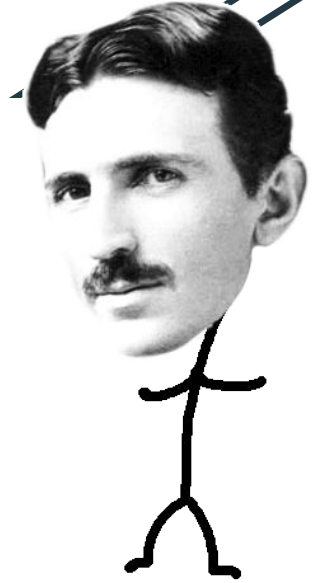


Year End Electricity Review

You'll be shocked when I start spitting static....

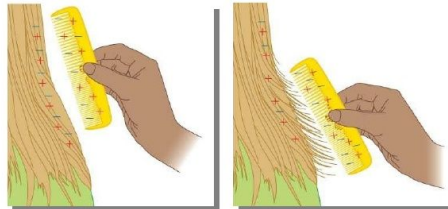


Electrical Charges

- The amount of electric charge is measured in Coulombs (C)
- Static electricity is when an imbalance of electrons occurs in a material
- Current electricity occurs when electrons flow through a material

Static Electricity and Friction

- As one object **loses** electrons, the other object **gains** them



Law of Charges

- If an object has
 - The same number of electrons and protons it is neutral
 - fewer electrons than protons it is positively charged
 - More electrons than protons it is negatively charged
- Unlike charges attract, like charges repel, charged objects attract uncharged objects

+ + - + - -
- - + - + +

(a) neutral ("uncharged")
equal positive and
negative charge

+ + + + - +
- - + + + +

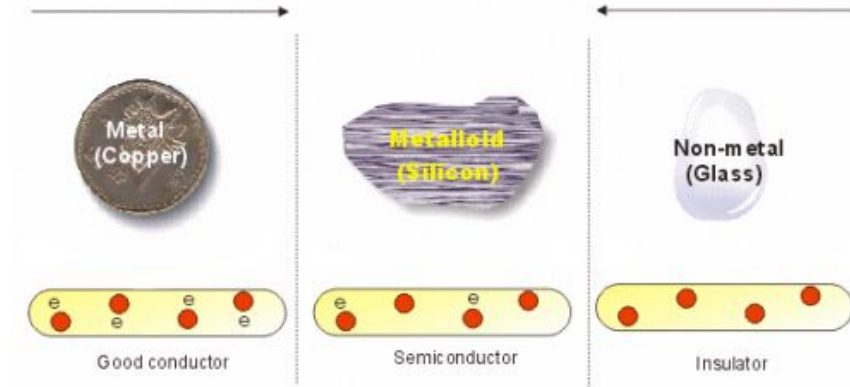
(b) positive charge
excess positive charge

- - + - - +
- - - + - +

(c) negative charge
excess negative charge

Current Electricity

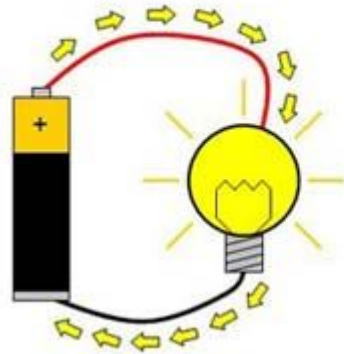
- Matter can be a conductor, an insulator or a semi conductor
- Discharge is the flow of electrons off of a charged objects resulting in neutralization
- Grounding an item will cause the item to discharge and become neutral



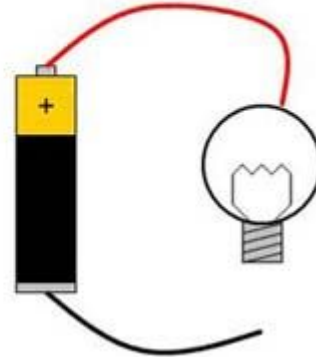
Circuits

- Circuits must provide an uninterrupted path for electrons to flow along
- Open circuits have a path for the electrons but the pathway is broken, electrons will not flow and the circuit will not work
- Closed circuits provide a continuous path for electrons, circuit will work

Closed circuit



Open circuit





_____ conducting wire



lamp



cell



switch



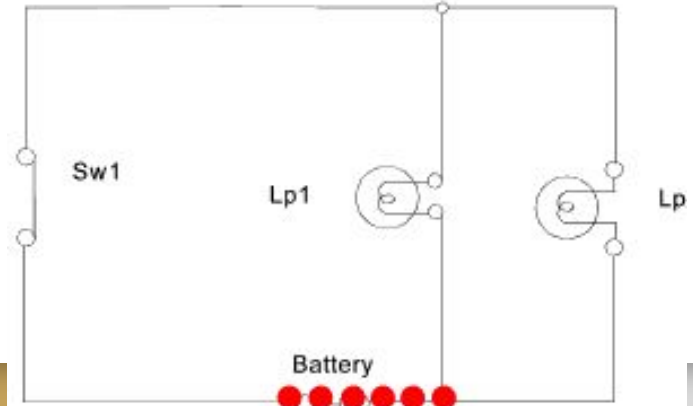
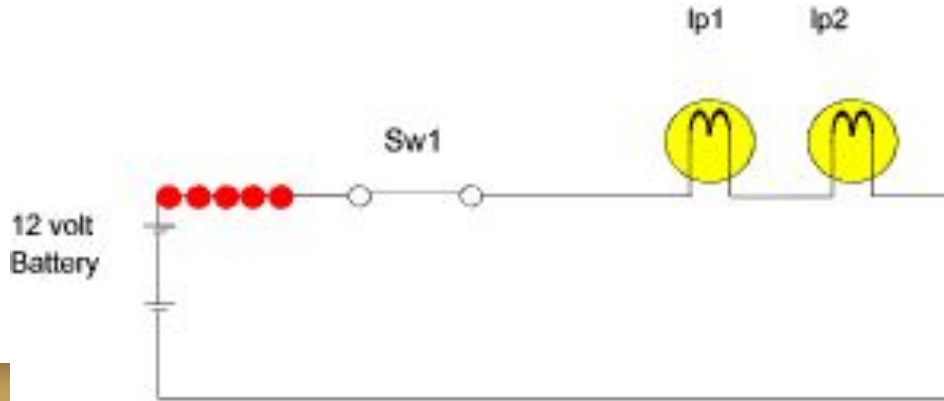
battery



resistor

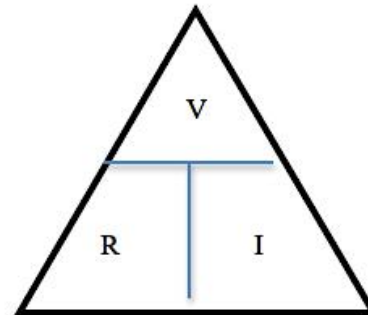
Series vs Parallel Circuits

- Series circuits provide electrons with only one path to flow down, if part of the series is broken the circuit will not work
- Parallel circuits provide electrons with multiple paths to flow down, one part being disconnected does not necessarily affect the rest of the circuit



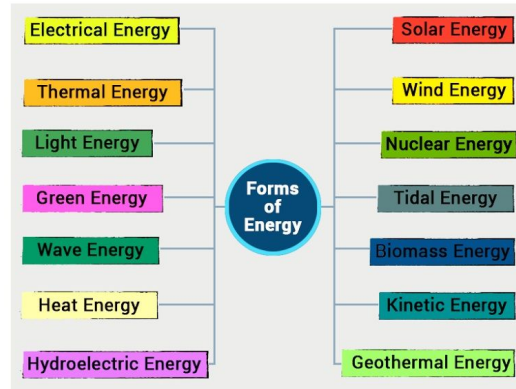
Electrical Measurements

- Voltage is the measure of how much the electricity is being “pushed” along the circuit, also known as potential voltage, measured with a voltmeter (V) Volts
- Current is the amount of electricity flowing through a circuit, measured with an ammeter or galvanometer for small currents (I) Amperes
- Resistance opposes the movement of the electrons through the circuit, (Ω) Ohms, resistance increases with length, increases with temperature, decreases with width



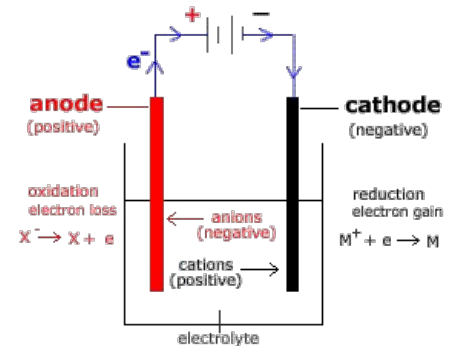
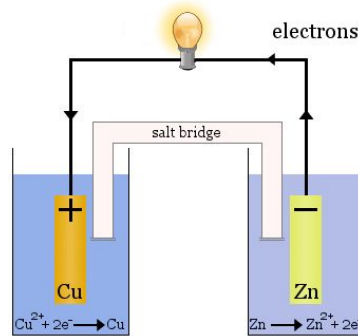
Energy Conversion

- Energy from movement - Mechanical energy
- Energy from chemical reactions - Chemical energy
- Energy from charged particles - Electrical energy
- Energy from heat - Thermal Energy
- Thermocouples convert thermal energy into electrical energy
- Solar panels convert light energy into electrical energy



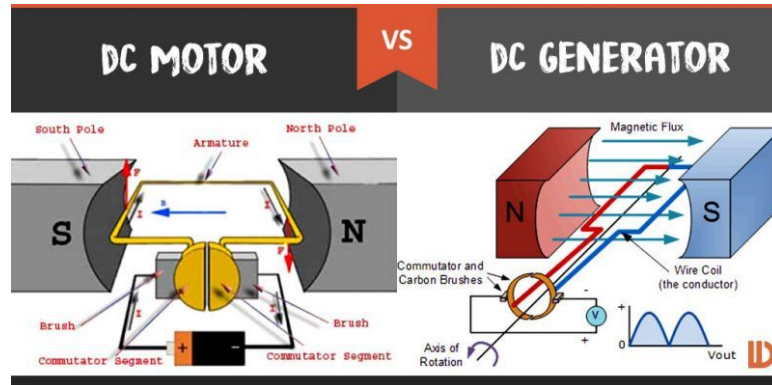
Portable Power

- Two different metals in a salt or acid solution will transfer electrons, creating an electrochemical cell
- If multiple cells are linked together a battery is created
- Cells need two different metals (electrodes) and an electrolyte to create a charge
- The electrolyte must contain ions to allow electrons to flow through it
- If the electrolyte is liquid the cell is a wet cell, if it is a paste or a solid the cell is a dry cell



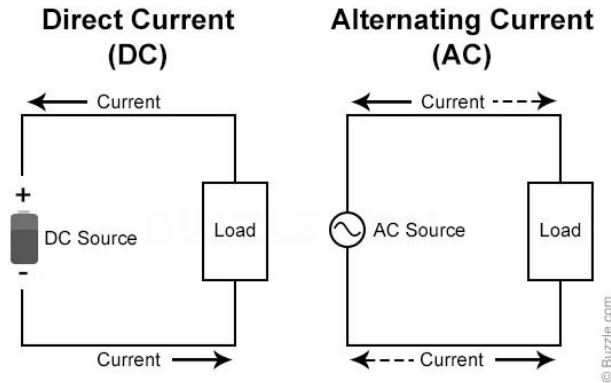
Generators and motors

- Generators convert movement into electricity
- Motors convert electricity into movement
- Electromagnets take advantage of the interactions between electricity and magnetism to create a magnet that can be controlled by a circuit - gets stronger with a larger iron core, more current, or more coils of wire around the core

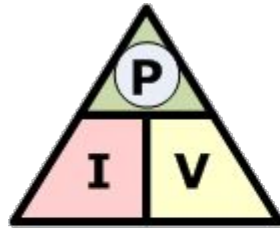
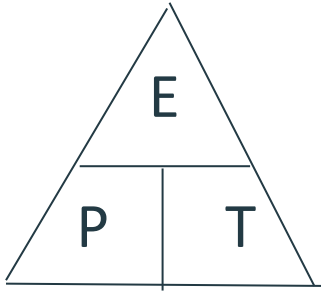


Types of Current

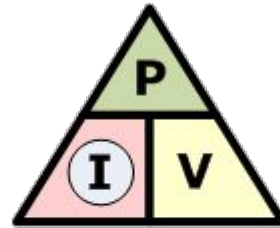
- Direct Current travels only one way down the circuit
- Alternating Current switches directions many times a second



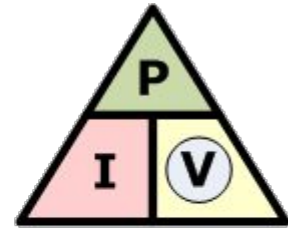
Companies charge you for energy in
kilowatt hours ($\text{kW} \times \text{h}$)



$$\textcircled{P} = I \times V$$



$$\textcircled{I} = \frac{P}{V}$$



$$\textcircled{V} = \frac{P}{I}$$