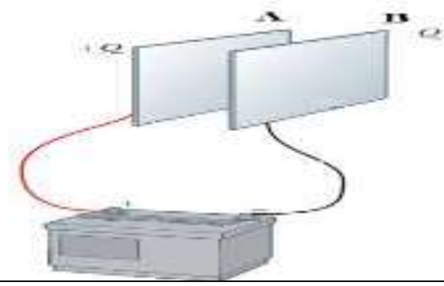
Physics Laws

2 Secondary

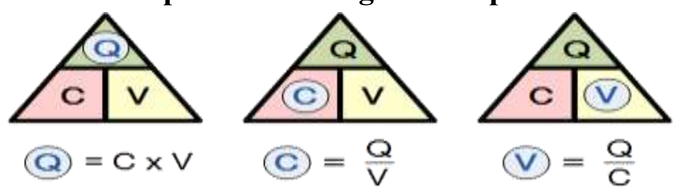
Capacitor:

(Two parallel metal plates separated by an insulator)

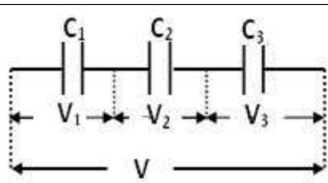
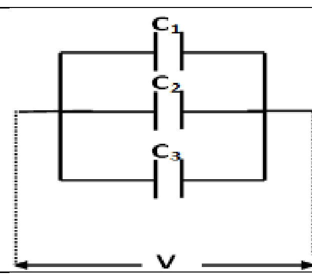


Quantity of charge on plates = Capacitance of capacitor ×Voltage across plates

$$Q = C\,V$$



Connection of Capacitors:

Series connection	Parallel connection
	
$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3}$	$C_{eq} = C_1 + C_2 + C_3$
If the capacitance for all capacitors is **equal** $C_{eq} = \frac{C}{n}$	If the capacitance for all capacitors is the same $C = n\,C_1$

Dynamic Electricity

1) Conductors
* They are the materials which allow electricity to flow easily through it
* Metals are conductors, such as copper, silver and gold.
* They contain large number of free electrons (rich in free electrons).

2) Insulators
* They cannot allow electricity to flow easily through it.
* Examples: wood, paper, plastics, and ceramics.
* They contain very few numbers of free electrons (poor in free electrons).

3) Semiconductors
* They are materials with conductivities somewhere **between conductors and insulators.**
* Examples are silicon and germanium

1) the electric current intensity (I)	**2) Potential Difference between two points (V)**	**3) The electric resistance (R):**
It's the quantity of electricity (charges) in coulombs passing through any cross section of the conductor in one second).	(It is the work done in joules to transfer a unit charge (1C) between the two points)	(It's the opposition of the conductor to the flow of electric current due to the friction) **OR** (it's the ratio between the potential difference (voltage) across the conductor and current intensity passing through it at certain temperature)

$$I = \frac{Q}{t} = \frac{Ne}{t}$$

I : the electric current intensity
t : time of flow
Q: the quantity of charges
N: the total number of electrons passing a given point
e: the electron charge (1.6×10^{-19}C)
The electric current intensity measured in Ampere (A) = coulomb per second (C/s)
I is measured by the ammeter

- **Ampere: (It is the current intensity if** the quantity of electricity passing through any cross section of the conductor in **one second** is **1 coulomb)**

$$V = \frac{W}{Q}$$

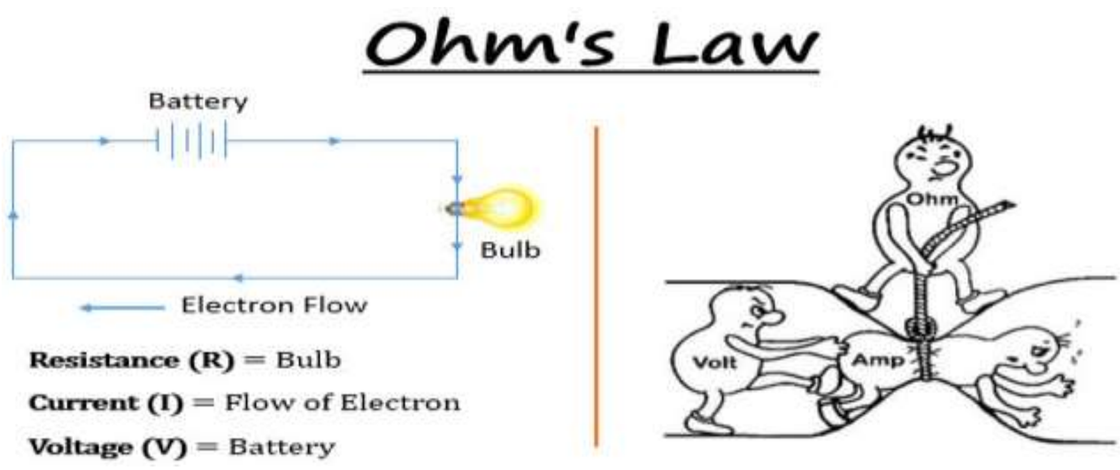
V : potential difference between two points
W : the work done (energy)
The potential difference measured in Volt (V) = Joule/coulomb (J/C) and measured by the voltmeter
Volt: (It is the potential difference between two points if the work done required to transfer a unit charge (1C) between the two points is 1 Joule

$$R = \frac{V}{I} \text{ (At constant temperature)}$$

$$R = \rho_e \frac{l}{A}$$

where

R: the resistance of conductor
l : the length of conductor
A: the cross sectional area of conductor
ρ e : the resistivity of the conductor (specific resistance)



Electric power (P_w):

$Pw = \textbf{\textit{electric energy consumed}}/\ time = W/\ t = VIt/\ t = V\ I$

The power dissipated in a resistor can be obtained by the use of Ohm's Law

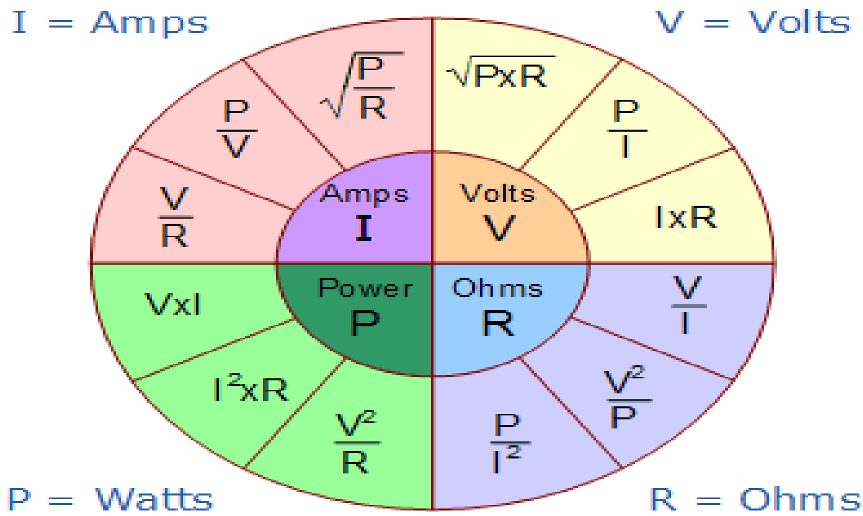
$Pw = V\ I = I^2 \times R = V^2/R$

Definition:

(It is the rate of electrical energy consumed in the electric conductor)

The measuring unit

Watt (W) ≡ Joule per second (J/sec) ≡ Volt .Ampere (V.A)



Thank You & Good Luck

Ms. Mariam Mohamed