Meet a Meter

An electrician has a special tool to measure the current that flows through wiring. The tool is called a multimeter and it is capable of measuring several properties of electric flow. In this experiment, you'll build a simple type of meter that also responds to the flow of current.

Materials
- Wire strippers
- Packaging tape
- A sewing needle
- Thread
- A strong bar magnet
- 1"D"-cell battery
- 3 yards (3 m) of 24-gauge insulated copper wire

To Do
Strip several inches of insulation from both ends of the wire. Wrap this wire around the can into a tight coil, leaving about 1 foot (30cm) of wire at each end of the coil. Slip the coil off the can. Wrap several pieces of packaging tape around the coil to secure its shape. Use a larger piece of tape to stick the coil onto a flat surface so that it stands up.

Stroke the needle against the magnet at least forty times in the same direction to magnetize it.

Tie a small length of thread around the middle of the needle so that it hangs level. Tape the other end of the thread to the top of the wire coil. The magnetized needle should balance in the middle of the coil's open space.

Touch the free ends of the wires to the positive and negative sides of the "D" cell battery. What happens? Switch the wires to touch the opposite sides of the cell. What happens now?

The Science
When the wires were attached to the cell, electricity flowed through the coil. This movement of charge created a magnetic field. The magnetic field affected the magnetized needle, causing it to spin and change its pointing direction. When the wires were switched, the current flowed in the opposite direction. In response, the needle turned and pointed in the opposite direction.