

Topic: Making a Circuit Tester

Teacher Information

Teacher Background

Definition of a complete circuit:

- A circuit that has a power source, a load such as a light or motor to power and a ground point

When a current of electrons is released by an electrical power source -- such as a battery or the electric outlets in your house -- the electrons eventually *return* to the same source. That is called a **complete circuit**. The word **circuit** means *circle*. And circles that have gaps in them are *not* complete!

When current flows through an electric lamp, it makes a **complete circuit**. When you turn the switch on the lamp to "off," you are *breaking* the circuit. The current no longer flows through the system because the circuit is no longer **complete**, and the lamp goes off. When you turn the switch back to "on," you are once again **completing** the circuit and allowing the electrons to flow through the lamp, which produces light.

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 – Students will:

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?