

New Section: Circuits & Machines. Warm Up:

1.) How do we use electricity every day?

- lights, computers, electronics, tvs, microwaves, etc...

2.) What do you think of when you hear the word "current?"

- new, flowing...?

3.) Where does electricity come from?

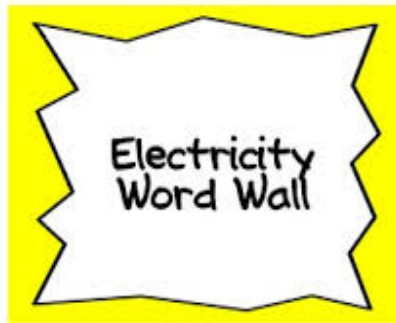
- various sources: nuclear power, solar energy, wind energy, hydropower...

What do you know about electricity and circuits?

owers things

It is
~~de~~electric

When its
at rest its
called static



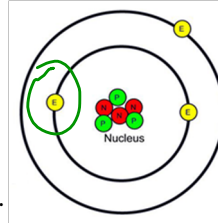
It flows
faster depending
on what its
flowing through
Movement of
Electrons

School House Rock: Electricity



Electric Circuits

- **Electricity** is the presence or movement of electrons, which are tiny, negatively charged particles that orbit an atom's nucleus. Electricity is what we get when electrons move from one place to another.



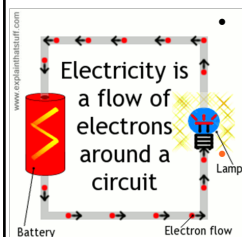
- Energy can be transferred from one system to another when two objects push or pull on each other over a distance. In the case of electricity, electrons are pushed and pulled through a circuit.



- A force is a push or a pull. There are many types of forces. **The pushing and pulling of moving electrons is an electrical force.**



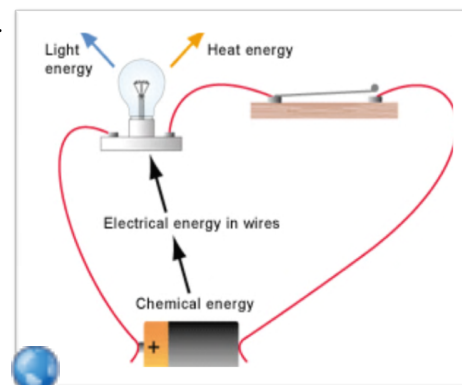
- Electricity is naturally present in lightning and static electricity, but the flow of the electrons in lightning and static electricity are not controlled or steady.



- In order for electricity to be useful in our homes and devices, there needs to be **a steady flow of electrons called a current.**

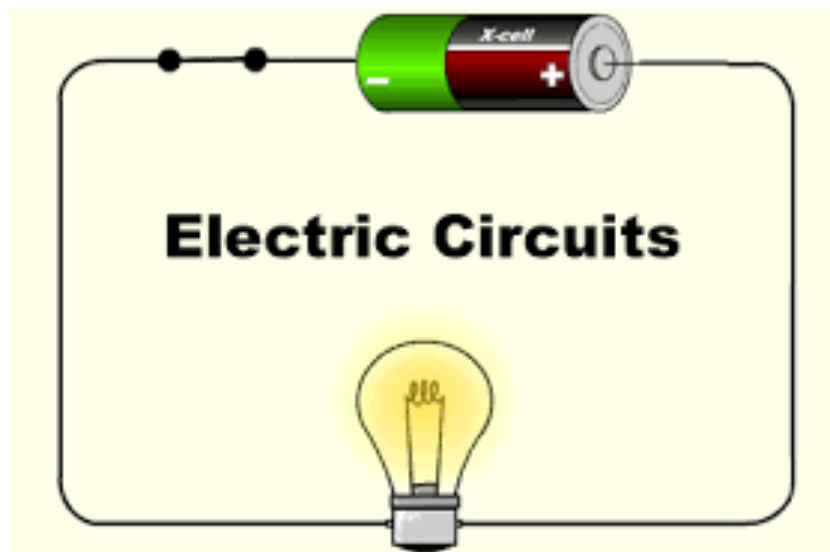
There also needs to be a complete circuit or a complete loop through which the electrical current can pass.

- **In a complete circuit, energy starts at a power source** (for example a battery), **moves through a conductor** (for example, a metal wire), **passes through a load** (a device that uses electricity such as a light bulb or toaster) **and returns back to the power source.**
- It starts out in one place, travels around the circuit, and ends up back at the place where it originated (**it makes a complete loop**). The electrons are pushed and pulled through the circuit.



Web Activity

Electrical Circuits Web Quest

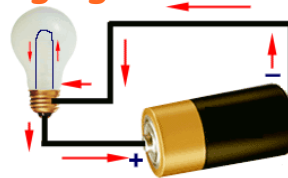


Warm Up

- 1.) In a complete battery circuit, what is the name/purpose for a battery? -a power source
- 2.) What is the light bulb or electrical appliance called in an electrical circuit? -the load
- 3.) Review: Does pressure increase or decrease as you go get higher into the atmosphere? -air pressure decreases

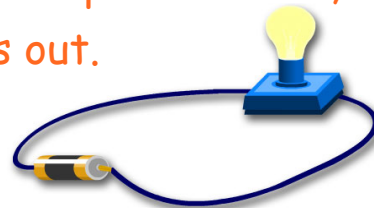
Batteries and Circuits

- Batteries are devices that use “**energy transformation**” to produce electricity. They work by changing stored chemical energy into electrical energy.

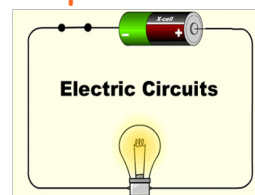


Simple circuit with light

- A chemical reaction inside a battery creates electrons. These electrons are stored in the negative terminal (-) of the battery. When a battery is part of a complete circuit, the negative terminal pushes the electrons out.



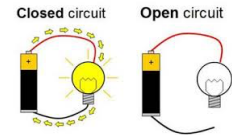
- The electrons travel from the negative terminal, through the circuit to the positive terminal (+). The positive side of the battery pulls the electrons in.



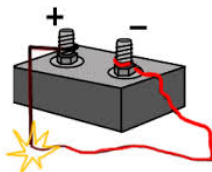
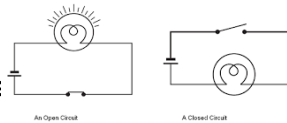
- Batteries create an **electrical force** by pushing and pulling electrons through a complete circuit.

Types of Circuits

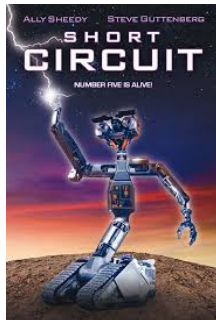
- A **closed circuit** has a complete path for current to flow. An **open circuit** doesn't, which means that it's not functional.



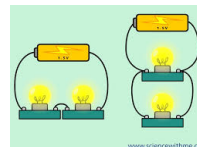
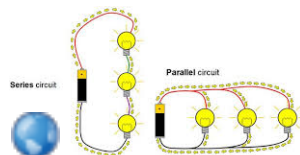
- You might think that when a circuit is open, it's like an open door or gate that current can flow through. And when it's closed, it's like a shut door that current can't flow through. Actually, it's just the opposite, so it might take awhile to get used to this concept.



- A **short circuit** is an unintentionally path of electricity that can cause a large amount of energy to flow. This can happen when two bare wires in a circuit touch each other. The part of the circuit bypassed by the short circuit ceases to function, and a large amount of current could start to flow. This can generate a lot of heat in the wires and cause a fire. As a safety measure, fuses and circuit breakers automatically open the circuit when there is an excessive current.



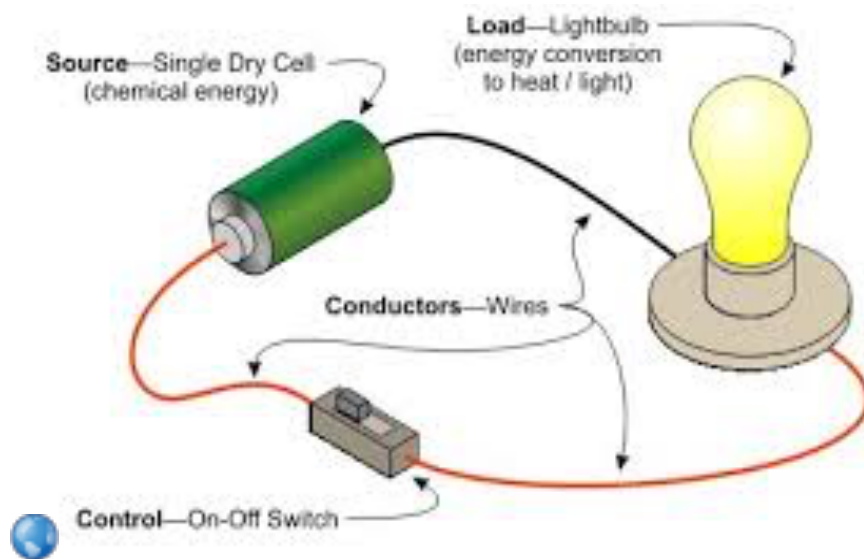
- A **series circuit** is a circuit in which resistors are arranged in a chain, so the current has only one path to take. The current is the same through each resistor. The total resistance of the circuit is found by simply adding up the resistance values of the individual resistors:



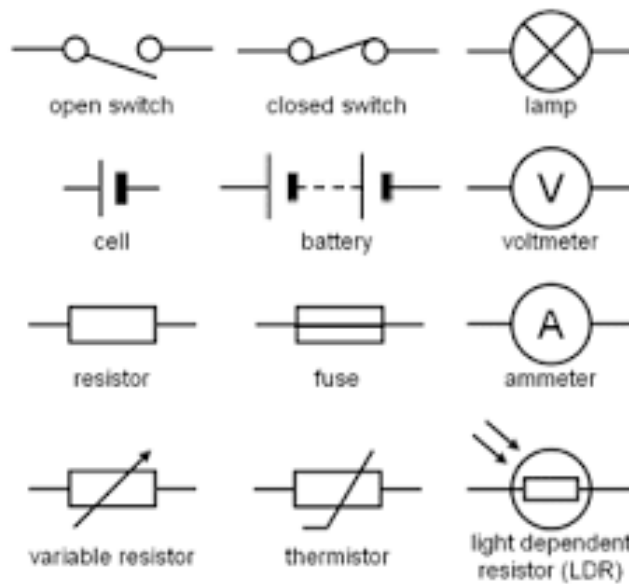
- A **parallel circuit** is a circuit in which the resistors are arranged with their heads connected together, and their tails connected together. The current in a parallel circuit breaks up, with some flowing along each parallel branch and re-combining when the branches meet again.

GT- How well do you understand
building circuits?

Play Level 1, 2, or 3!

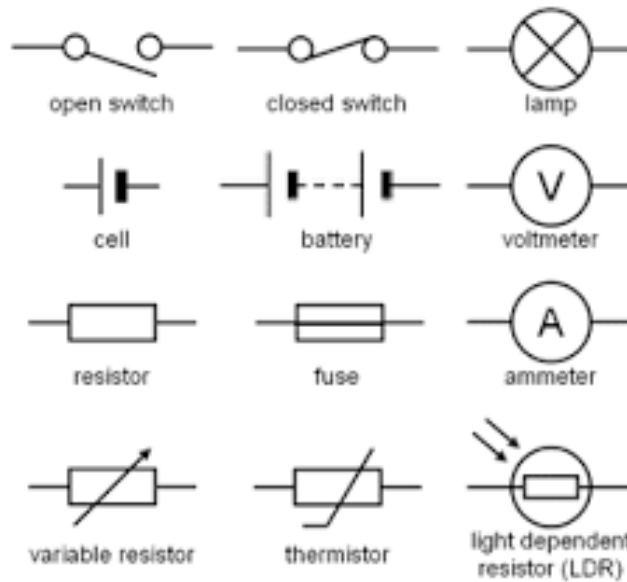


AG- Use the symbols to create circuits for this online game!



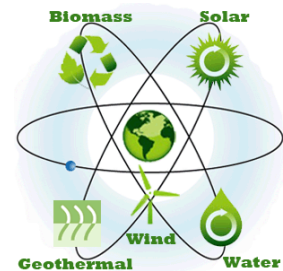
AG- Electric Circuit Worksheet-

Finish for Homework!

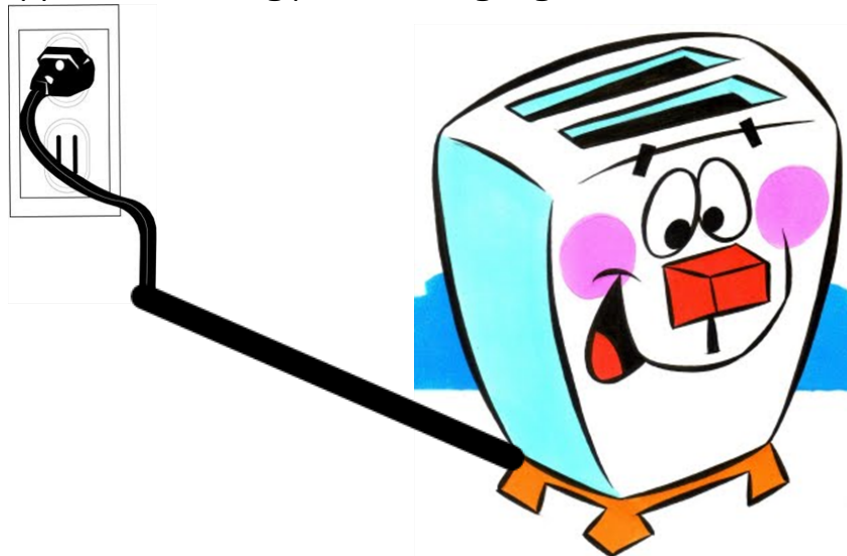


Generating Power

- Power plants use generators to produce electricity. The electricity produced through these generators are secondary energy sources.
 - › **Primary energy sources** are found in nature and have not been subjected to any conversion or transformation process; such as sunlight, wood, oil, coal and natural gas.
 - › **Secondary energy sources** have been transformed from another source.
 - › To produce electricity through
 - › a generator, a heat source is needed to create the conditions in which electrical currents form. This heat can come from a variety of different primary energy sources including coal, hydro power, wind power, nuclear and solar energy.
- **Water, wind and solar** are some sources of **green energy** - meaning they do not pollute the environment.

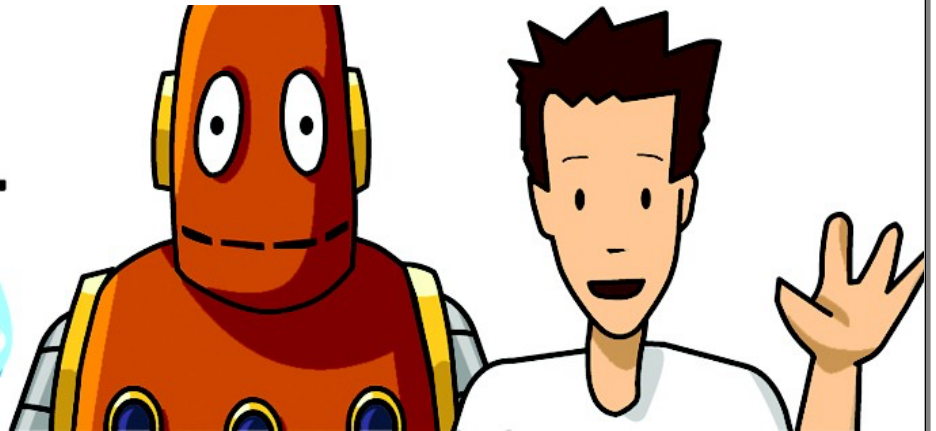


You need a complete circuit for electrons to flow and have an electrical current. Electricity is important because we can use it to make so many things work. When electrons are pushed or pulled through a circuit (electrical force), the electrical energy can be converted through energy transformation into many other types of energy including light, heat, and sound.



What is static electricity?

Brain
POP™



CIRCUIT LAB

The word "CIRCUIT" is written in a large, black, sans-serif font. Below it, a horizontal line contains a resistor symbol (a zigzag line), a diode symbol (a triangle pointing right with a vertical bar), and the word "LAB" in a bold, black, sans-serif font.

Warm Up: Read over your lab sheet!

Electrical Circuits Quiz!

Use the first 5 minutes of class to study
your notes from this week!