Curiosity Guide #210
Mechanical Energy

Accompanies Curious Crew, Season 2, Episode 10 (#210)

Waterwheel Work

Investigation #5

Description

Round and round it goes! Find out what the energy of water can do.

Materials

- 2-liter bottle with cap
- Wooden dowel, $\frac{1}{4}$ inch or less in diameter
- Spool
- Egg carton
- Duct tape
- Pitcher of water
- String
- Washer
- Basin
- Drill
- Hot glue

Procedure

1) Drill a quarter-inch hole through the bottom of the bottle and the cap to the bottle.
2) Slide the wooden dowel through each end of the bottle. Verify that the dowel can spin freely.
3) Remove the wooden dowel.
4) Hot glue the wooden spool to the end of the cap so that the spool hole and drilled hole line up.

5) When the glue is dry, slide the dowel back through the spool and the bottle.
6) Cut the lid off the egg carton. Set aside.
7) Cut the carton side in half lengthwise and then each section in half. You should have four "paddles" of 3 chambers each.
8) Duct tape or hot glue the paddles on each side of the bottle so that they are equidistant.
9) Cut a 5-foot length of string.
10) Tie and tape one end of the string around the spool that is attached to the bottle.
11) Tie a washer on the other end of the string.
12) Fill the pitcher with water.
13) Lay the bottle across the basin so the dowels rest on the sides of the basin.
14) Pour the water over the water wheel and watch it wind up the string with the washer.

My Results

Explanation

The elevated water in the pitcher holds **gravitational potential energy** and equates to water in a mountain lake, or water that has been dammed up. As the water descends from the pitcher, it has **kinetic energy** that can be transferred onto the paddles of the waterwheel. This creates **mechanical energy** and winds up the string. Systems for capturing the energy in falling water can be transferred into mechanical energy in a mill, or electrical energy if the moving water interacts with a turbine and generator.

Something more to investigate: It's strange to think that water can have mechanical energy by pushing on the paddles of a waterwheel, but did you know that air has mechanical energy, too? When the wind blows, the moving air has kinetic energy. Air molecules push on the blades of wind turbines. In both cases, waterwheels and wind turbines can spin and convert that mechanical energy into electrical energy for us to use. Energy sure is fascinating!

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