Printout

October 4, 2022 1:37 PM

Science 9 – Physics Topic 3.3 Concept 2-3: Conductors, Current and Resistance

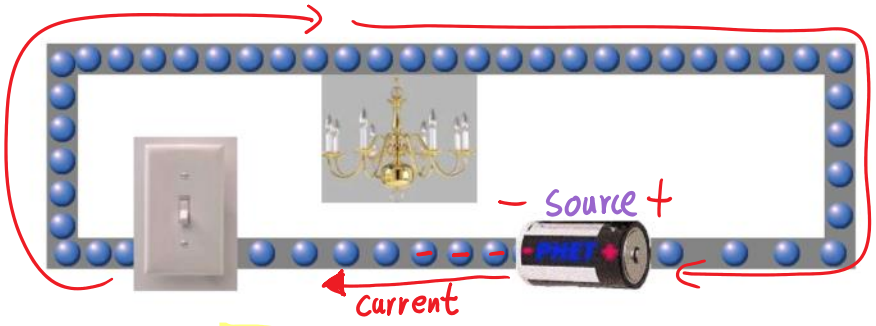
Concept 2: Conductor vs insulators

- Eletrons can move through some material easier than others and it depends on the material's Conductivity.
- **Conductivity** is an indication of how easily charges travel through a material
  - Electrons can move through almost all metal (conductors); can move through some metals more easily than others
  - The higher the conductivity of a material, the more easily electrons can move through

Conductor	Insulator
A material that Electrons can travel easily *is called a conductor.* • Most metals, water with impulitiy • We use copper for electric wiring because it has high conductivity and low cost.	*A material that electrons* cannot *travel through is an insulator* • Wood, rubber, plastic, air, and pure water • (extending) – if electrons carrie enough voltage (Energy), they would be able to go throught any material. There is no pertect insulator!!

Concept 3: Moving electron makes Electric Current

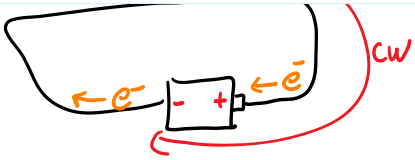
Chemical energy from a Source (cell or battery) causes charges to move through a Conductor (wires), carrying energy to a load/ electrical device (light)



- The Current (I) of running in a wire is the amount of charge (Coulomb) passing through in one second. In short: Current is the rate of movement of electrons

Figure 1: André-Marie Ampère

- Symbol: I *(in the past we called it "Current **Intensity**")*
- Units: Ampere (A) dist = 2 km
- Ex) the equation I = 2A means that the current (I) is two Ampere
- a current measurement of [2 A] means there is 2 Coulomb of Electrons is passing by the one point in the circuit every second.



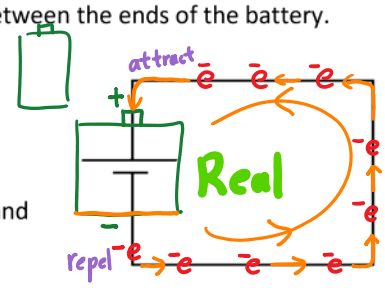
Direction of Current (flow of electron)

An electric cell (battery) uses a chemical reaction to create a "potential difference" between the ends of the battery.

- That means that one end of the cell becomes positive and the other becomes negative.

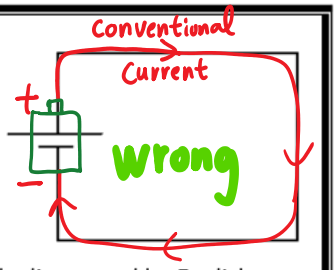
When a circuit connects the two ends of the cell, current flows through the wire.

- This is because electrons are repelled by the negative end of the cell and attracted to the positive end.



Conventional Current

- When scientists discovered electric current, Physicists initially thought positive charges were moving in the wire.
- This is called conventional current
  - defined as the direction positive charges move in a circuit
  - from positive to negative
  - we now know this isn't the correct direction. Because electron was finally discovered by English physicist **J.J. Thomson** in 1897. And it turns out Electron is negatively charged. ^__^
  - so the "**correct**" direction of electric current should be negative to positive



Example

- Defibrillator
- pacemaker
- TENS – Transutaneous Electrical Nerve Stimulation.
- EMS – Electrical Muscle Stimulation.
- other