

# Build a Simple Motor?

Grades: 4-5

**Objective:** Students will learn how to construct a simple electromagnet based motor.

**Time:** 40 minutes

## Materials:

For each group of 4 students, have one set of:

- 1 Battery (AA, 9 Volt, etc, but low voltage so nobody gets hurt)
- Alligator clip wires
- 2 Strong magnets (size of batteries in laser pointer) (with clearly labeled ends)
- Wooden dowels
- Many textbooks
- Two coils of wire
- 2 way switch
- Cork

## Overview:

You will receive an explanation of what each component is. You must now construct a circuit so that you can rotate the orientation of the magnet by turning the switch on or off.

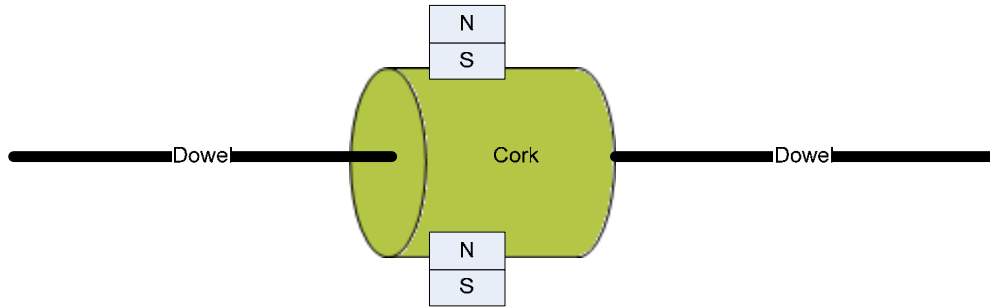
## Scientific Background:

Ask the students what knowledge they have of motors, and if they have ever taken apart a motor, in particular electric motors. Explain the concept of electromagnetic induction.

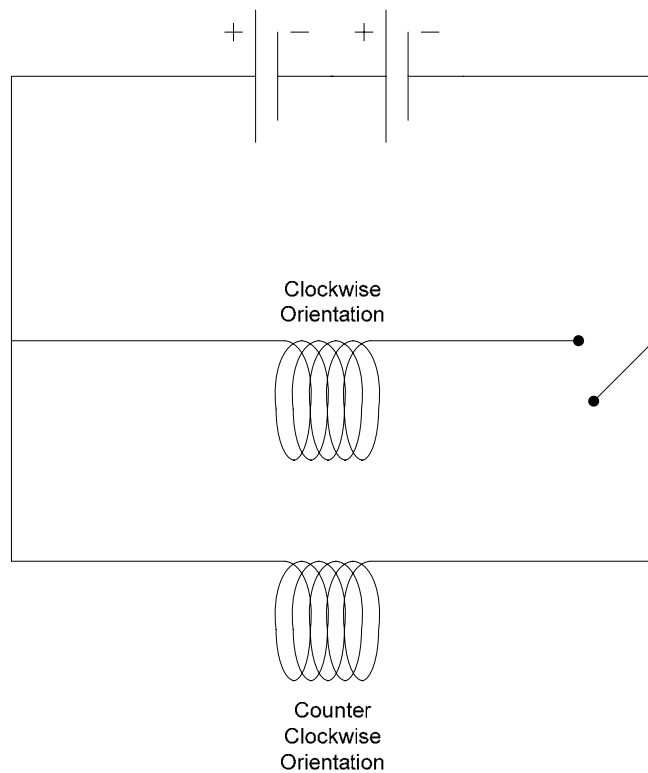
## Procedure:

1. Hold up each material, and explain what each one is, and what it does. This should be relatively easy, as kids have all seen these components.

2. Divide the kids into groups of 4. Give each group a set of components. Ask each group to discuss how they might direct the orientation of the bar magnet using the switch. Help them construct the freely rotating magnets as shown here:



Then let them try to build the following circuit:



3. Ask each group to discuss how they can use the textbooks to position both components of the motor and how they think it will work? Let them test their prediction. *The circuit should be such that both coils are side by side and the current should flow in opposite directions within them. The magnet-dowel-cork contraption should be suspended on top of the coils by the textbooks.*

4. Explain how the circuit works. *The circuit works by producing a magnetic field through the coils (only one of the two coils is active at any time due to the switch), and the magnets orient themselves in the same direction by rotating. By flipping the switch we are simulating alternating current to a degree.*

**Additional Questions/Discussion Points:**

Discuss electromagnetic induction further with the students. Explain that the process can be used backwards by rotating a magnet in a coil of wire to generate current. Ask them how they would use this knowledge to make a simple powerplant.

Ask them how they believe the setup could be bettered (take notes! little kids are smarter than expected and may actually come up with simple improvements).