Vocabulary

Electrical Charge – responsible for electrical phenomena; conserved quantity; charge is a characteristic of an object, similar to height; positive/negative;

Coulomb – unit for charge; incredibly large unit for charge 10^{13};

Circuit – closed loop; a path way that returns to the same point;

Electrically Conducting path – a path conducting electricity;

Conductors – naturally move charged particles easily;

Insulators – naturally move charged particles with difficulty;

Conductance – measure of how easily something conducts moving charged particles;

Resistance (resistivity)– measure of how hard it is for electricity to pass through them; measured in ohms

Electrical Current – continuous flow of charged particles; Symbol = I; measured in coulombs per second and called Amps

Amperes – coulombs per second

Battery – device w/ a positively charged end and a negatively charged end and a chemical pump to transfer the particles in the uphill direction;

Electrical Potential – related to the amount of charge that has been concentrated at the ends of the battery; measured in volts;

Volts – named after Alessandro Volta; Voltage; abbreviated V;

Series – end to end; the negative end touches the positive end of another battery, used to increase the voltage provided to a device;

Current – I = V/R; Voltage divided by resistivity;

Ohm's Law – I = V/R;

Parallel – batteries or resistors organized in such a way that the current flows differently; used to increase the lifespan of batteries or to decrease overall resistance to the voltage going through devices;

Power – how much energy is converted from one form to another in a certain amount of time; measured in watts; P = energy/second or P = Current times voltage;

Magnetic Field – shaped by poles;

Geospace – region of space immediately surrounding the Earth and heavily influenced by it;

Scientists

James Clerk Maxwell – Scottish physicist, connected electricity and magnetism, are related if not the same "beast";

Weinburg/Glashow/Salam – more research on unified electromagnetic and weak force;

Benjamin Franklin – thought charge was a kind of fluid that were either positive or negative; collected charge particles, lightning rods;

J. J. Thomson – small negative particles = electrons, can be removed from atoms;

Charles Coulomb – did experiments with charged objects and determined exactly how the electric interaction works; developed the equation for electric force; measured and derived an equation for the strength of electrical force;

Georg Simon Ohm – Ohm's Law (I = V/R); experimented w/ charge moving through conductors; resistance;

Andre Ampere – studied electrical current; amps named after him; absent minded enough to forget about Napoleon Bonaparte;

Luigi Galvani – frogs that were impaled on bronze hooks twitched when hung on an iron trellis;

Alessandro Volta – made one of the first batteries; tissue conducted the electricity that made the frogs move, the electricity came from the metal and traveled through the frog;

Nicola Tesla – developed motors and generators; AC current;

Thomas Edison – light bulb; direct current in our homes (DC current);

Edith Clark – programmed how to balance circuit loads;

Notes

Charge is conserved

Charge by induction – charge near a conductor can move the charge; (lightning/sparks)

Semiconductors – not good at conducting or insulating;

Super conductors – in low temperatures resistance decreases;

Charges in motion = Current

Voltage = EPE/Charge

Charge = EPE/Voltage

EPE = Charge times voltage;

A charged object will always attract/repel a neutral object.

Solving Circuit Problems

1. Evaluate batteries
    a. Find voltages
    b. Total voltage
2. Look at series portions of the circuit
3. Find current through parallel branches
4. Add all currents to find total current
5. Find total resistance
    a. I = V/R (Ohm's law)

To have a battery last longer, lower the current

To create a magnetic field

1. Use a permanent magnet
2. Wire w/ a flowing current

Electric current has 2 types

AC = generator, relative motion between electric charges and magnetic fields

DC = potential difference; batteries

Electricity and magnets

- Similarities
    - 3D field structure
    - Electric charge cause/effect
    - EM wave
- Differences
    - Single electric charge