⇒ **Coulomb's Law :-**

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

$$|\vec{F}_{21}| = |\vec{F}_{12}| = F$$

$$\Rightarrow \frac{1}{4\pi\varepsilon_0} = 9\times10^{9}\ \frac{N\text{-}m^2}{C^2}$$

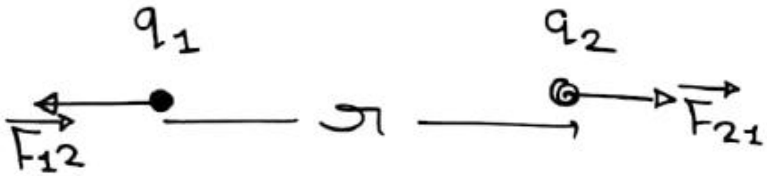
$$\varepsilon_0 = 8.85\times10^{-12}\ \frac{C^2}{N\text{-}m^2}$$

ε_0 → Permitivity of free space

$[\varepsilon_0] =$

JEE Mains 2013

⇒ Coulomb's Law:-



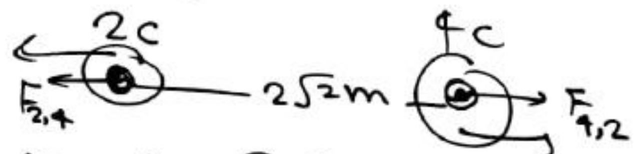
$\vec{F}_{12}$ = Force on 1 due to 2.

$\vec{F}_{21}$ = Force on 2 due to 1

$$|F| = |F_{12}| = |F_{21}| = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

$$\frac{1}{4\pi\varepsilon_0} = 9\times10^9 \ \frac{N\text{-}m^2}{C^2}$$

⇒ Q1:- two charge 2c & 4 Coulomb placed at $2\sqrt{2}$ m distance. find Force b/w them & Nature of Force.



$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

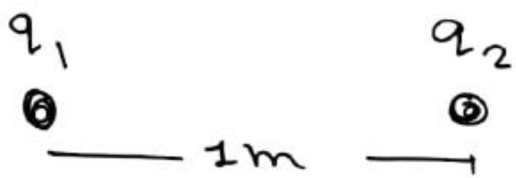
$$= \frac{9\times10^9\times2\times4}{(2\sqrt{2})^2} = \frac{9\times10^9\times2\times4}{4\times2}$$

$$\Rightarrow F = 9\times10^9 \text{ N}$$

Coulomb's Law :-

Q1 :- Find minimum possible Force b/w two point charges placed at 1m distance.

$q_{min} = 1.6 \times 10^{-19} C$



$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{1^2} = \frac{1}{4\pi\varepsilon_0} q_1 q_2$$

$$F_{min} = \frac{1}{4\pi\varepsilon_0}(q_1)_{min}(q_2)_{min}$$

$$F_{min} = \frac{1}{4\pi\varepsilon_0}(e)(e) = 9\times10^{9} \times e^2$$

$$= 9\times10^{9}\times(1.6\times10^{-19} c)^2 \text{ N.}$$

Coulomb's Law :-

Q1:- Find minimum possible Force b/w two point charges placed at 1m distance.

$q_1 = e$ $\qquad\qquad$ $q_2 = e$

$q_{min} = 1.6\times10^{-19}\,C$

$\longleftarrow r \longrightarrow$

$$F_{min} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

$$= \frac{1}{4\pi\varepsilon_0}\times\frac{e\times e}{1^2} = 9\times10^{9}\times e^2$$

$$= 9\times10^{5}\times(1.6\times10^{-19})^2\ N$$

AIPMT 2010

8. Two positive ions, each carring equal charg q, are seperated by a distance d. If F is the force of repulsion between the ions, the number of electron missing from each ions will be.

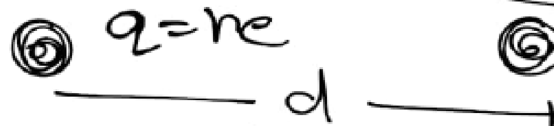
(a) $\frac{4\pi\varepsilon_0 F d^2}{e^2}$

(b) $\sqrt{\frac{4\pi\varepsilon_0 F e^2}{d^2}}$

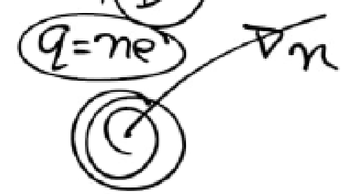
(c) $\sqrt{\frac{4\pi\varepsilon_0 F d^2}{e^2}}$

(d) $\frac{4\pi\varepsilon_0 F d^2}{q^2}$

$q = ne$ $\quad$ $q = ne$



Y, (D)

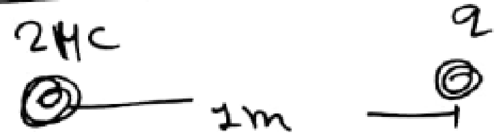


$$F = \frac{1}{4\pi\varepsilon_0}\frac{q \times q}{d^2} = \frac{1}{4\pi\varepsilon_0}\frac{q^2}{d^2}$$

$$F = \frac{1}{4\pi\varepsilon_0}\frac{(ne)^2}{d^2} \qquad \frac{4F\pi\varepsilon_0 d^2}{e^2} = n^2$$

$$F \times 4\pi\varepsilon_0 d^2 = n^2 e^2 \qquad \sqrt{\frac{4\pi\varepsilon_0 d^2 F}{e^2}} = n$$

⇒ Q :- $= 2\times10^{-6}C$



$F = 18\times10^{2}$ Newtron . Find Value of q.

$$F = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

$$18\times10^{2} = \frac{9\times10^{9}\times2\times10^{-6}\times q}{1^2}$$

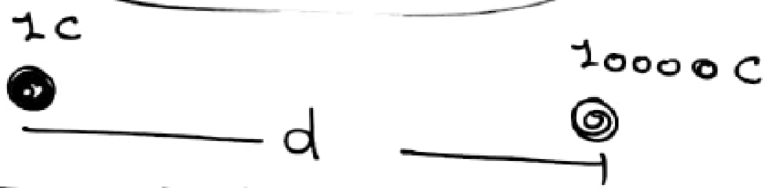
$$10^{2} = 10^{+3}\times q$$

$$q = \frac{10^{2}}{10^{3}} = 10^{2}\times10^{-3} = 10^{-1}C = 0.1C$$

Coulomb's Law:-

$$F \propto q_1 q_2$$

$$F \propto \frac{1}{r^2}$$



→ किसपर ज्यादा Force लगेगा.

→ Equal force

$$F = \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r^2}$$

$$|F_{12}| = |F_{21}|$$

$$= \frac{1}{4\pi\epsilon_0}\frac{q_1 q_2}{r^2}$$

Coulomb's Law:

$$|\vec{F}_{12}| = |\vec{F}_{21}| = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$$

⇒ $\vec{F}_{12} = -\vec{F}_{21}$ ⇒ both are action-reaction pair. [Always act on different body]

⇒ F_{net} Force on q_1 is equal to $\frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$

⇒ F_{net} Force on q_2 is equal to $\frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{r^2}$

** ⇒ Net Force on System of q_1 & q_2 is zero.