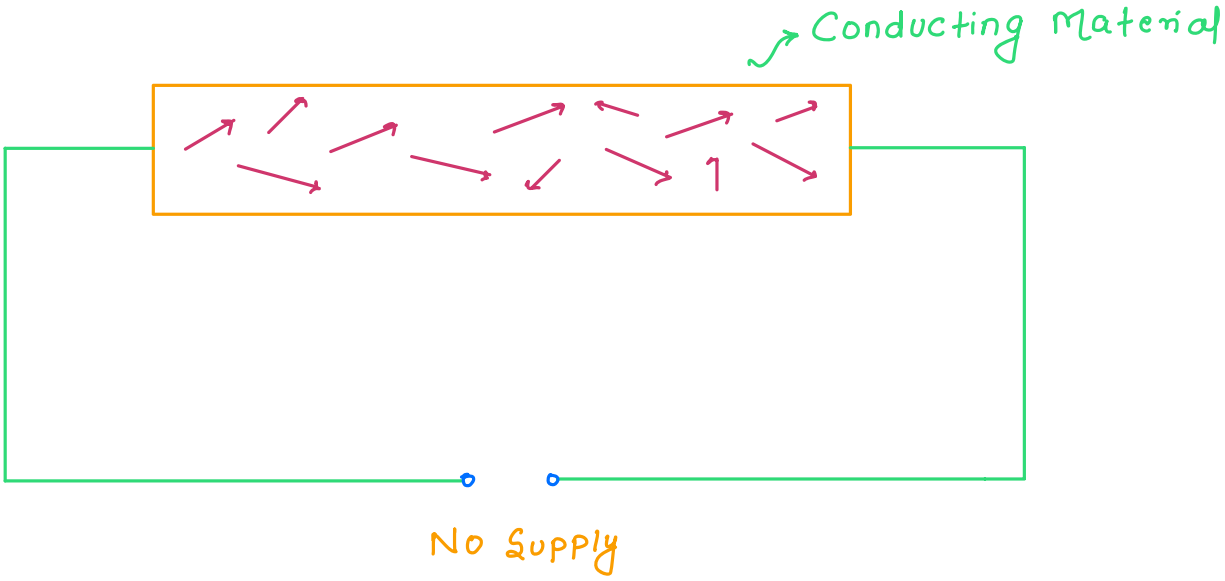
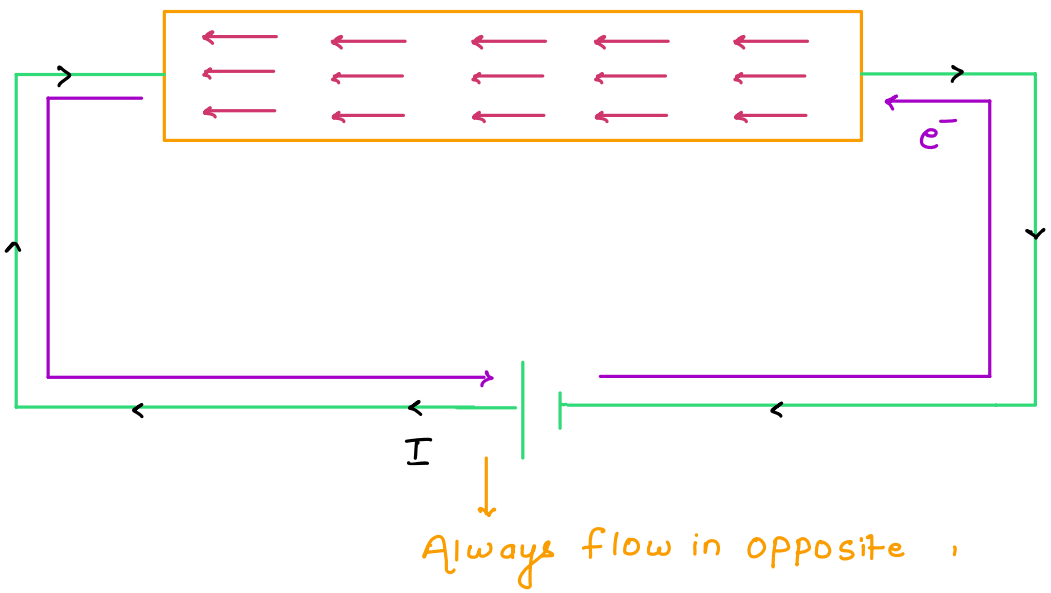
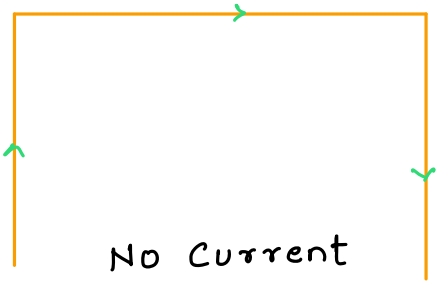
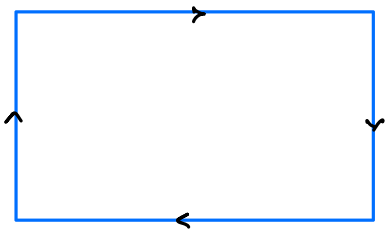
Electric Current :- Flow of Electrons









Current always flow in Closed Path.

$I = \frac{q}{t}$ → Charge (unit Coulomb)

t → Time (unit Second)

Charge flow per unit time

Unit of Current = $\frac{\text{Coulomb}}{\text{Sec}}$ $\quad C/S$ = Ampere

Ex:-

$q = ?$ $\quad I = 0.5\ A$ $\quad t = 10$ mins

$10 \times 60 = 600$ Sec

$q = It$

$q = 0.5 \times \frac{600}{10} = 300\ C$

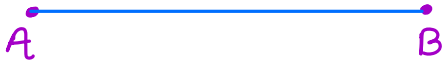
$q = ne$

Charge of electron $= -1.6 \times 10^{-19}\ C$

$1 = n \times 1.6 \times 10^{-19}$

$n = \frac{1}{1.6 \times 10^{-19}} = 0.625 \times 10^{19}$

Electric potential & Potential difference



$V = \frac{W}{q}$ $\quad$ Unit = Joule/Coulomb or Volt

Work done in moving unit positive charge from one point to other is called Potential difference

Potential Difference measured by Voltmeter

↓

Connected in parallel

Current is measured by Ammeter

↓

Connected in Series

Q

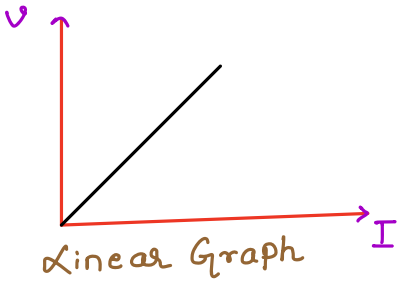
$q = 2C \quad \omega = ? \quad V = 12V$

$$V = \frac{\omega}{q}$$

$$\omega = Vq$$

$$\omega = 2 \times 12 = 24\,J$$

OHM's LAW :-

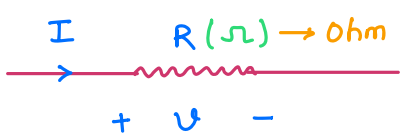


$V \propto I$ ⟶ At Constant temperature

$V = RI$

↓

Constant



Resistance :- property of Conductor which Resist the flow of current

Unit → ohms (Ω)

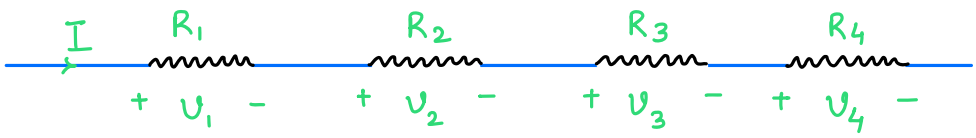
$$\text{Current} \propto \frac{1}{\text{Resistance}}$$

$$R = \frac{V}{I}$$

Rheostat is used to change Resistance of Circuit

Combination of Resistance :-

SERIES COMBINATION



Series ⟶ Current Same

$$V = V_1 + V_2 + V_3 + V_4$$

$$V = IR_1 + IR_2 + IR_3 + IR_4$$

$$V = I(R_1 + R_2 + R_3 + R_4)$$

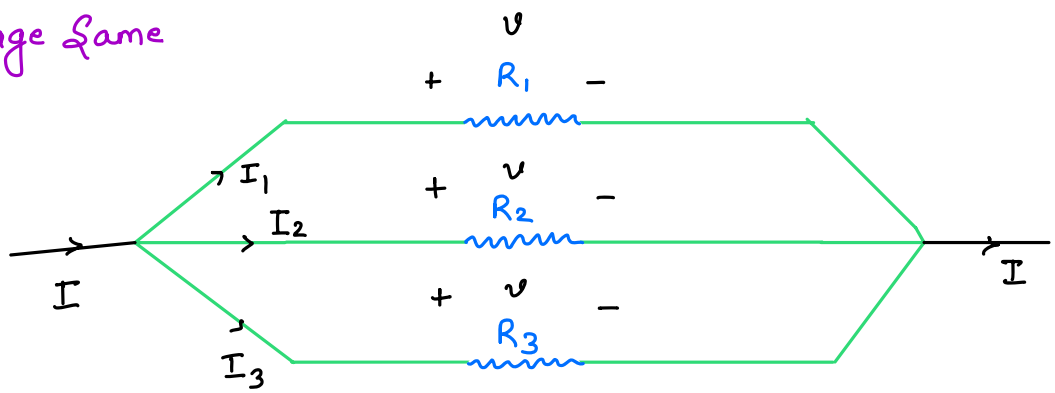
$$\boxed{V = I R_{eqv}}$$

$$R_{eqv} = R_1 + R_2 + R_3 + R_4$$

Resistance gets Added

PARALLEL COMBINATION

Voltage Same



$$I = I_1 + I_2 + I_3$$

$$I = \frac{V}{R_1} + \frac{V}{R_2} + \frac{V}{R_3}$$

$$I = V\left(\frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}\right)$$

$$I = \frac{V}{R}$$

$$\boxed{I = V R_{eqv}}$$

$$\boxed{R_{eqv} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3}}$$

Heating Effect of Current

$H = I^2Rt$ $\quad$ $H = Pt$ $\quad$ $H = \frac{V^2}{R}t$ $\quad$ $H = VIt$

Electric power :- work done per unit time

$$P = \frac{W}{t}$$

unit $\rightarrow$ Joule/sec = watt

$$P = VI$$

$$V = IR$$

$$P = IR \cdot I = I^2R$$

$$P = V \cdot \frac{V}{R} = \frac{V^2}{R}$$

$$\boxed{P = VI = I^2R = \frac{V^2}{R}}$$