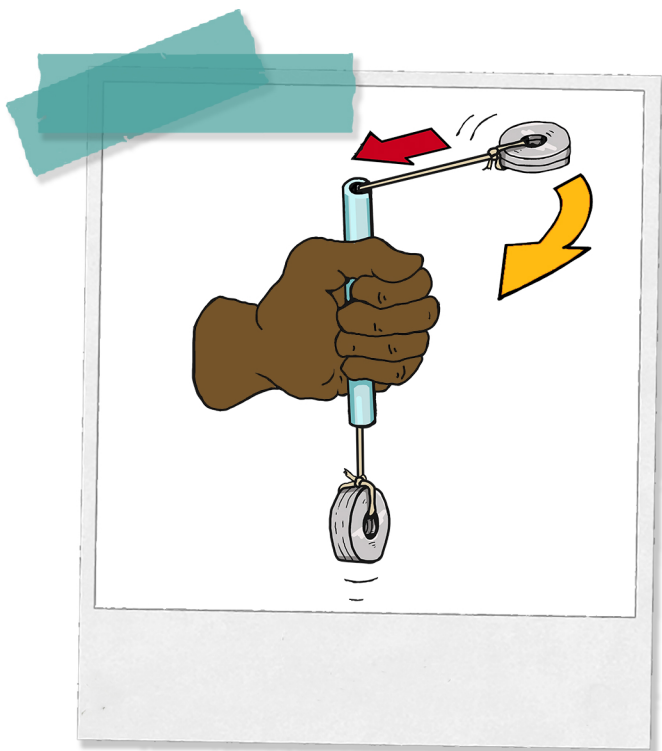
How to build

1. Tie three washers securely onto the end of the string or line.
2. Thread the line through the plastic tubing.
3. Tie the remaining two washers to the other end of the string.

What you need

- 15 centimetres of hollow plastic tubing (a pen casing works just fine)
- 5 large metal washers
- 50 centimetres of cotton string





How to use

1. Stand in an open space far from furniture, walls, and other people. Outside is preferable.
2. Hold the plastic tubing vertically in one hand, with the mass of three washers hanging down towards the ground. The mass of two washers should sit on top of the tube.
3. Gently wiggle your hand a tiny bit. Do the top washers move far?
4. Slowly but firmly rotate your hand to make the top washers swing in a circle. Watch what happens to the three washers hanging below.
5. Rotate your hand with a little more force to make the top washers move in a larger circle. What happens to the washers below?

HOW IT WORKS

The three washers represent a large mass (like Earth), the two washers represent smaller objects (like people, balls, and satellites) and the string pulls them together representing the force of gravity which pulls all masses together.

If the swinging is fast enough, your washer satellite will move away from your hand like a rocket from a planet. It takes some force to 'swing' them into orbit, just like launching a satellite takes the velocity of a fast-moving rocket to make them zoom.

Newton's second law of motion says objects in motion will stay in motion until another force changes their speed or direction. This is called inertia. Just imagine what might happen if you let go (**NOTE: don't let go**) – the two washers would be flung off in the direction of their inertia!

Gravity (the string) exerts a force perpendicular to the direction of inertia, creating an angled movement which results in centripetal motion.

