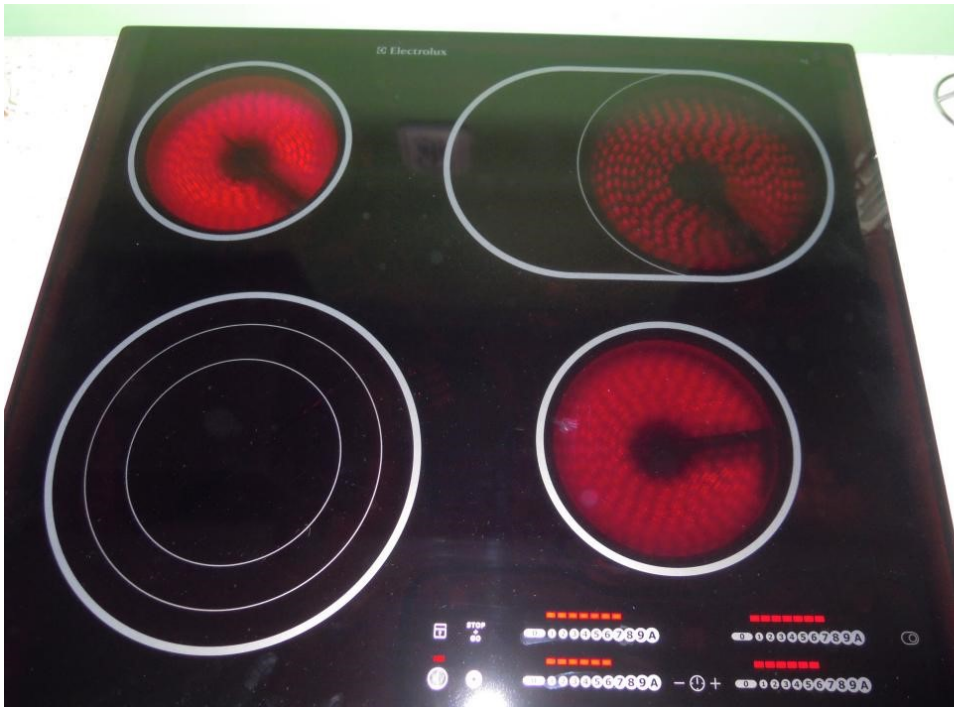
Electricity:

Let's Light It Up!

A Family Inventors' Lab Original

Look around you. What can you see that runs on electricity?

Here’s some hints: if it has a power switch, plugs in, or has a battery, it’s using electricity.



Electricity can make things glow with light, heat up, move around, or make sounds.

Learning about Electricity

Over 2,500 years ago, a Greek mathematician named Thales (*TAY-less)* was polishing a piece of amber with fur. He noticed that after he did this, the amber would attract lightweight objects like dust, hair, or feathers.

Static Electricity

We now call that effect *static electricity.*

Have you ever experienced it?

On a slide?

In a ball pit?

When playing with a parachute?

When you took clothes out of a dryer and they were stuck together?

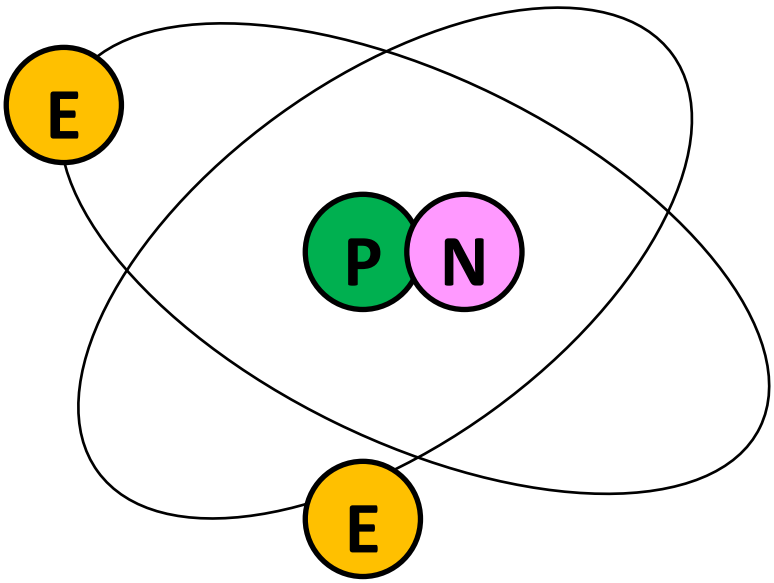
(That's called *static cling*.)

Have you ever gotten a shock when you touched a friend or touched something metal?

What causes static?

To understand that, you need to know about atoms and electrons. An atom is a teeny tiny little particle – way too small for you to see. There are millions of atoms in one eyelash. Everything is made of atoms – air, a ball, a dog, the ocean— they're all just lots and lots of atoms.

Each atom is made up of protons, neutrons, and electrons. Protons and neutrons make up the nucleus – the center. Electrons spin (or orbit) around the nucleus.



Electrons can jump from one atom to another. That's what's happening with static. An electron has jumped from one object to another.

Experience it:

Shuffle across carpet wearing socks. Touch a friend's finger, or touch something metal (like a doorknob or faucet) – you'll feel the shock. Turn off the light, and shuffle around – then reach toward metal - you may see the spark.

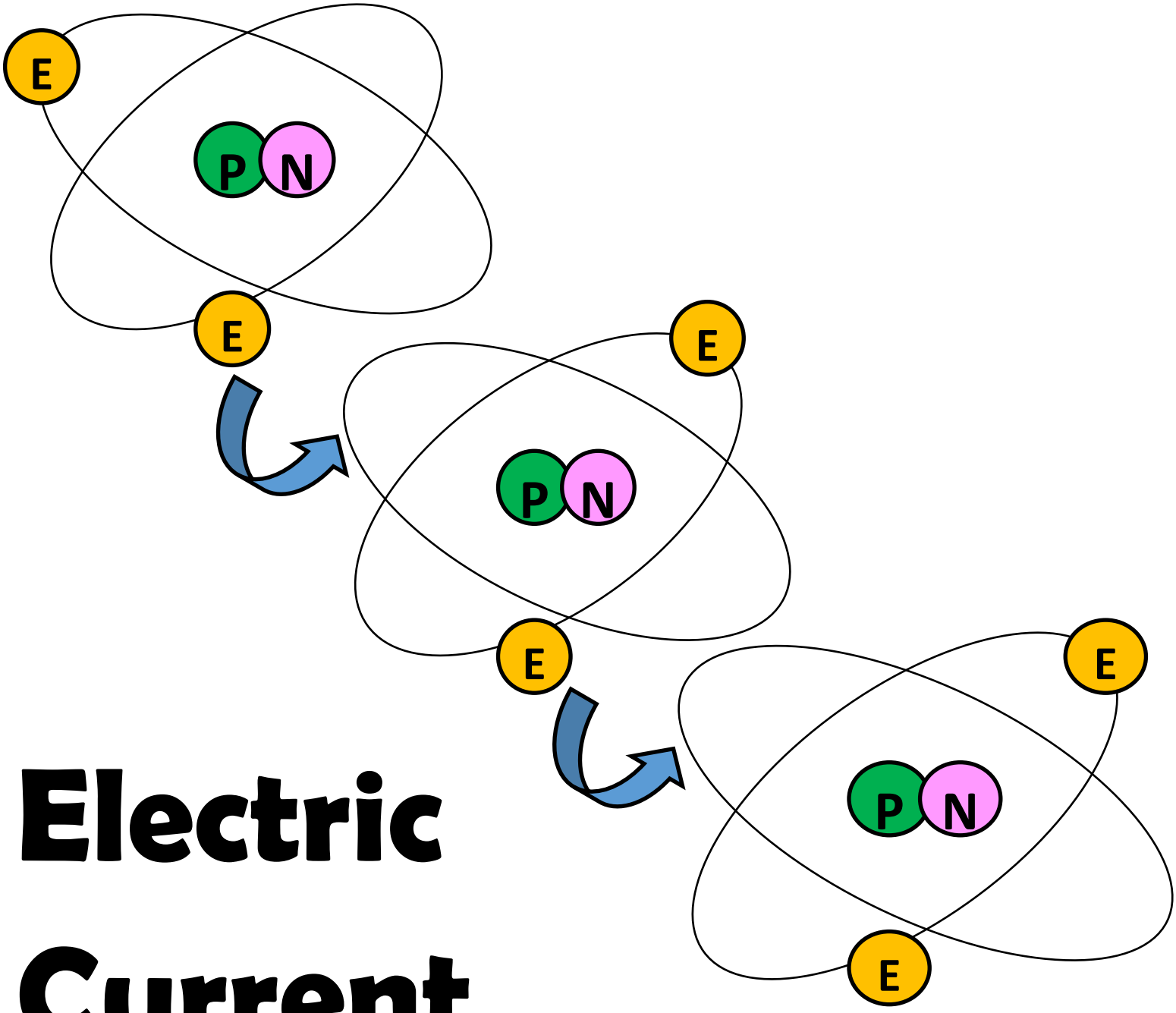
Experience It

Rub a balloon on your hair, or rub a plastic comb on a wool sweater. Wave it over feathers or tissue paper – it attracts. (Pulls things toward it.)

Hold a charged balloon near an empty aluminum can. Does it attract? Or repel (push the can away?)

When a lot of static electricity builds up in clouds, a mass of electrons will suddenly flow to the positively charged earth, creating a lightning bolt.

Static electricity discharges very quickly. Electricity will last longer if there’s a continuous flow of electrons.



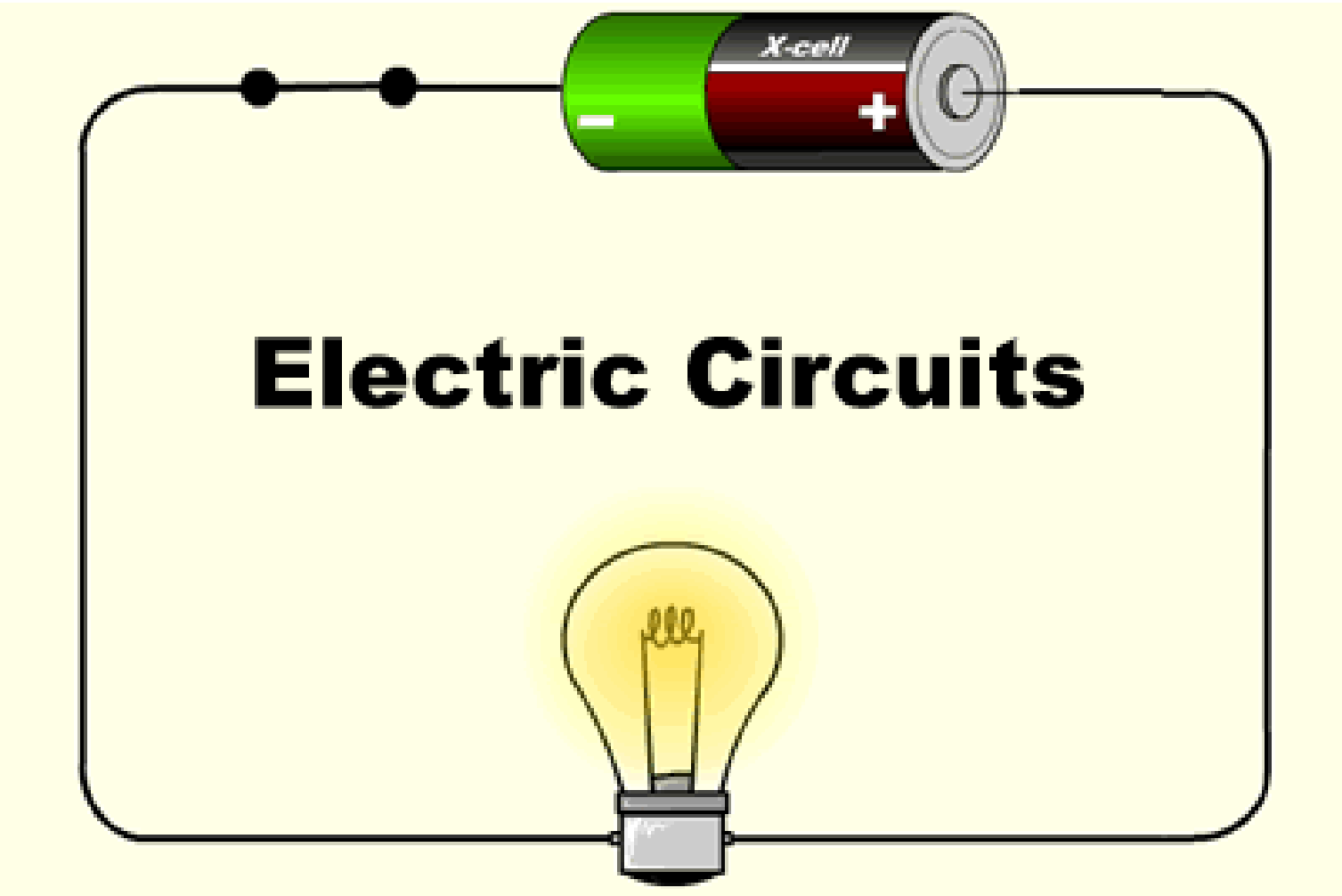
Electric Current

An electrical current is like a stream of water, where there is a flow of electrons jumping from atom to atom.

Experience it:

Play “Pass the Electron” game. Stand in a line. Everyone is holding one ball. That’s your electron. The first person passes their ball down the line. When the second ball comes to each person, they have to pass a ball on, down the line. When the extra ball reaches the end, stop. The first person in line doesn’t have an electron. They are “positively charged.” The last person has two electrons. They are “negatively charged.” The negative charge and the positive charge attract each other – so let them wrap the ends of your line around to turn it into a circle. The last person hands the extra electron to the first, and the cycle can begin again and keep repeating. You’ve just created a circuit.

Electrical current can be harnessed in a circuit – a circular path where both ends are connected. If the circle is complete, current will flow. If the circle is broken, the current stops flowing.

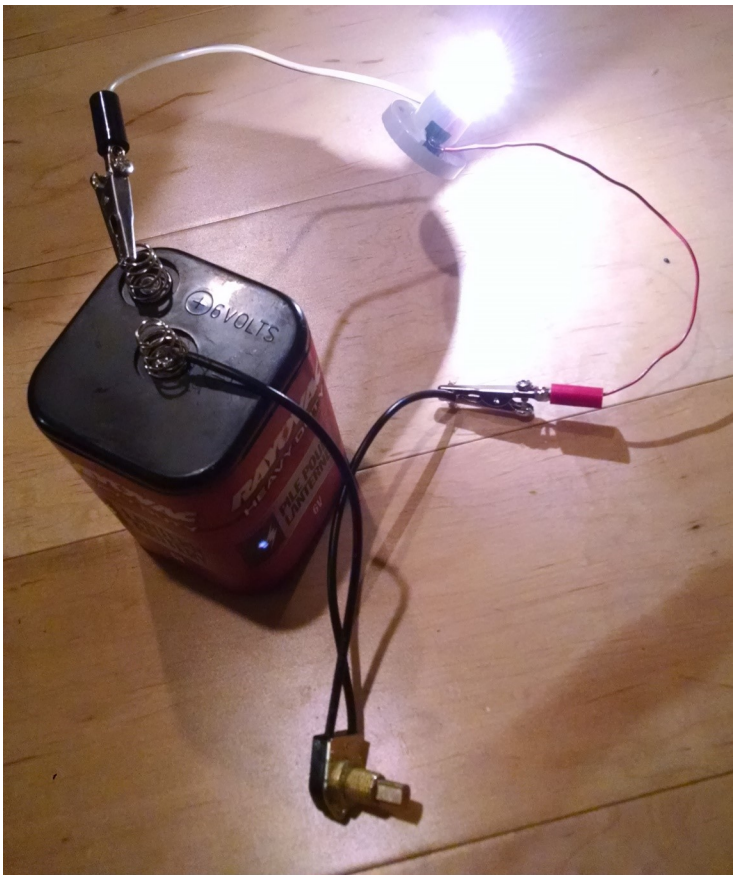


Electricity doesn't flow by itself. It needs a push. A battery can push electricity through a circuit (like a water pump pushing water through a hose).

Experience it

Create an electrical circuit by connecting a wire to the negative terminal on a battery, then to a component – like a light, buzzer or motor.

Then use a wire to connect that component to the positive terminal of the battery. The battery will push electrons along the wire, moving through the component, which converts the energy into light, sound, or motion. Then the current flows back to the battery.

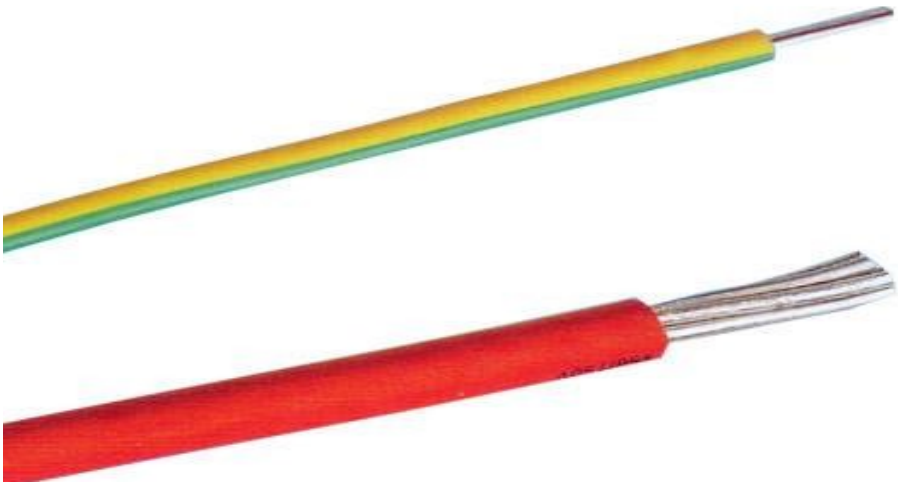


Switches

Lots of electrical objects have a switch to turn them on and off. When the switch is flipped one way, the wires are connected, the circuit is complete, and the energy flows. Flipping the switch the other way breaks the circuit and the power goes off.

Conductors and Insulators

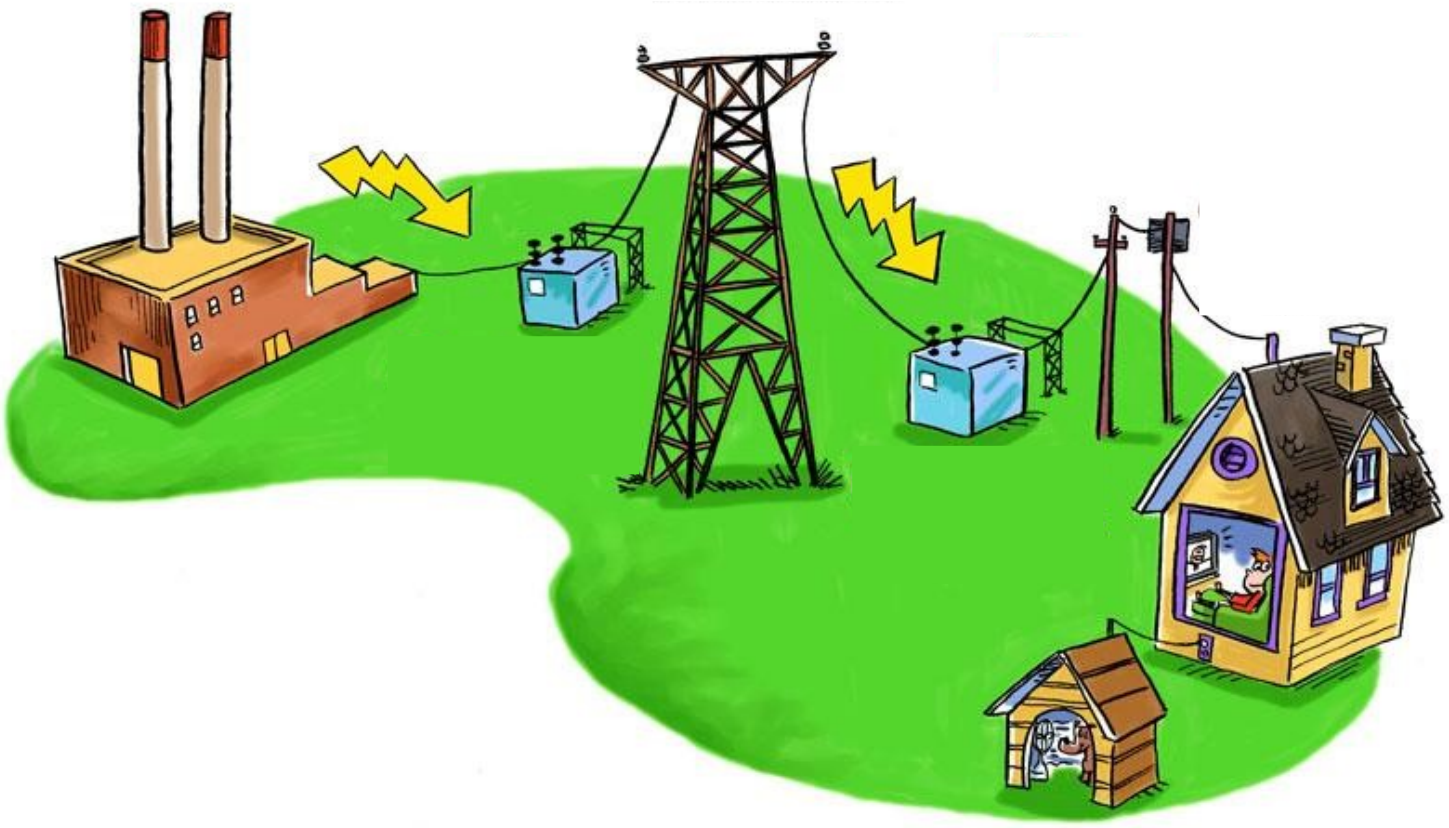
Electricity flows well through some things and not through others. Conductors, like metal, water, and acid have loosely bound electrons that can travel easily along the path. Insulators, like glass, rubber, plastic, and air, have tightly bound electrons that don't flow. Metal wire that conducts electricity is often wrapped in plastic to insulate it.



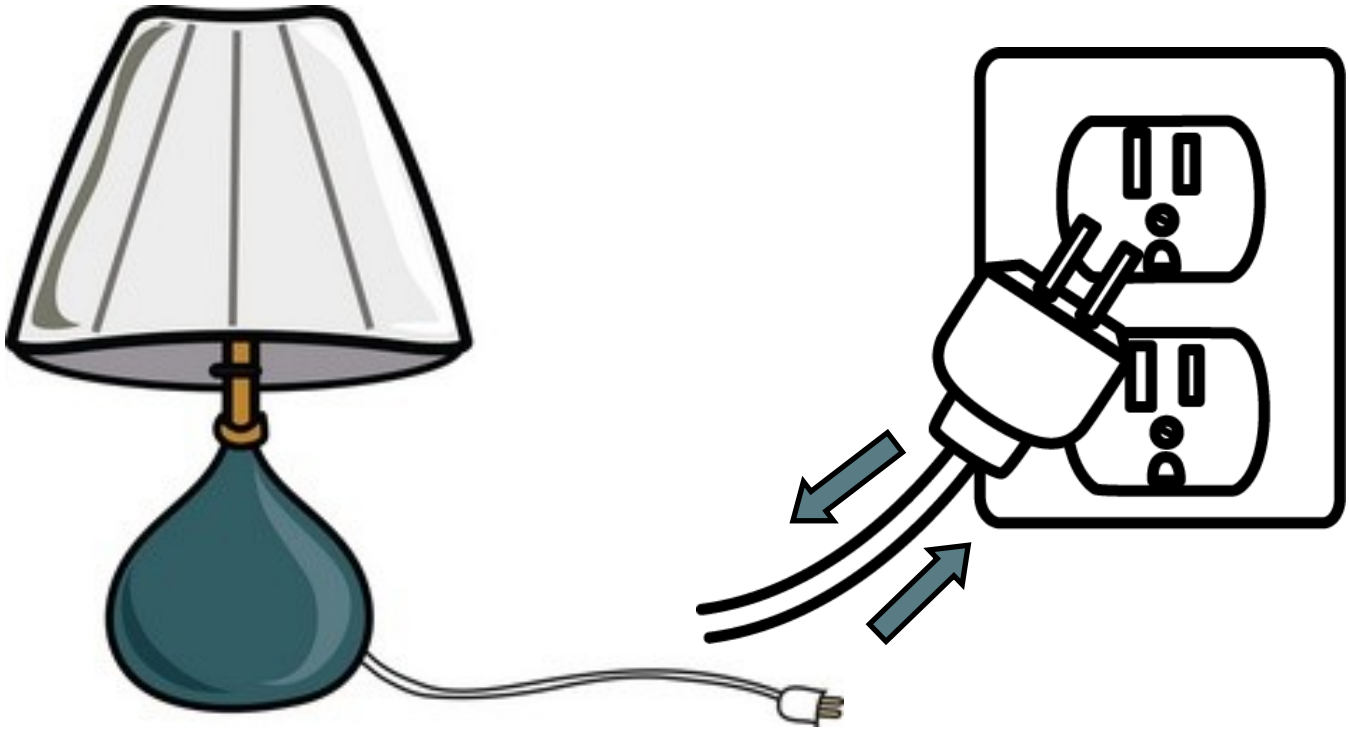
Electricity can be dangerous – if it goes through a person, it can hurt, or even kill them. Don't ever push anything into electrical outlets, or touch bare exposed wire.

How does electricity get to the outlets in your house?

Electricity is generated at a power plant. Energy from wind, water, coal, or other resources is used to turn a turbine. The magnet in the turbine then pushes electricity from the generator into power lines that travel to your home.



At home, the electricity travels on wires hidden inside your walls. When you flip a light switch, that completes a circuit. Electricity flows, and the light comes on.



Experience it. Find a lamp. Ask an adult to unplug it and show you the two prongs on the plug, then ask the adult to carefully plug the lamp into the wall. Then you can switch the lamp on. When you turn the switch, electricity flows from the house through one prong of the outlet, through one wire inside the cord, into the lamp to light the bulb. Then the electricity travels out along a second wire inside the cord to the second prong, and back into the house circuit.

Experience it:

Walk around your classroom or home, and make a list of all the things you can find that use electricity. Then ask an adult to tell you what you missed.

Note to Parents and Teachers: This book is intended to introduce children age 5—6 to some basic concepts of electricity. Have fun experimenting together! If you'd like ideas for more hands-on STE(A)M activities for kids, check out my website, www.InventorsOfTomorrow.com