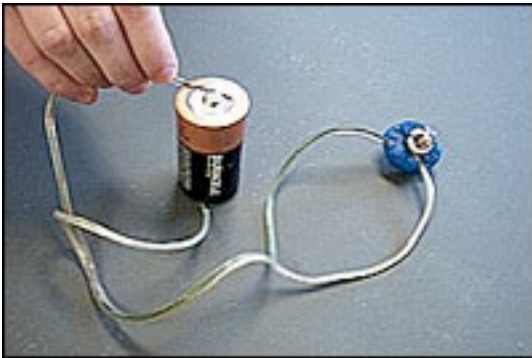


# Completing a Circuit

## Hands-on Activity

If you have ever had someone work on the electricity in your home or school, you know that the first thing the electrician does is turn off the power. That's so he or she does not accidentally become part of a circuit! In order for electricity to move from one location to the next, it has to travel along a conductive material, such as copper. Conductive materials permit the electrons to move fairly freely. See if you can create a complete circuit using the following materials.



### What You Will Need:

- 2 flashlight batteries (D size)
- Some small gauge electrical wire (cut in pieces about 30 cm long)
- A flashlight light bulb
- Electrical tape
- Some modeling clay
- Steel wool



### Make It

Begin by connecting the electrical wire to the light bulb. Tape the exposed copper end of the wire to the metal side of the bulb. Place the exposed end of another wire on the surface of a lump of clay (a 3 cm cube will be sufficient). Press the bulb into the clay so that the bottom of the bulb is firmly in contact with the

exposed end of the wire. Tape the other end of one of the wires to the flat side of the battery (the – side).

### **Try It Out**

Now, you are ready to complete the circuit. Touch the other end of the battery (the + side) with the remaining wire. What happens? The electricity flows through the light bulb causing its filament to glow, then out to the other end of the battery.

### **Experiment**

Note the brightness of the bulb, then try the same experiment with two batteries joined together with tape. Now, how bright is the bulb?

A short circuit results when the electricity finds a path with little resistance, so very large current can flow. This may lead to wires getting so hot they can burn and cause a fire. To prevent this, buildings have fuses that break the flow of electricity should a problem with the electricity occur. Modern fuses consist of circuit breakers – switches that automatically click off when a dangerously high current is sensed. But many older buildings still use wire fuses should a short circuit or overload on the wires occur. A wire fuse consists of a thin piece of metal or wire contained in a glass chamber. This metal breaks when an overload occurs and the fuse has to be replaced. Try and create your own fuse in your circuit with a strand of steel wool. Splice a small strand of the material in the wire that connects the negative side of the battery with the light bulb (you can use electrical tape to secure the wire). Now, touch the other wire to the batteries. If there is enough current coming from your batteries, the steel wool filament should quickly melt and break the circuit.

### **Fishy Electricity**

Humans are not the only species that work with electricity. There are a number of fish that can generate their own electric current. Most notable is the electric eel. This swimming dynamo can generate 350 to 650 volts of electricity for about 1/500th of a second (your house uses 110 volts). In ancient times, physicians would treat patients' headaches by dunking them in a tank of electric eels! After such a treatment, clearly the headache would be the last thing on the patient's mind.