Electricity Notes – Science

Attraction and Repulsion

- If the charges are the same, they repel
- If the charges are opposite, they attract
- If one a charge and the other is neutral, they attract
- Like charges repel
- Unlike charges attract
- Static electricity = when electrons jump through the air
    - Caused by rubbing/creating friction
    - Electric charge builds up on a surface
    - If electrons have been rubbed off, the surface will be positively charged
    - If electrons have been transferred to another surface, the surface will be negatively charged

    Eg 1. Balloon gains electrons from your hair through rubbing, the balloon is then negatively charged and the hair is positively charged. The hair and balloon are then opposite charges and causes the hair to be attracted to the balloon.

    Eg 2. Lightning is the result of the movement of water droplets in storm clouds which causes the charges to separate within a cloud. Part of a cloud becomes positively charged as it loses electrons, and the others are negative. If enough static builds up, the electrons jump from one cloud to another or to the ground.

    Eg 3. The Van de Graff generator is a device designed to create static electricity. When the motor is turned on, the belt begins to turn and the rubber in the belt builds a positive charge and the silicon tape in the lower roller builds a negative charge. Since the charges are opposite, the sphere creates a spark with the chamber.

- Current electricity = (measured in amperes) a flow of electrons, electrons travelling through wires
    - Runs through a circuit
    - Will take the path with the least resistance
- A circuit consists of 3 components:
    - Cells and batteries (power supply) = the cell is an electrical potential that stores energy in a chemical form.
    - A load – an electrical component that has resistance and converts electrical potential energy to another form – eg. Hair straightener, speakers, lamp
    - Conducting Path – electric wires, allows the current to pass through
- Measuring charge
    - 1 coulomb of charge = 6 million, million, million electrons
    - (6,000,000,000,000,000,000)
- Battery = two or more cells joined together
    - They transfer electrons from the positive end to the negative end, electrons gain energy
    - Negative terminal = the energy of electrons is called the electrical potential
- Resistance = a measure of how easily the electrons move through a substance, loose electrons
    - Measured in ohms
    - Movement of electrons = delocalised electrons shuffling between atoms in a conductor
    - Collisions between the vibrating atoms and delocalised electrons effect the resistance
- Measuring current and voltage
    - Ammeter = measures current in amps. It is placed in the circuit so the current can pass through it
    - Voltmeter = measures the electric potential difference in volts (V). It is parallel to the circuit so it can measure the difference in the electrical potential energy
- Conductors and Insulators
    - Conductors = electrical current passes through, metal are conductors