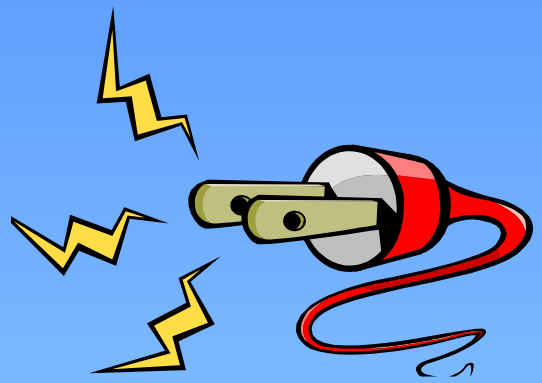
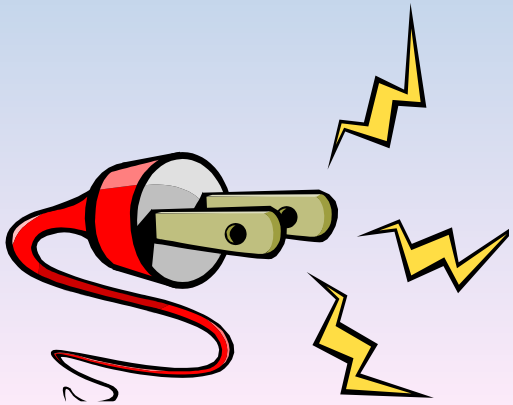
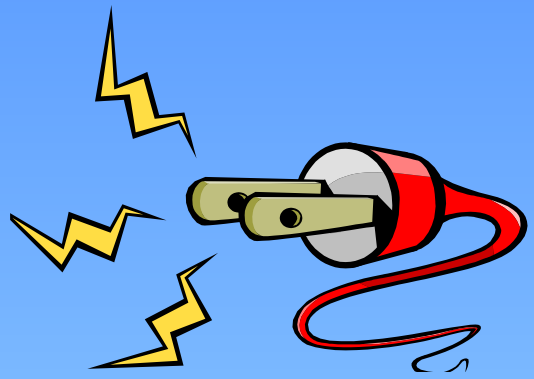
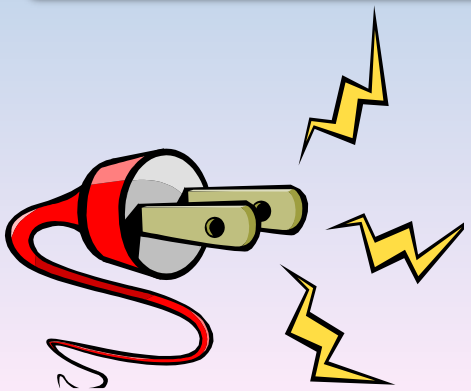


Electric Circuits



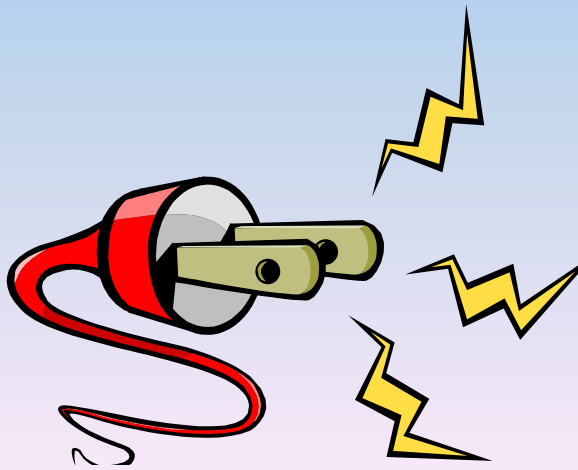


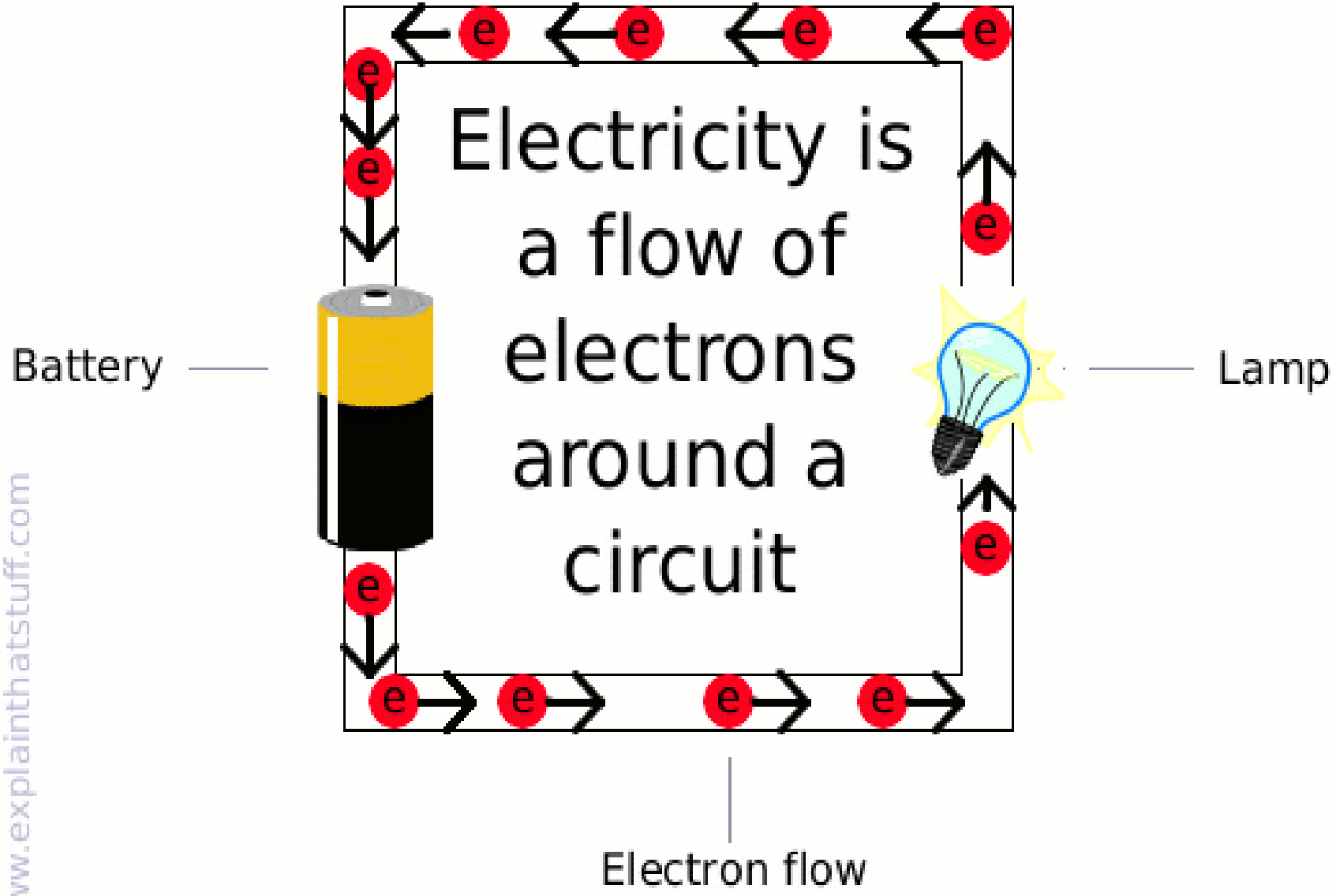
Circuits Activator



Electric Charge: Objects become positively charged when they lose electrons and negatively charged when they gain electrons; objects with like charges repel and objects with opposite charges attract

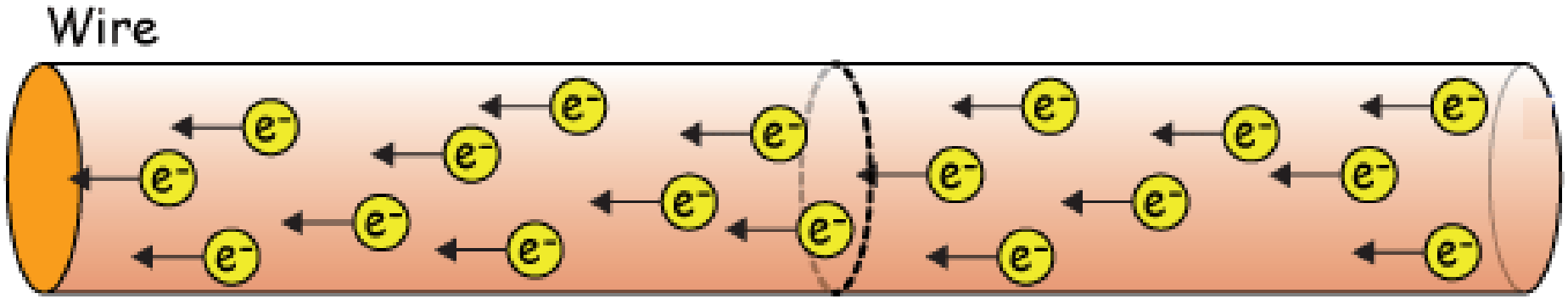
Electricity: the presence and/or flow of electric charges





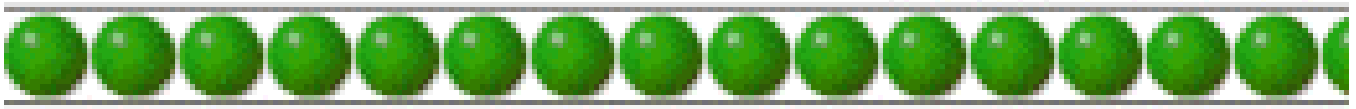
All matter is composed of positive and negative particles.

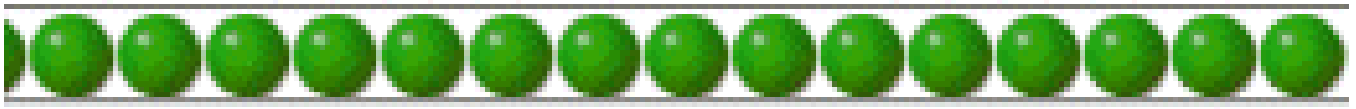
The flow of charged particles is an electric current.



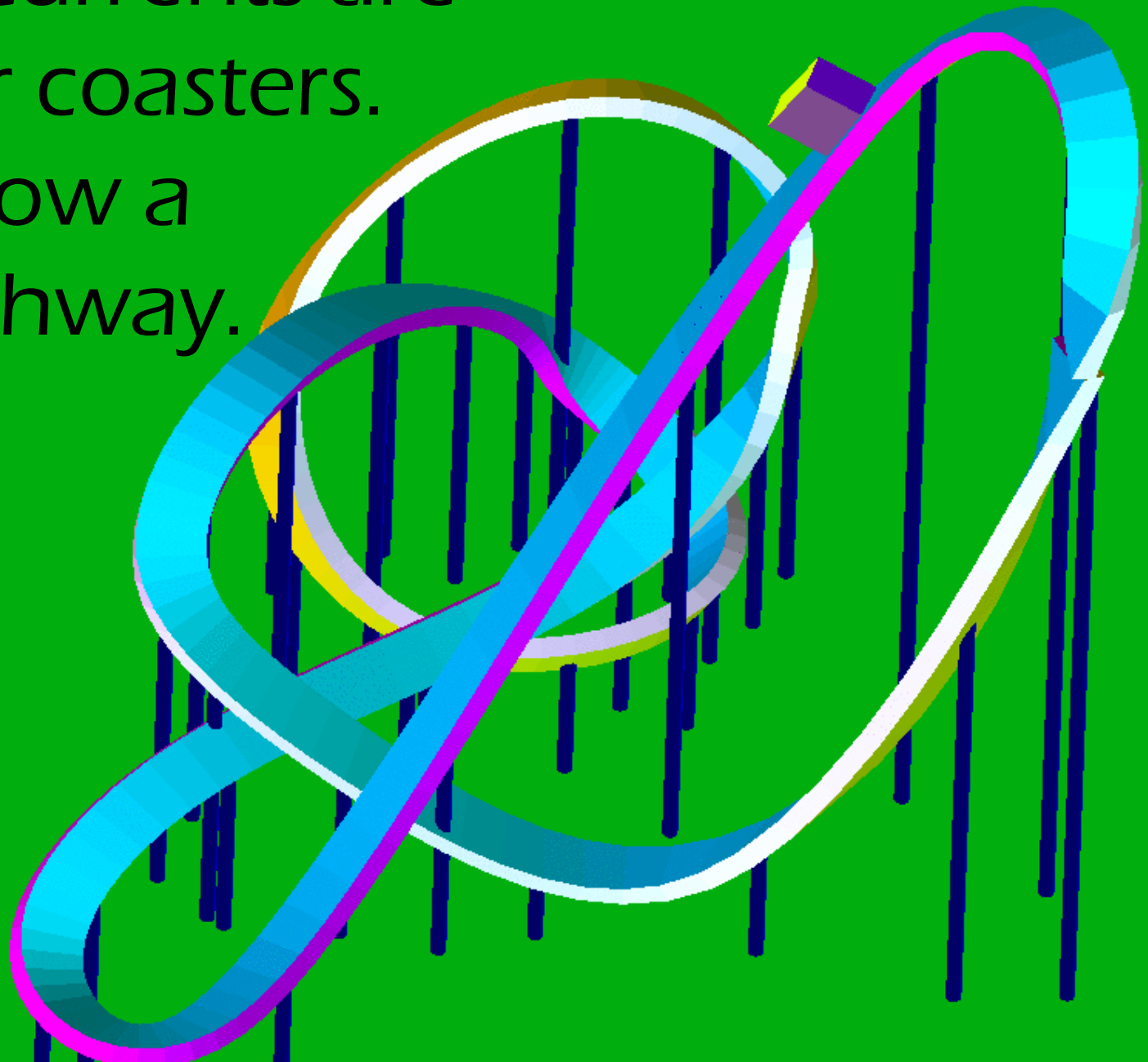
When you watch TV, use a computer, or even turn on a light, you depend on moving charges for the electrical energy that you need.

Higher Current = Faster Moving Electric Charges (Electrons)





Electric Currents are like roller coasters. They follow a fixed pathway.



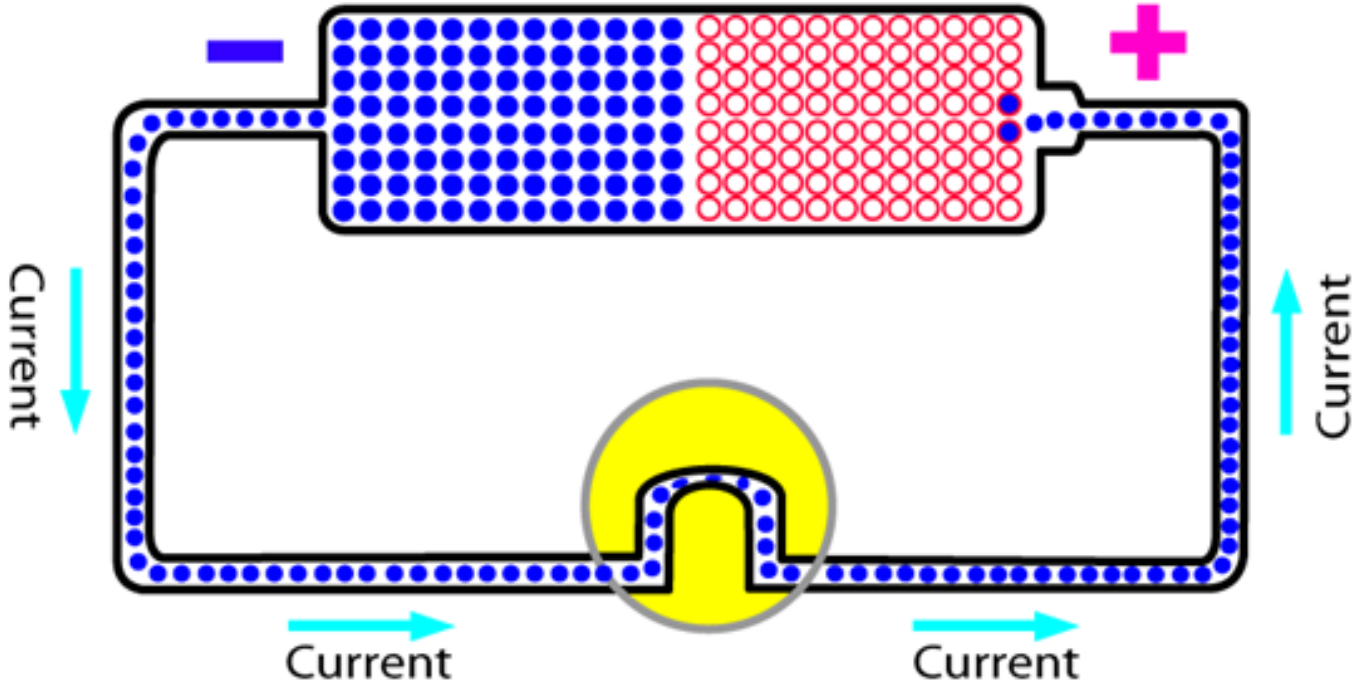
Electric Circuits

- Circuits control the movement of electric current by providing paths for electrons to follow.

- The path of an electric circuit is a closed loop.

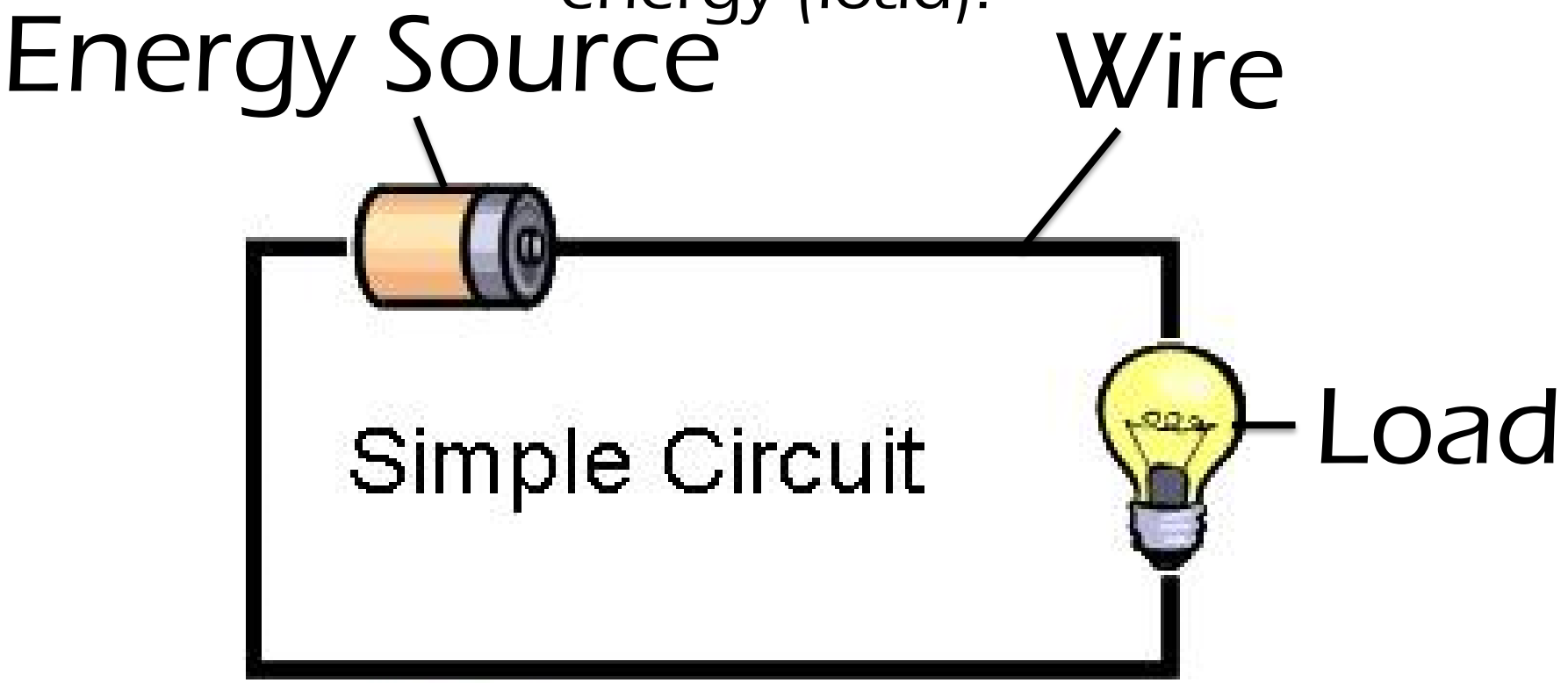
Electric Circuits

An electric circuit allows electrons to flow from a negative pole (excess electrons) to a positive pole (deficient in electrons)



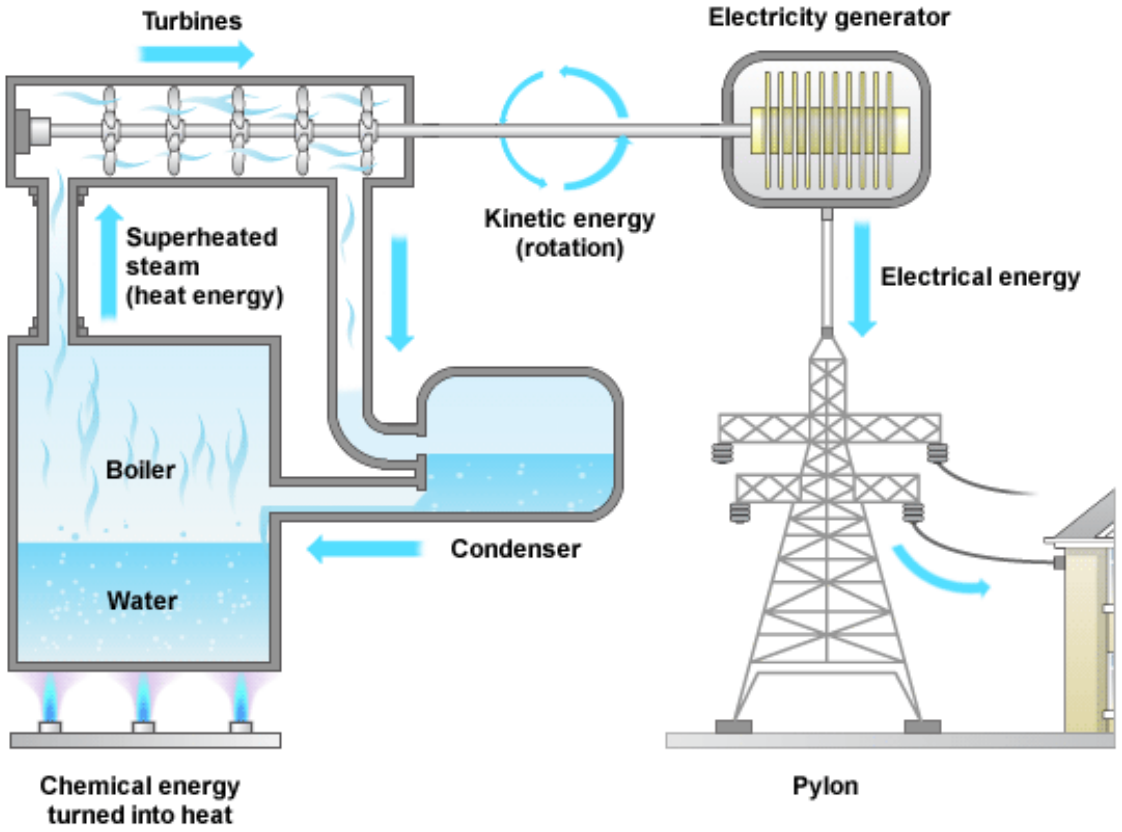
Electric Circuits

All circuits need three basic parts: an energy source, wires, and the object that is going to change the electrical energy into another form of energy (load).



Energy Source Examples

Battery



Power Plant Generator

Load Examples

Changes electrical energy to other forms of energy

Light Bulb

Car

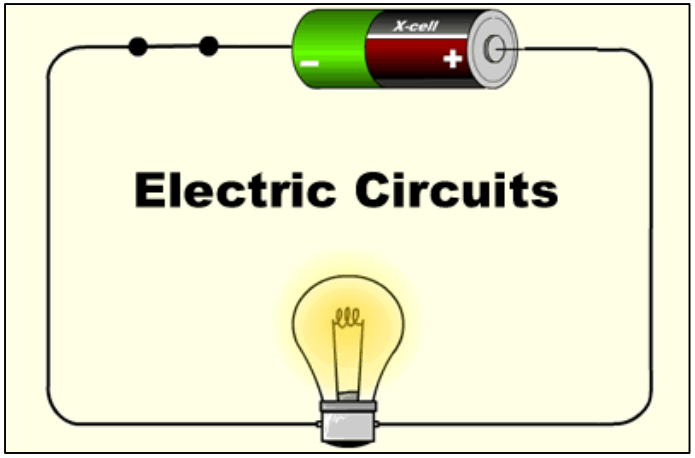
Speaker

Fan

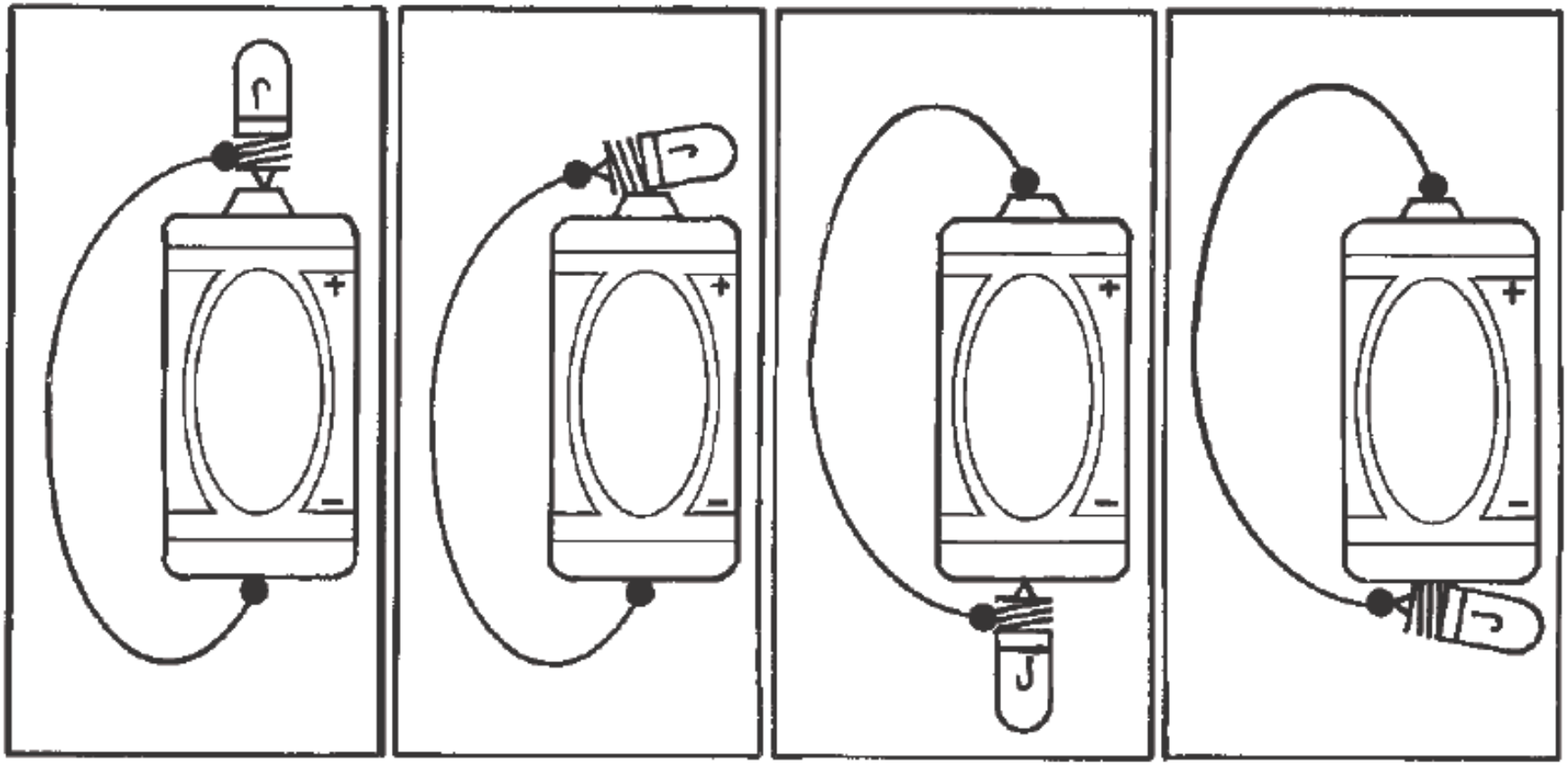
Toaster

Connections in a Circuit

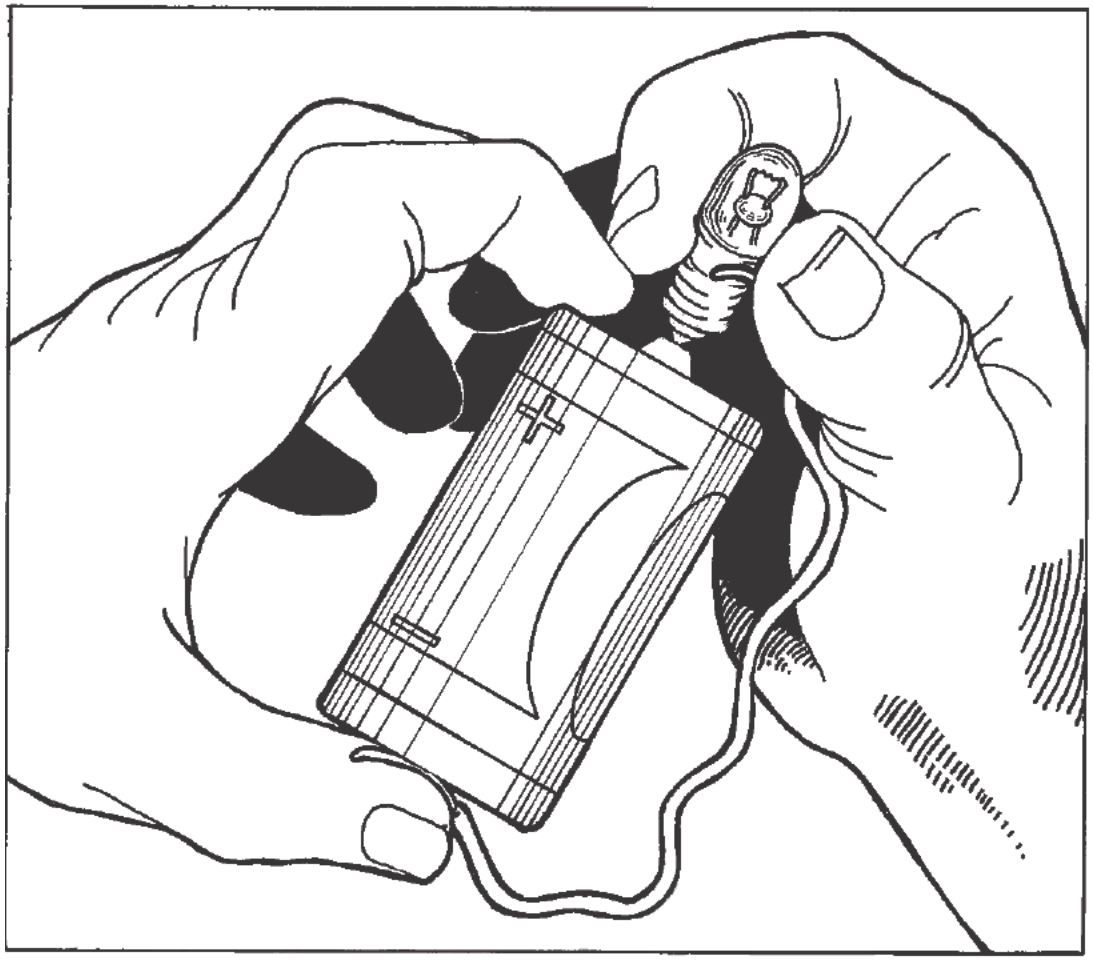
- Electrons flow from negative to positive; therefore, a complete circuit must have wires that connect the negative pole of the energy source to the positive pole of the energy source.
- The circuit is established when there is a continuous path for electricity to travel from one end of the energy source to the other end.



The illustrations below show four ways in which a simple circuit can be made.



Make a Simple Circuit

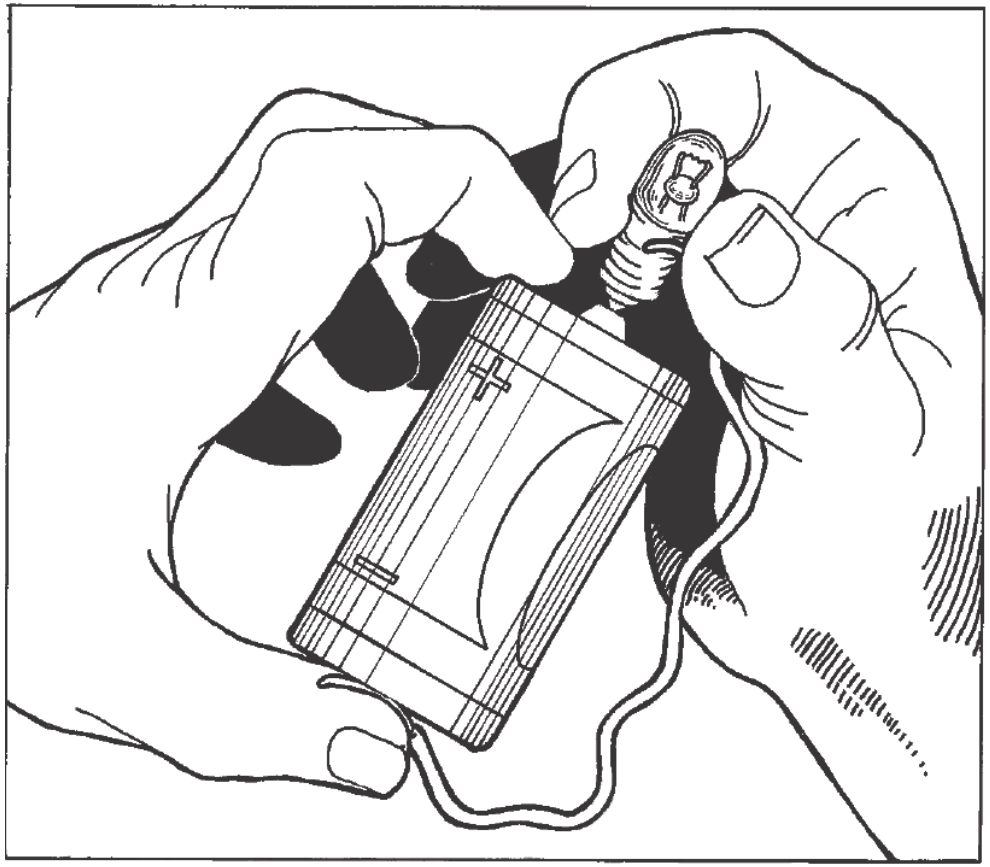


Aluminum and Tape

You have **10** minutes to make a simple circuit. **You must use all supplies.**

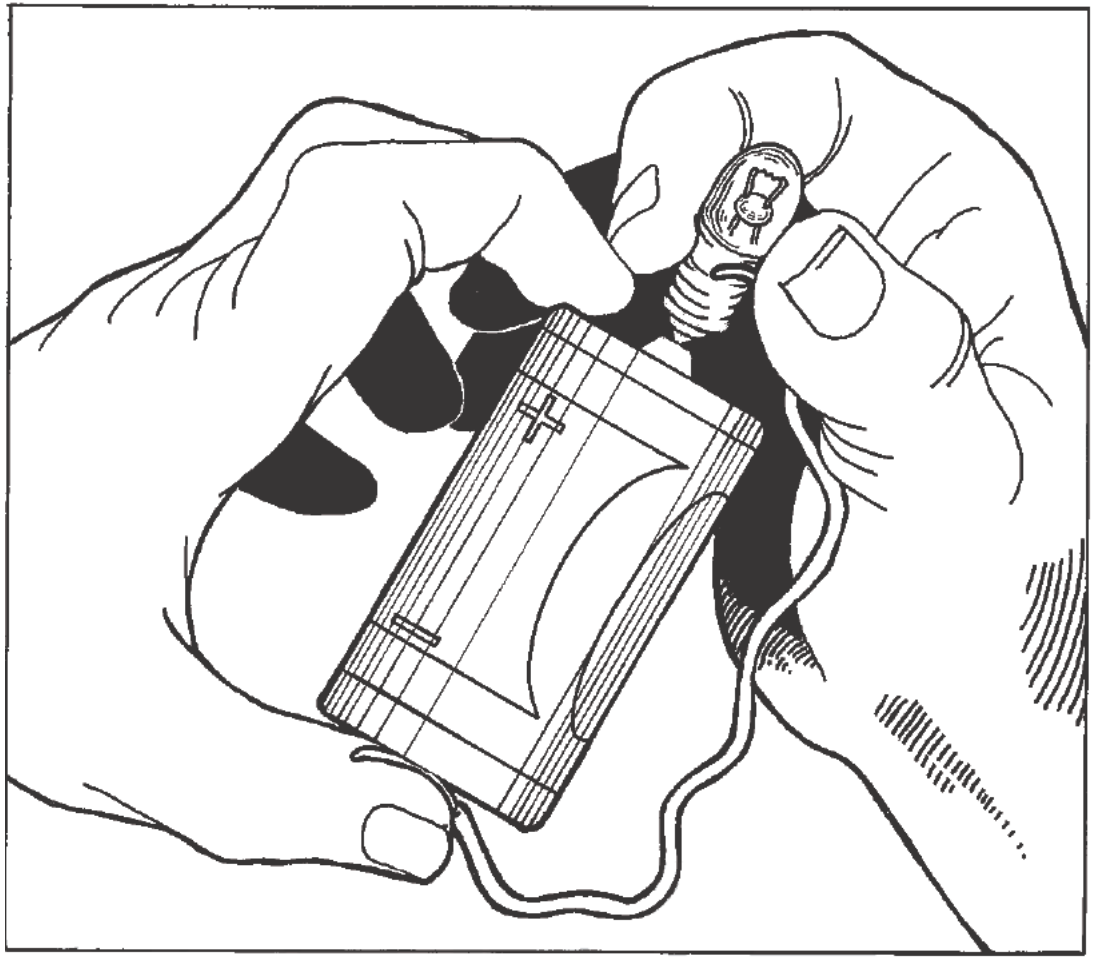
Show it to me when completed.

Make a Simple Circuit



Keep your pie pan (throw away the foil) and come and get a Styrofoam bowl.

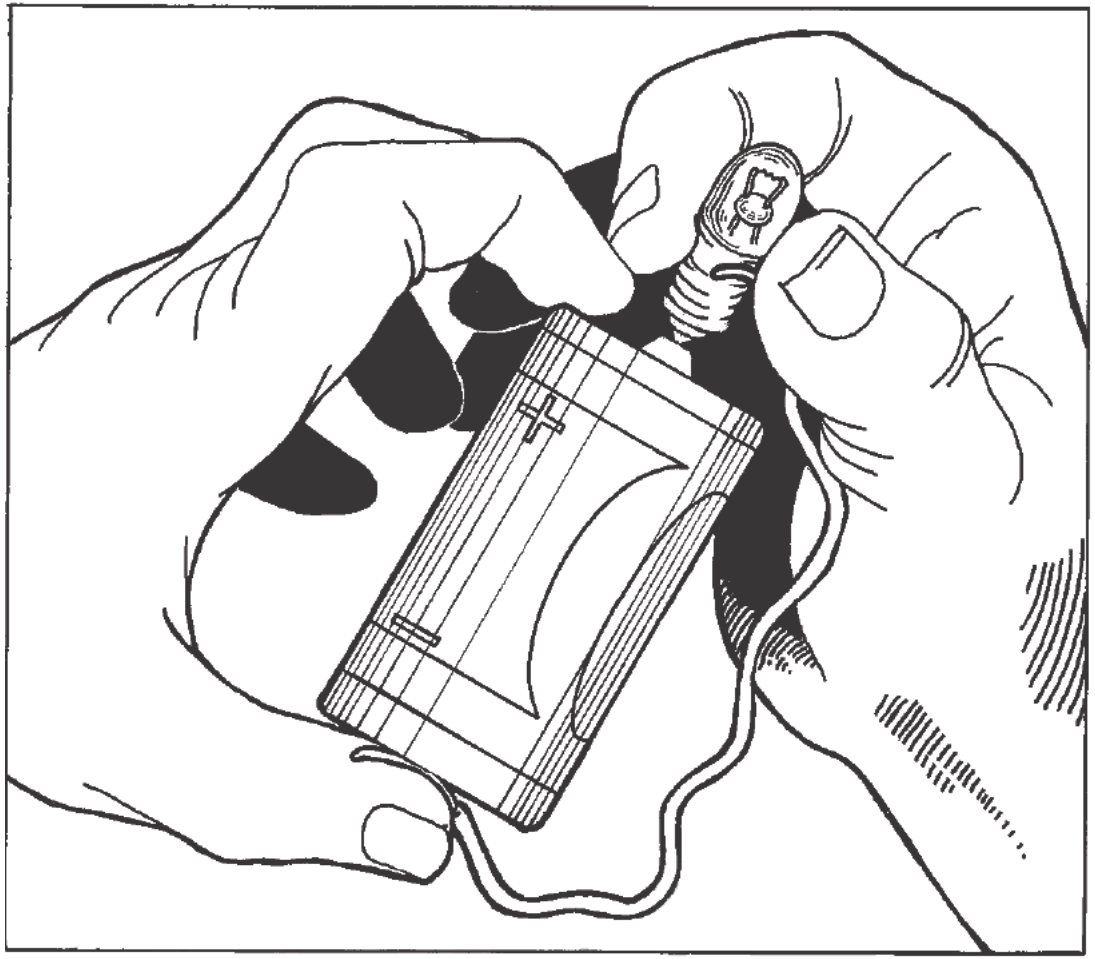
Make a Simple Circuit



Use what is in the bowl as well as the battery and bulb to build a circuit.

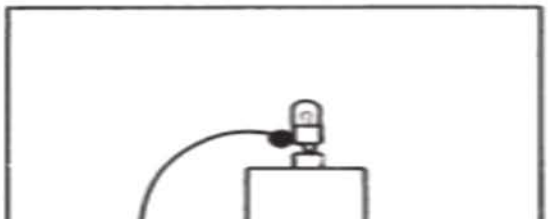
You have **10** minutes. Show it to me when completed.

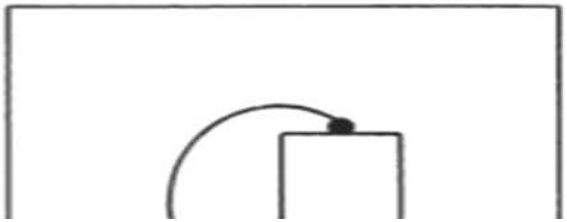
Make a Simple Circuit

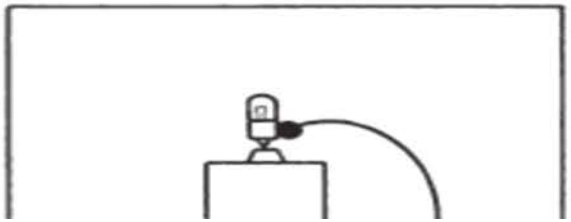


Bring the pie pan back up with the tape, battery, tape, and bulb.

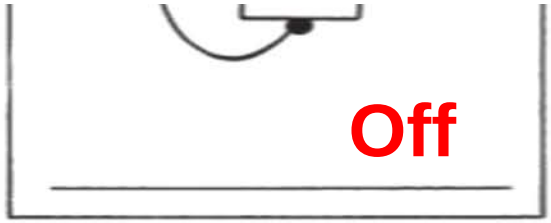
Bring the bowl back up with the battery holder, two wires, and the bulb platform



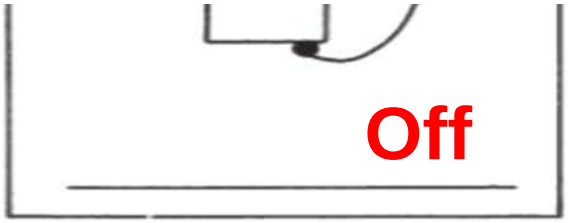




With a partner, determine whether the light bulbs in the following images will be On or Off based on the circuit connections. Be able to explain your answer.



Off

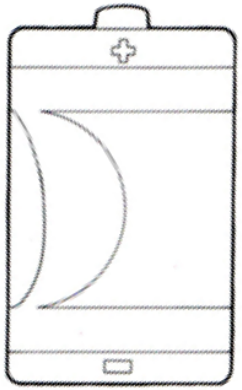


Off

On

Circuits: Formative Assessment #1 Name _____ Date _____

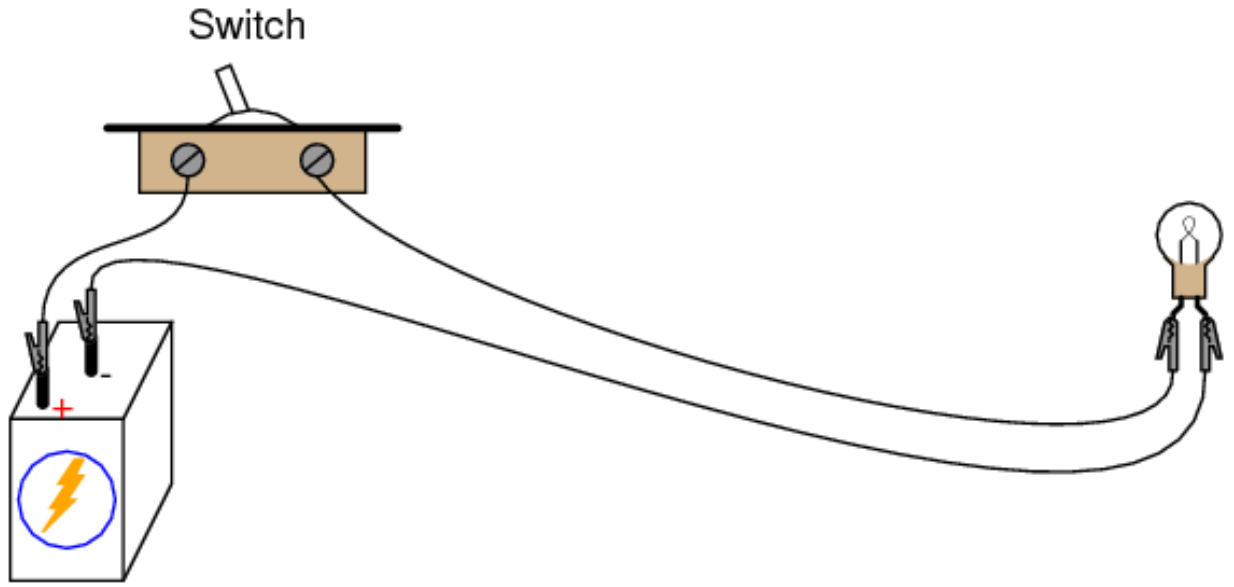
Draw wires to correctly connect the circuit in the diagram below so that the bulb will light. Label and identify the following: Arrows showing the flow of the current; Arrows showing the flow of electrons; Energy Source; Load



Identify whether your illustration is a closed circuit or an open circuit. Explain your answer.

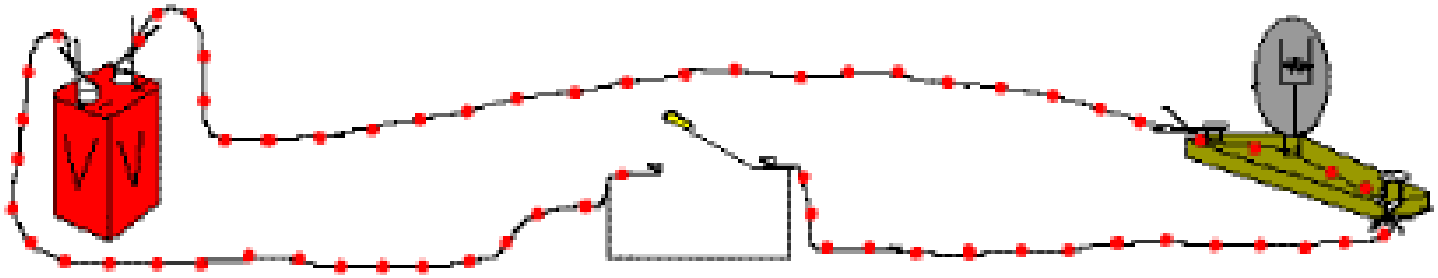
Electric Circuits

Sometimes a circuit also contains a switch that is used to open and close a circuit.

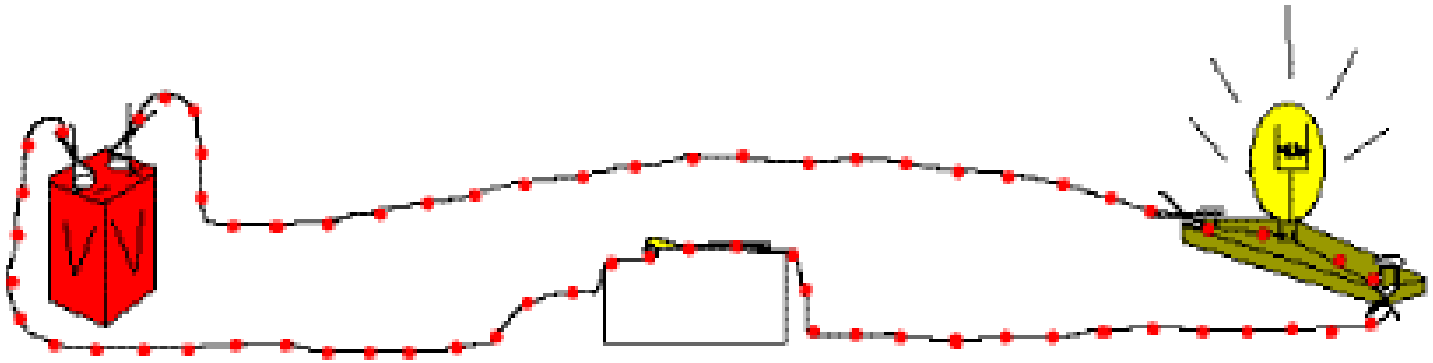


Electric Circuits

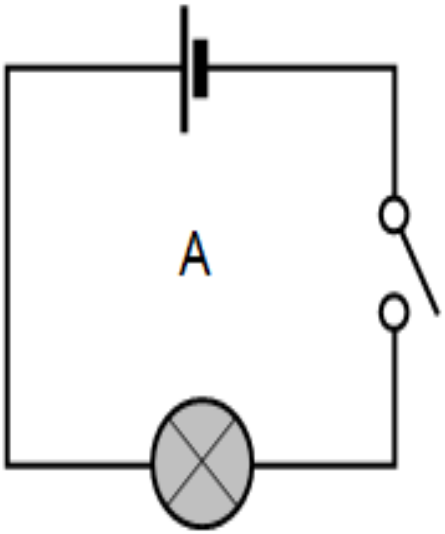
OPEN CIRCUIT

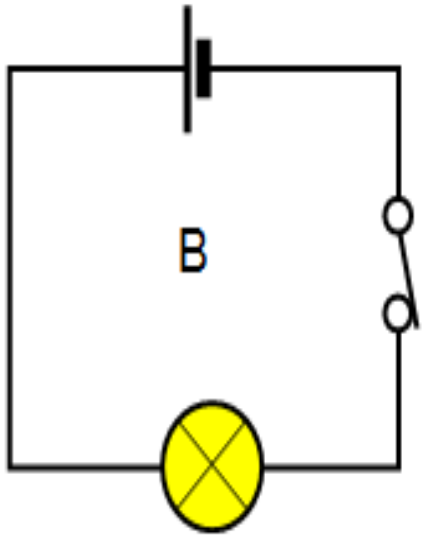


CLOSED CIRCUIT



Make a Closed and Opened Circuit

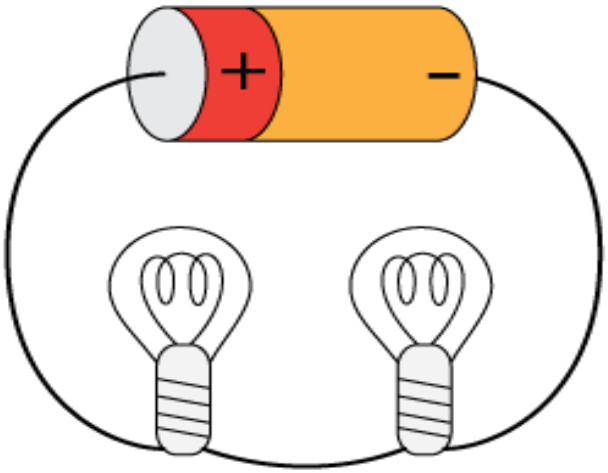


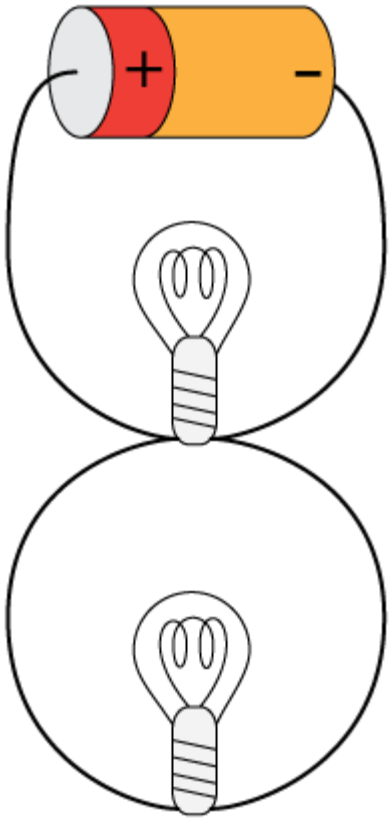


You will have 10 minutes to show me a circuit that can be closed and opened. Show it to me when completed.

Different Types of Circuits

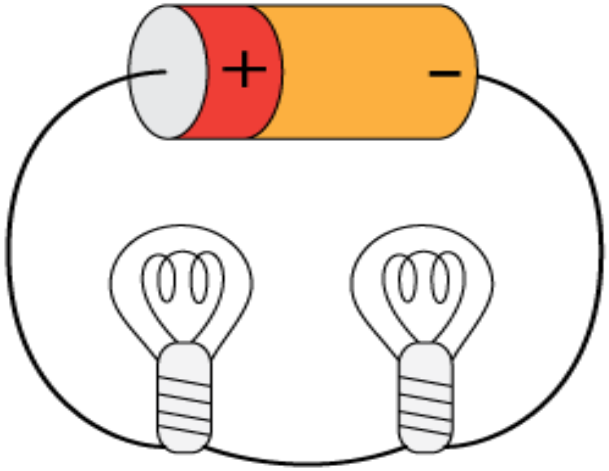
Circuits are distinguished based on the way in which loads are connected.

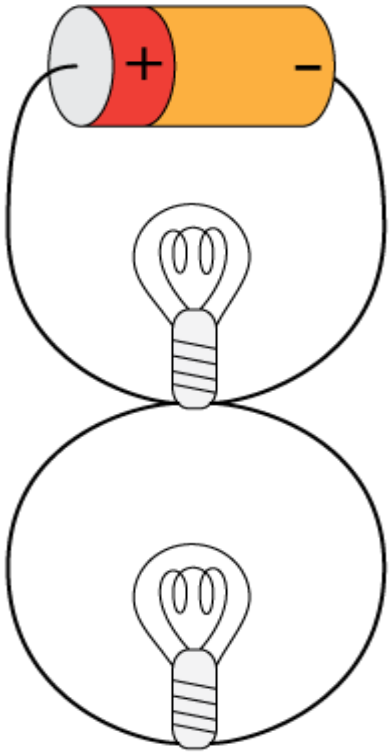




Different Types of Circuits

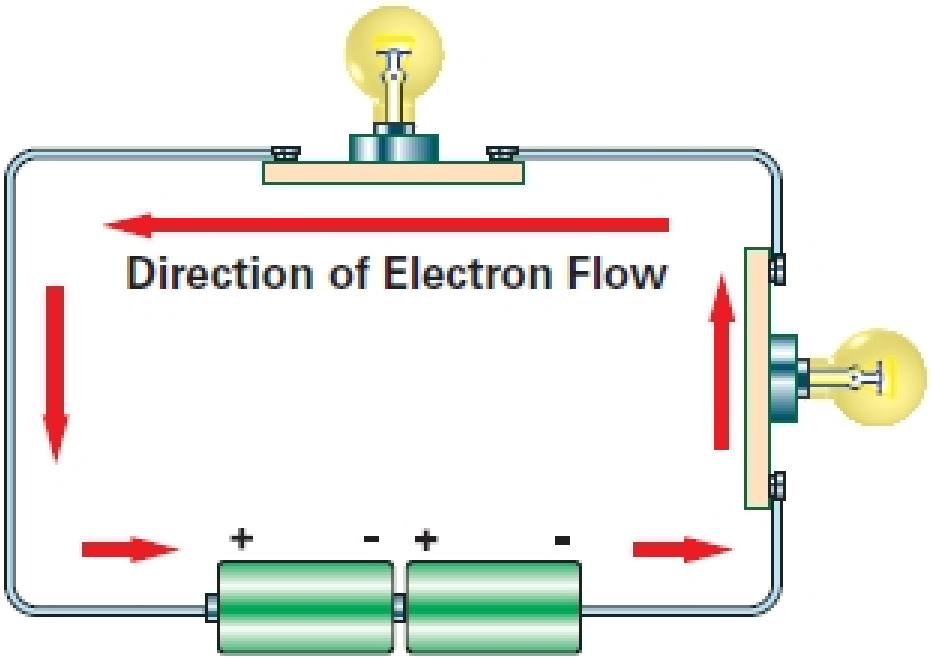
With a partner, discuss the differences in which the electric current will travel





Series Circuit

In a Series Circuit there is only one path for the electric current or electricity to flow.

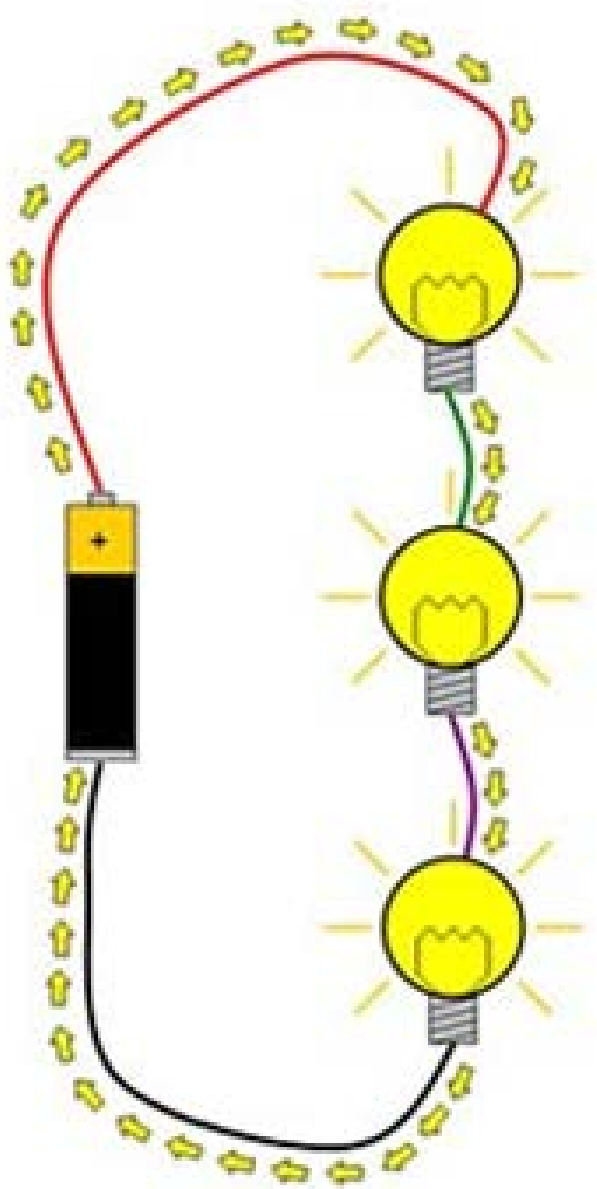


Series Circuit

Series Circuit

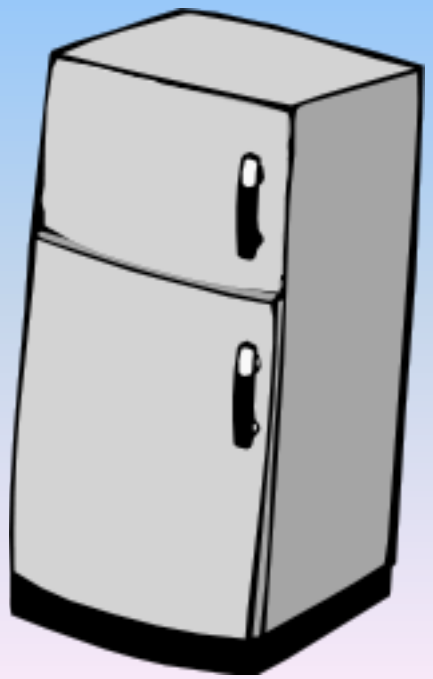
- All of the loads in a series circuit share the same current.

- If there is any break in the circuit, the charges will stop flowing.



Series Circuit

Imagine if your refrigerator and a lamp were in a series circuit together. Your refrigerator would run only when the lamp was on. And when the bulb burns out, the refrigerator would stop working.



Series Circuit

There are some cases when a series circuit is useful. For example, series circuits are useful in wiring burglar alarms. Why?

If any part of the circuit in a burglar alarm fails, there will be no current in the system. The lack of current signals that a problem exists, and the alarm will sound.

Can you think of any other examples?

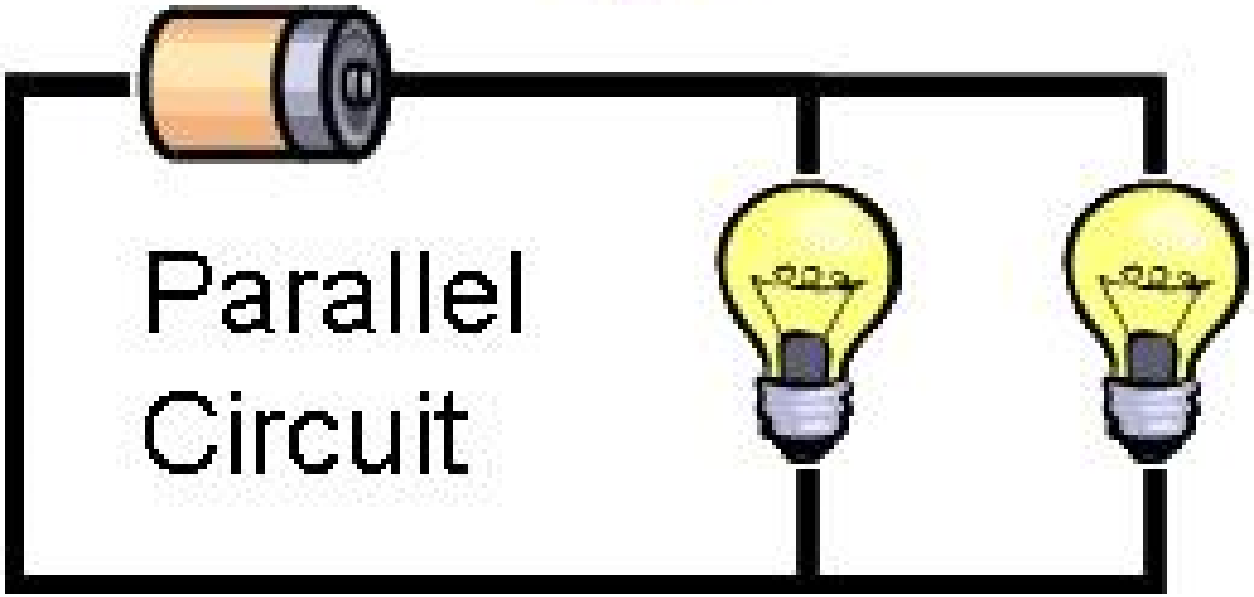
Imagine that your house is wired in a series circuit. What would have to happen if you wanted to watch TV?

You would have to turn on other appliances in order to watch TV. Stupid right?

Circuits in buildings are wired in Parallel.

Parallel Circuit

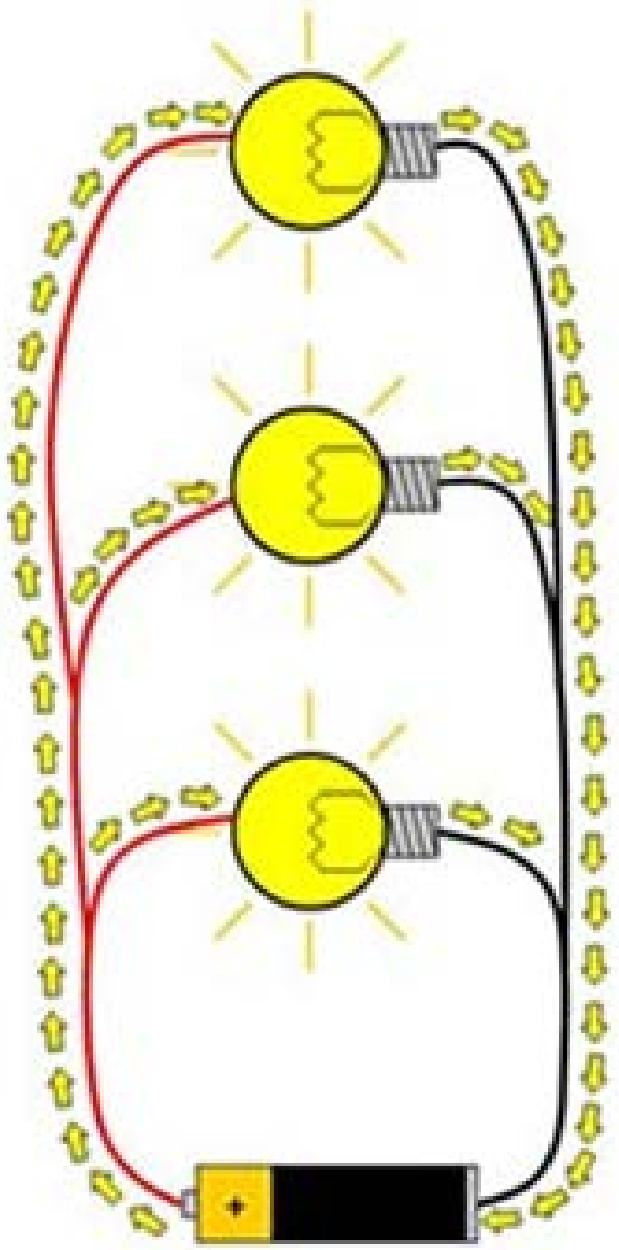
In a Parallel Circuit there is more than one path for the electric current or electricity to flow.



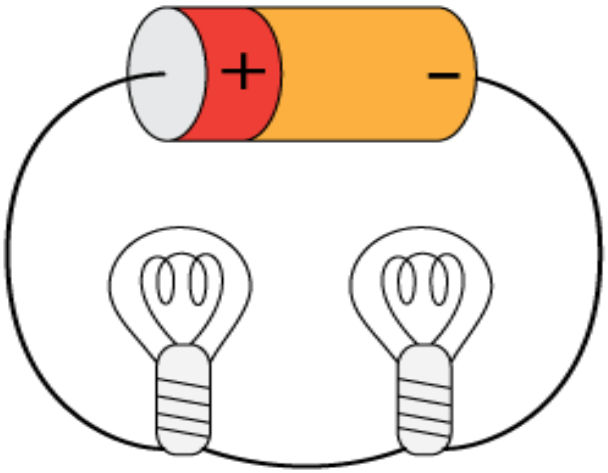
Parallel Circuit

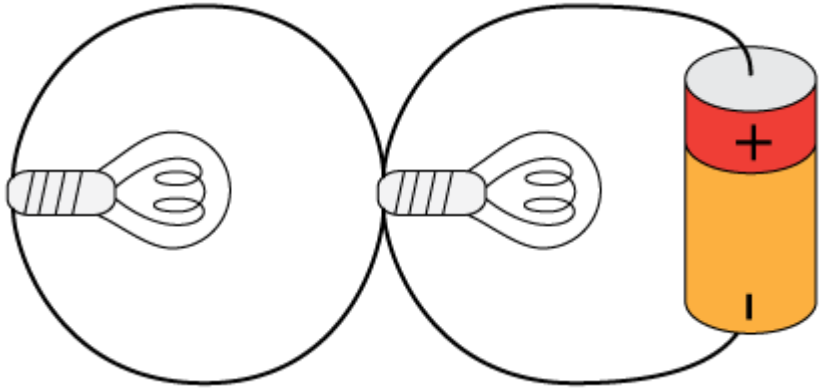
- The electric current branches so that electron flow through each of the paths

- If one path is broken, electrons continue to flow to the other paths

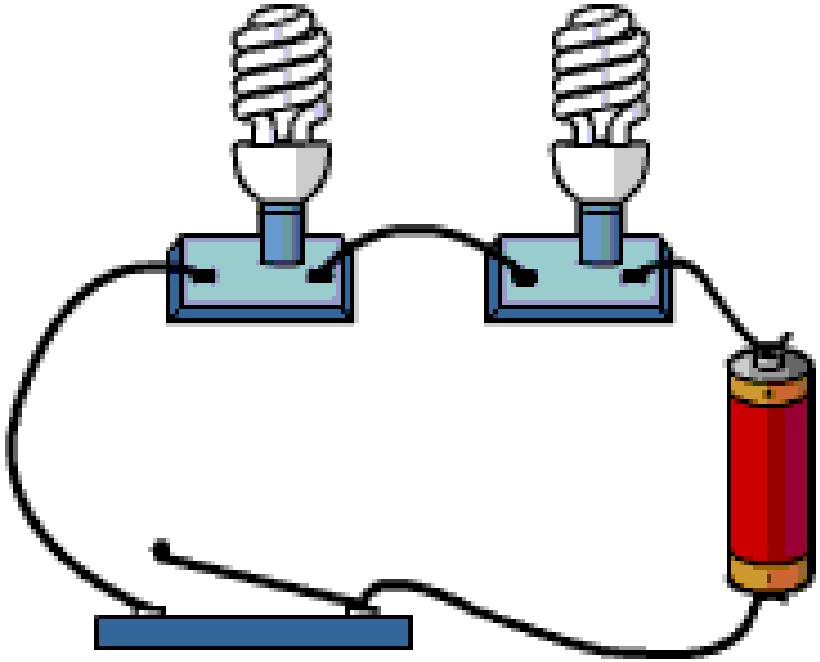


Circuit Sort Activity

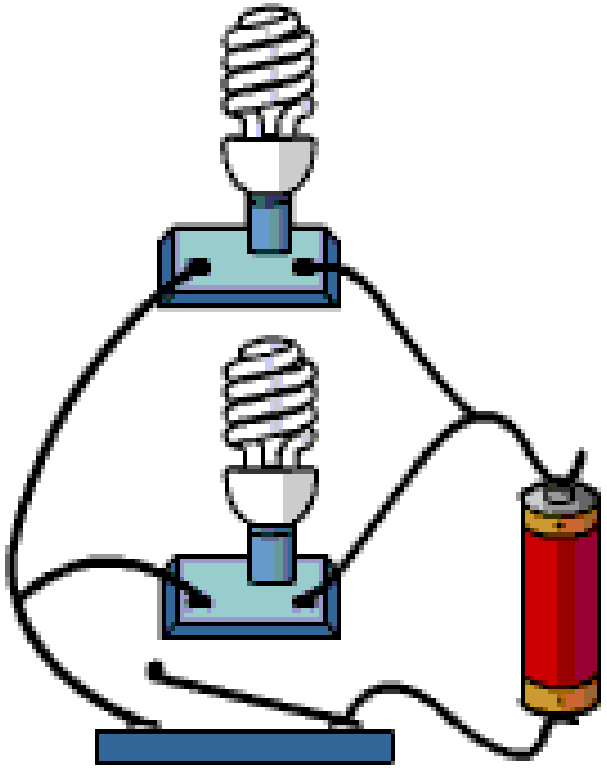




Comparing Series & Parallel



Series Circuit



Parallel Circuit

Comparing Series & Parallel

What are the advantages of using a parallel circuit to a series circuit.

The load in a parallel circuit will still work if one of the loads is broken or missing. You can use one load at a time, even it another load fails.

Comparing Series & Parallel

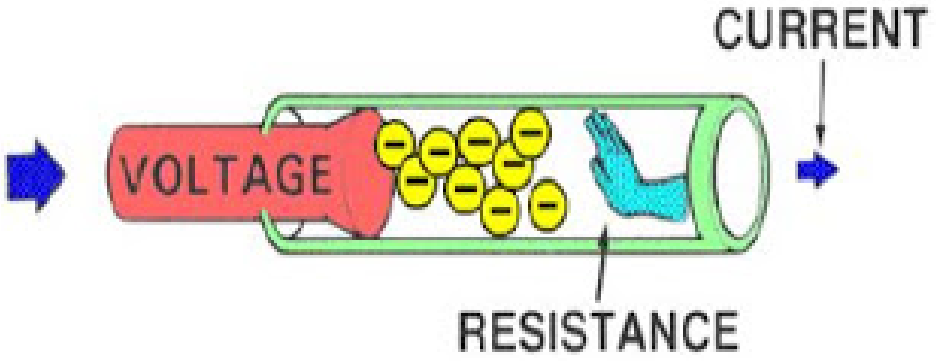
Another advantage of a Parallel circuit is that you can connect loads that need different currents to the same parallel circuit.

For example, you can connect a hair dryer, which needs a high current to run, to the same circuit as a lamp, which needs less current to run.

Comparing Series & Parallel

In a Series circuit, the current has to travel through each bulb; therefore, adding more light bulbs makes each bulb dimmer because the resistance of the whole circuit has increased.

Resistance is how difficult it is for electrons to flow through a material (friction).



Build a Circuit

You are pulling out Christmas lights for your tree but the strand will not light up. You moan in frustration because you know that you will have to check each and every bulb by replacing them with a new bulb.

Build this circuit for me.

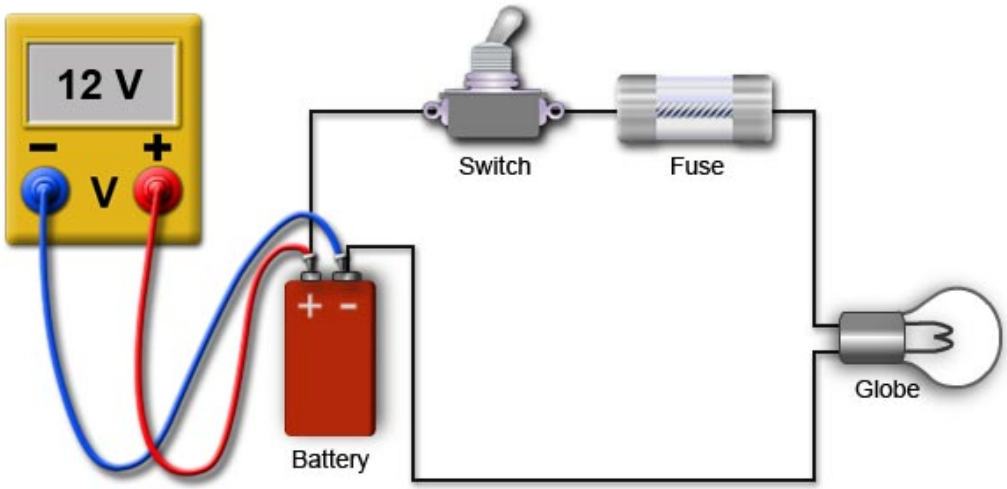
Build a Circuit

You walk into your house and smell fresh chocolate chip cookies baking in the oven. You smile in fondness at your dog who is sitting in front of space heater trying to get warm, and you hear your sister upstairs blaring her New Direction music. You want to barf but instead you throw your book bag on the floor and turn on the TV to play Madden 17.

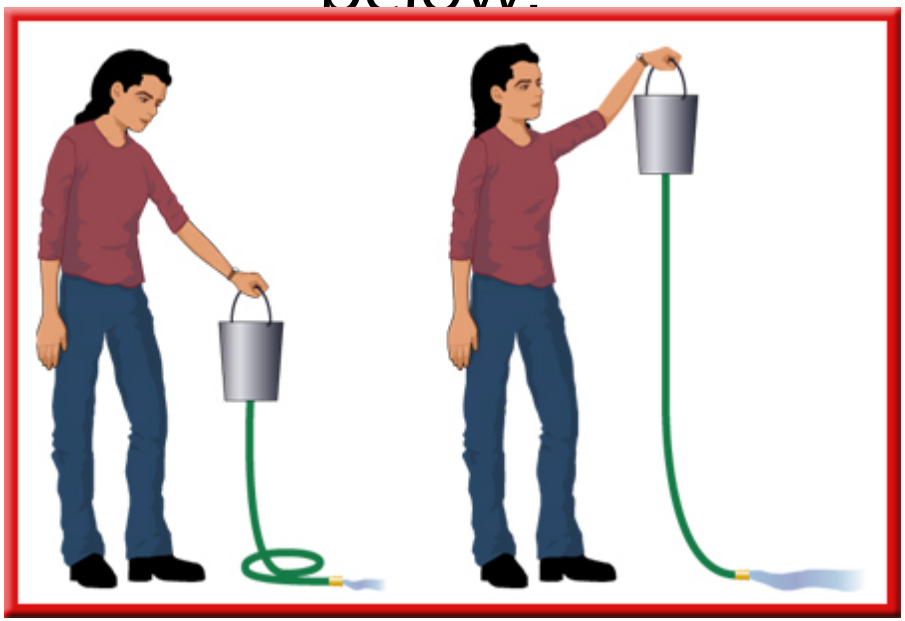
Build this circuit for me.

Voltage

- Voltage is the potential difference between two points in a circuit. (ex. between the positive and negative terminal of a battery)
- As voltage increases, more electrical potential energy is available to be changed into other forms of energy.
- Basically, higher voltage means a faster flow of electrons or electric current.



Think of the relationship between Electric Current, Voltage, and Resistance as shown in the diagram below.

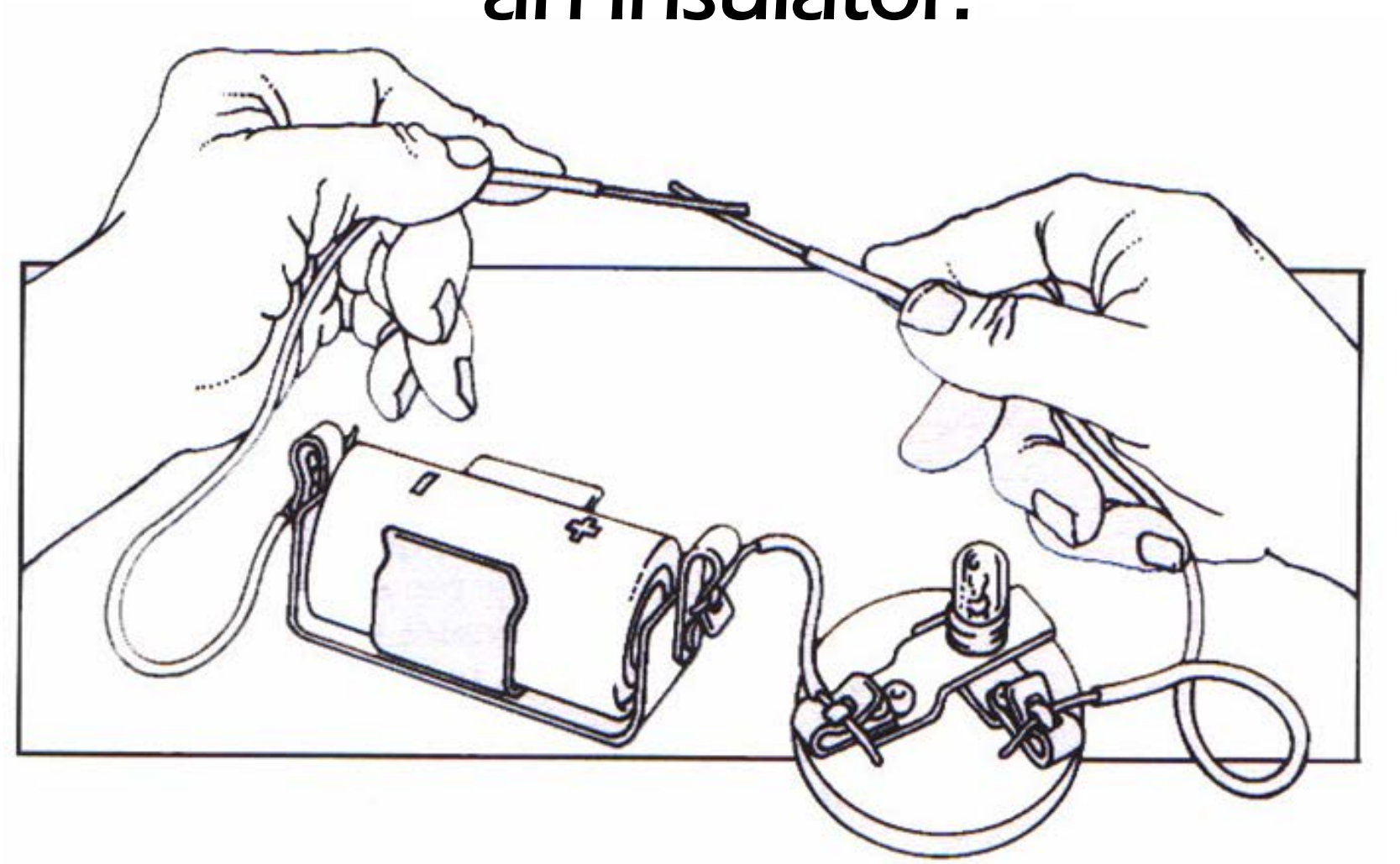


As the bucket is raised, potential energy is increased (increase in voltage) and there is less resistance (friction) in the hose; therefore the flow of water (electric current) is greater.

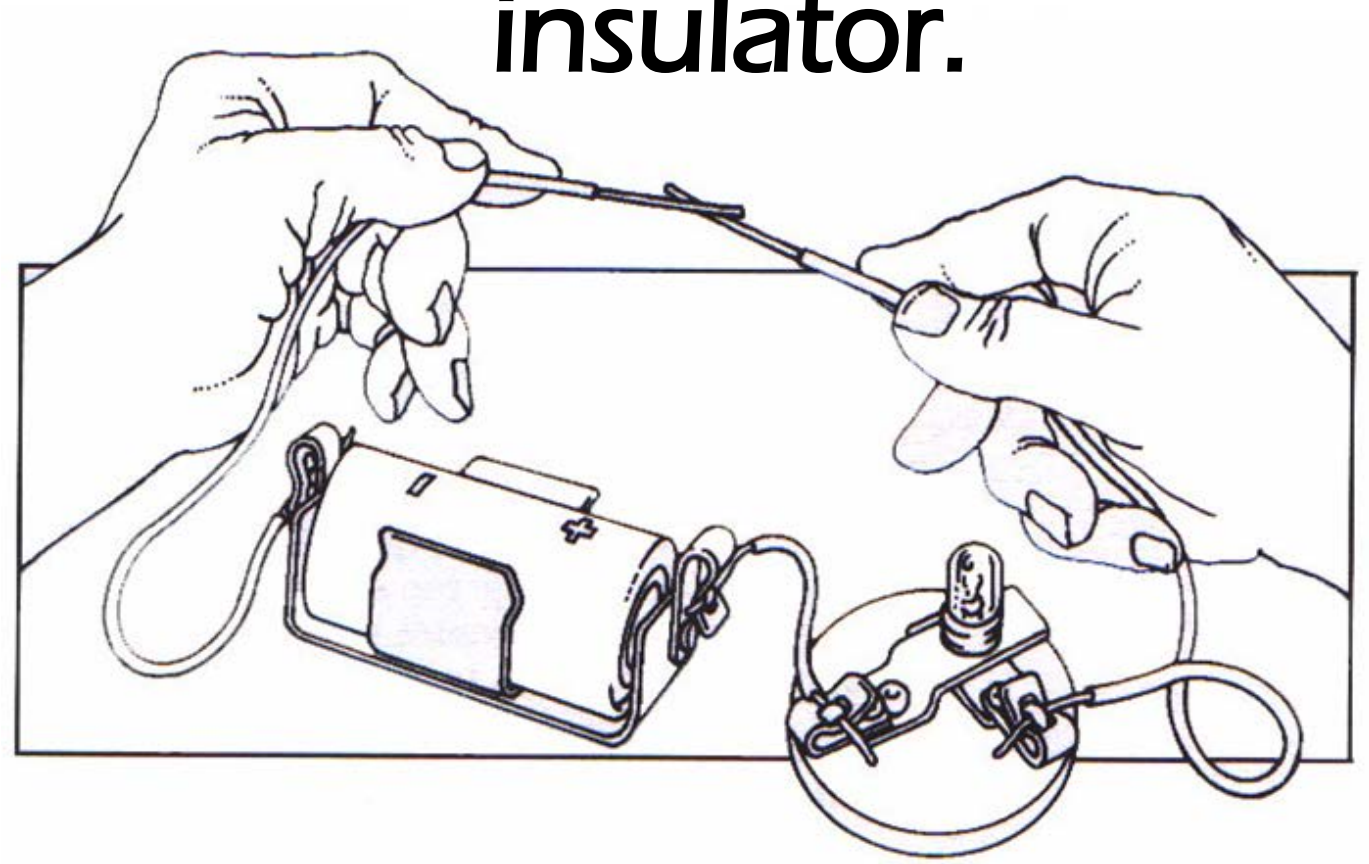
Recall that an electrical conductor is a material in which charges can move easily (electrons flow freely).

An electrical insulator is a material in which charges cannot move easily (their electrons cannot flow freely).

An open circuit can be used to test whether an object is a conductor or an insulator.



Look at objects on the next two slides and identify whether the object is a conductor or insulator.



Can electricity flow through this material?		HYPOTHESIS		ACTUAL RESULTS (Conductor or Insulator?)
		YES	NO	
1	Golf Tee			Insulator
2	Straw			Insulator
3	Brass Screw			Conductor
4	Paper Clip			Conductor
5	Aluminum Screen			Conductor
6	Plastic Screen			Insulator
7	Chalk			Insulator

Can electricity flow through this material?		HYPOTHESIS		ACTUAL RESULTS (Conductor or Insulator?)
		YES	NO	
8	Pencil			Lead to lead-conductor Wood- Insulator
9	Brass Paper Fastener (brad)			Conductor
10	Finishing Nail			Conductor
11	Aluminum Nail (flat head)			Conductor
12	Marble			Insulator
13	Pipe Cleaner			Metal to metal -conductor Brush- Insulator
14	Copper Wire			Conductor
15	Aluminum Rod			Conductor