



EINSTIEN

اینستاین العرب



**Electrostatics****1.2 Electric Charges**

what the charge

$$Q = N \times e$$

How many electrons

$$N = Q/e$$

where

Q → Charge (C)

N → Number of excess electrons

e → Elementary charge (1.6×10^{-19})

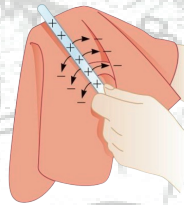
what the charge

you have in question protons and electrons

$$Q = (N_p - N_e) \times e$$

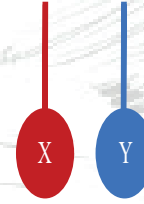
where

Q → Charge (C)

 N_p → Number of excess protons N_e → Number of excess electronse → Elementary charge (1.6×10^{-19})the charge gained by the first body is **equal** the charge lost by the other.when two bodies touches (**connected**)

$$q_{\text{after}} = q_{\text{before}} \\ (q_x + q_x)_{\text{after}} = (q_x + q_x)_{\text{before}}$$

where

 q_x → Charge for body x (C) q_y → Charge for body y (C)**1.5 Electrostatic Force —Coulomb's Law**

Force Between two charges

$$\text{where } F = \frac{kq_1q_2}{r^2}$$

k → Columb's constant

 q_1 → Charge 1 (C) q_2 → Charge 2 (C)

r → Distance (m)

same direction

$$F_{\text{ent}} = F_1 + F_2$$

opposite direction

$$F_{\text{ent}} = F_{\text{great}} - F_{\text{less}}$$

two forces are perpendicular

$$F_{\text{ent}} = \sqrt{F_x^2 + F_y^2} \quad \theta = \tan^{-1}\left(\frac{F_x}{F_y}\right)$$

Equilibrium Position

$$x_3 = \frac{\sqrt{q_1}x_2 + \sqrt{q_2}x_1}{\sqrt{q_1} + \sqrt{q_2}}$$

where

 q_1 → Charge 1 (C) q_2 → Charge 2 (C) x_1 → Distance for Charge 1 (m) x_2 → Distance for Charge 2 (m)

charged balls

$$\tan \theta = \frac{kq^2}{4mgL^2 \sin^2 \theta}$$

$$d = 2L \sin \theta$$

where

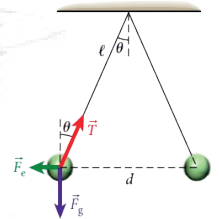
 θ → angle with respect to the vertical of the Strings

k → Columb's constant

q → Charge (C)

L → length of the Strings (m)

d → Distance between two Charge (m)

**bead on a Wire**

$$F = \frac{kq_1q_2}{d^2} = m_2g \sin \theta$$

Mr Abdelrahman Esam

0509886279

