

Topic: Circuitry

Teacher Information

Time Allowance

45-50 min.

Background

An atom has a nucleus of protons and neutrons with outer “shells” of orbiting electrons. Metals have electrons in their outermost shell which tend to move from one atom to another quite freely.

One type of battery uses two different metals in one acid solution to produce a movement of electrons from the metal containing more electrons to the metal containing fewer electrons. This can only be accomplished through the use of a metal wire which conducts the electricity (or allows the transfer of electrons through it) from the negative terminal to the positive terminal. This wire allows the flow of electrons to continue in a circle. The electrons traveling through resistors in the circuit create heat and light.

The flow of electrons through a wire also causes a magnetic field around that wire. When this occurs, the wire can be coiled and used with another magnet to turn a motor.

Materials

1 piece of cardboard (4"x 2")

1 D-cell battery

1 mini light bulb (1.5 volt)

3 lengths of bare copper wire (one 4", one 5" and one 6")

electrical tape

scissors

hot glue gun (optional)

access to other objects made of plastic, glass, lead and wood for testing purposes

Making a Circuit Tester

Student Activity

Electronic equipment must be tested prior to being sent as part of the payload on a mission.

Objective

These instructions will help you make a circuit tester that can be used to make sure electricity is flowing through a circuit.

Materials

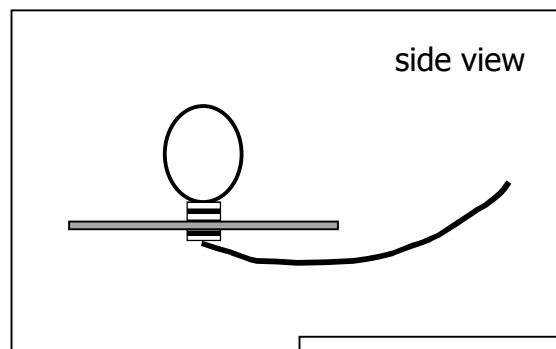
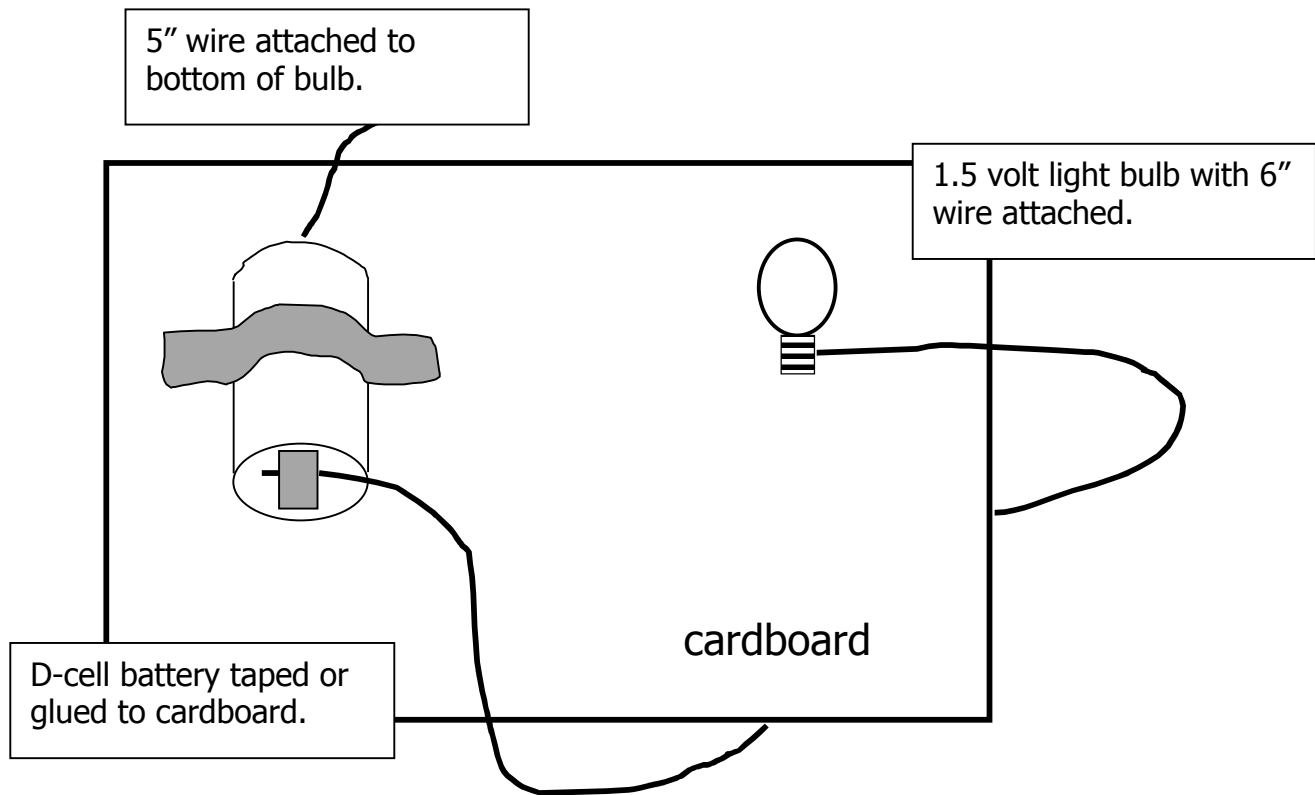
- 1 piece of cardboard (4"x 2")
- 1 D-cell battery
- 1 mini light bulb (1.5 volt)
- 3 lengths of bare copper wire (one 4", one 5" and one 6")
- electrical tape
- scissors
- hot glue gun (optional)

Procedure

1. Use scissors or pencil to poke a hole in the right center of the piece of cardboard. (The hole should be slightly smaller than the base of the light bulb).
2. Tape the battery to the cardboard as shown below. (A hot glue gun can be used to attach the battery to the cardboard.)
3. Take the 6" piece of wire and wrap it tightly around the base of the bulb. Twist it to connect it with a snug fit. The wire should not slip off.
4. Push the light bulb through the hole from the top. It should fit snugly. The attached wire should be on the top of the cardboard.
5. Use tape to attach the end of the 4" wire to one of the battery terminals. Tape the other end to the end of the light bulb as shown in the diagram. (Make sure that the metal from the wire makes good contact with the light bulb's metal contact).
6. Tape one end of the 5" wire to the other end of the battery. Make good metal-to-metal contact.
7. To make sure your circuit tester is working, touch the ends of the wires together. This completes the circuit -- the lights should come on. To use the circuit tester,

touch one wire to a piece of metal and touch the other wire to the same piece of metal. The light should come on. Test other objects made of plastic, glass, lead and wood. What objects are good conductors? What objects are good insulators?

Making a Circuit Tester



Make sure the wire is touching the metal contact, and then tape in place.