Another FREE SAMPLE LAB from TOPS LEARNING SYSTEMS!

This **TOPS Idea** is taken from an original series of black-and-white line masters, adapted to stand alone as an independent mini-lesson. Please purchase our original book to get the whole in-depth program.

galvanometer

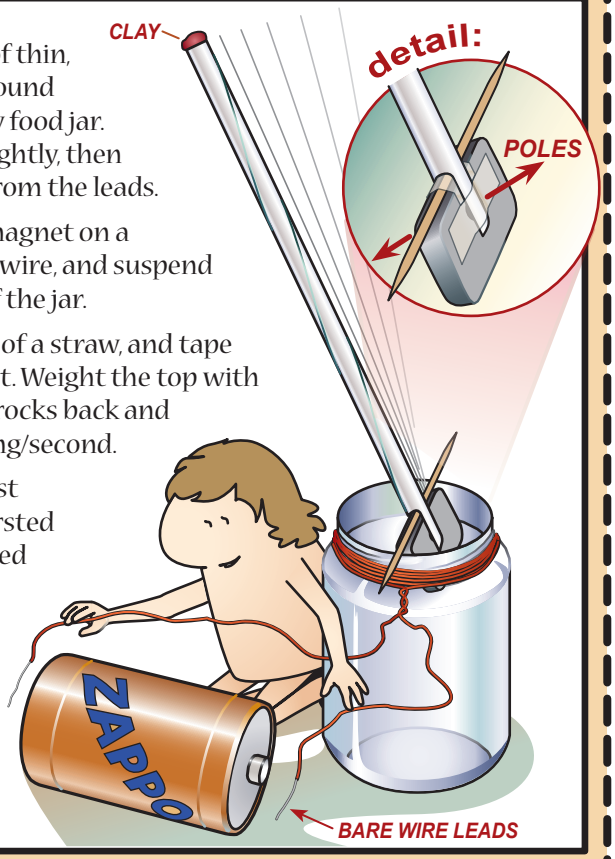
…adapted from **ELECTRICITY #19** by TOPS Learning Systems

1. Coil 3 meters of thin, insulated wire around the neck of a baby food jar. Twist to secure tightly, then strip insulation from the leads.

2. Tape a small magnet on a toothpick or stiff wire, and suspend it in the mouth of the jar.

3. Notch the end of a straw, and tape it over the magnet. Weight the top with enough clay so it rocks back and forth about 1 swing/second.

4. Danish scientist Hans Christian Orsted (1777-1851) discovered a valuable property of electricity. Connect your galvanometer to a battery, and tell what he learned.



OBJECTIVE

To construct a galvanometer. To understand that moving electrons create an associated magnetic field.

EXTENSION

What variables can you adjust to make a more sensitive galvanometer? Design and build an instrument that detects current in an old battery that is almost dead.

(a) Coil more wire around the neck of the jar. Doubling or tripling the number of turns, doubles or triples the sensitivity. ***(b)*** Coil the wire closer to the magnet by using a smaller diameter jar mouth. ***(c)*** Add more clay to the top of the straw so it leans far to one side, but does not fall over. Then roll the support pivot ever so slightly across the thickness of the magnet in the direction of the lean, bringing the straw back to near vertical with extremely slow oscillations.

MATERIALS

- A meter stick.
- Thin, insulated wrapping wire, 30 or 32 gauge, and scissors (or knife or sandpaper) to remove insulation.
- A small jar (a baby food jar works well).
- A round toothpick or stiff wire, about 3 inches long.
- A ceramic refrigerator magnet, about 1 x 3/4 x 1/8 inch.
- A plastic drinking straw, clay, and masking tape.
- A fresh battery – plus a weak one for extension.

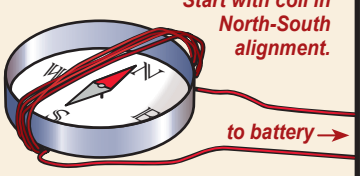
ANSWERS

4. Electricity moving through a wire generates a magnetic field that attracts/repels the permanent magnet. Reversing the current reverses the electromagnetic field, causing the permanent magnet and straw to lean in the opposite direction.

EVALUATION

Q. You have an old battery, insulated wire, and a compass. Using only these materials, how can you tell whether the battery is alive or dead?

A. Coil wire over and under the compass (as below), strip the insulation from the ends, and connect the coil to the battery. If current flows through the coil, it will create a magnetic field that deflects the compass needle.



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