



TRY THIS OUT!



ARCHIMEDES SCREW

Time: 15 Minutes
Difficulty: medium

Moving water downhill is easy, but uphill? Not so straightforward. In this experiment, create an Archimedes screw to — seemingly — fight gravity to get water up an incline!

WHAT YOU NEED:

- Empty paper towel roll
- Flexible clear tubing, a few centimetres in diameter (found at hardware stores)
- Bowl
- Food colouring
- Tap water
- Waterproof tape
- Glass

MAKE IT:

1. Make one end of the paper towel roll water-resistant by wrapping duct tape around it on the outside.
2. Wrap the tubing around the roll in a spiraling fashion. It should reach from the bottom to the top of the tube, with a bit of overhang on both ends.
3. Duct tape it on, without covering the holes. Make sure most of the tubing is still visible.
4. Fill the bowl with water, and mix in a few drops of food colouring.
5. Put the duct taped end of the roll into the water bowl. Hold it at a 30-degree angle from the table.
6. Move the drinking glass so that it is below the top end of the roll.

TEST IT:

There is a hole in the clear tubing at the bottom of the roll. You want to turn the roll in the direction so that the hole is turned into the water, instead of away. If the tubing is in a counterclockwise spiral from bottom to top, you'll turn it clockwise (or vice versa). Keep turning it and watch the water rise!

EXPLAIN IT:

The water in the tube is subject to gravity, so it always wants to be as low to the ground as possible. When your screw is on an angle, the lowest point moves upward as it is spun. At any given point, going “backwards” (toward the bowl) would mean that the water would have to go uphill, which it cannot do on its own! Because of this, the water will remain stuck unless a force (from spinning) is applied.

OBSERVE IT:

Screws like this are still used sometimes in wastewater treatment plants. One of the biggest advantages that this simple machine provides is that it allows for the passage of solid debris in the liquid — something that's useful when treating sewage!

GO FURTHER:

Try another round with the roll at a 90-degree angle from the table. Doesn't work, does it? Just like a spiraling waterslide, the Archimedes screw does not work vertically; it must be on an incline. Otherwise, all of the water rushes out of the bottom. Can you figure out why?

