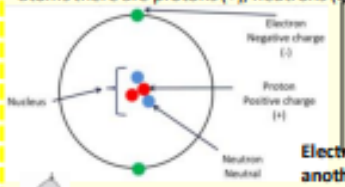
Year 8 – Spring 2

1. Static Electricity

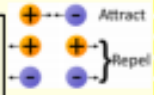
Atoms and electrons: All substances are made up of atoms. Within atoms there are protons (+), neutrons (0) and electrons (-).



Electrons have a negative charge, so when:
- Atom **gains** an electron= **negative** charge
- Atom **loses** an electron= **positive** charge

Electrons can move from one substance to another when two objects are rubbed together- the objects become electrically charged.

Example: Rubbing a balloon on your head
a) Electrons move from hair to balloon
b) Hair has lost electrons so becomes **positive**
c) Balloon has gained electrons so becomes **negative**



2. Conductors and Insulators

Electrical Conductor –allows electrons to flow freely e.g. most metals
Electrical Insulator – does not allow electrons to flow freely. E.g. most non-metals, such as wood

3. Electrical Circuits Symbols

4. Current

In an electric circuit charged electrons move through the wire.

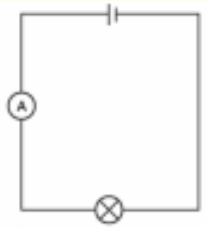
Electric current= The rate of flow of charge around a circuit

Ammeter symbol= A

Current can only flow if:
a) The circuit is complete
b) All the components are conductors
c) The cells are in all the same direction

- Current measured by an **ammeter**
- Measured in **amps (A)**

The more electric charge there is the more current will flow. 20A is a bigger current than 5A



5. Series and parallel circuits

a) Series circuit:
- Single loop with no branches
- If one bulb blows all the bulbs go out

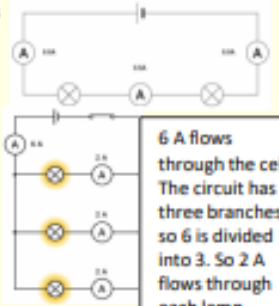
b) Parallel circuit
- Current is split between different branches
- If one bulb blows would still be a complete circuit to other bulb so it stays lit.

Parallel circuits are useful if you want everything to work, even if one component has failed. This is why our homes are wired up with parallel circuits.

6. Current in series and parallel circuits

Series circuit: Current is ***the same*** everywhere.
- The more cells the greater the current.
- Current is not used up.

Parallel circuit: Current is ***shared*** between the lamps

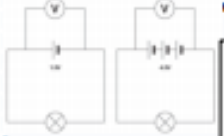


6 A flows through the cell. The circuit has three branches, so 6 is divided into 3. So 2 A flows through each lamp.

7. Voltage (potential difference)

Voltage: the amount of energy transferred by each electron.

How do we measure voltage?
- It is the difference between the amount of energy at two different points in the circuit e.g. before the cell and after the cell



vol V ts, V)

The more cells you add the bigger the voltage

Series: The voltage is used up. If you add another lamp the voltage will half.
Parallel: The voltage is equal across each lamp in each branch.

8. Resistance and power

Resistance: a measure of how hard it is for current to flow through different parts of a circuit.
Units: Ohm (Ω)

Increase in Resistance = Decrease in Current
Increase in Resistance = Increase in Voltage

Resistance (R) = Potential difference (p.d.) ÷ Current (I)
Ohms (Ω) Volts (V) Amps (A)

Power: A measure of energy transferred over time (how QUICKLY energy is transferred).
Units: Watts (W)

Power (P) = voltage (V) x current (I)
Watts (W) Volts (V) Amps (A)

9. Magnets

Magnetic metals:
a) Iron
b) Cobalt
c) Nickel
d) Steel (mostly iron)

A bar magnet has two magnetic poles:

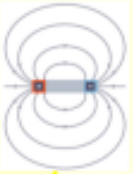
Opposite poles= Attract
Like poles= Repel

Permanent magnets: A magnet that stays magnetised.
Induced magnets: A magnet that is magnetised when in a magnetic field but then loses it quickly.

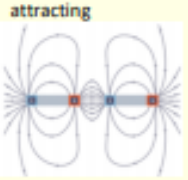
10. Magnetic Fields

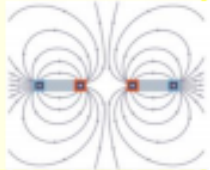
Magnetic field: Space around a magnet where a magnetic force acts

2 opposite poles attracting



2 like poles repelling

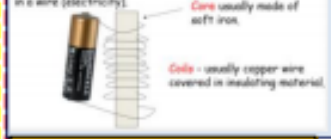




11. Electromagnets

Electromagnet: When a current is passed through a wire a magnetic field is created and this can be used to make an electromagnet.

Electromagnets are made of the three C's.



How to make it stronger:
Bigger **Core**
More **Coils**
Increase **Current**

Advantages:
- Can be turned on and off
- Strength of magnetic field can be varied

Uses:
- Picking up scrap iron and steel in scrapyards