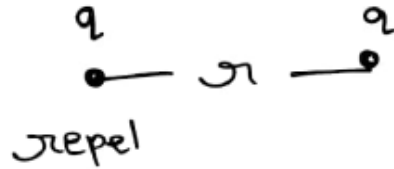
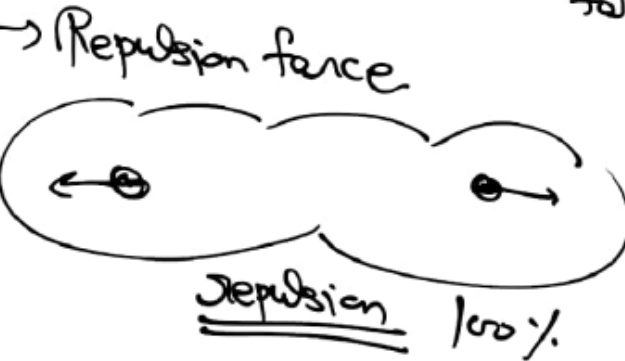
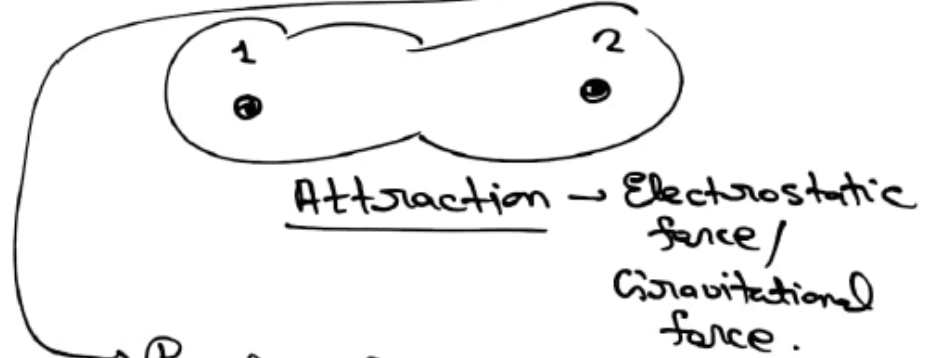


⇒ Q1: two positive point charges. / Q2 How to check true electrification:



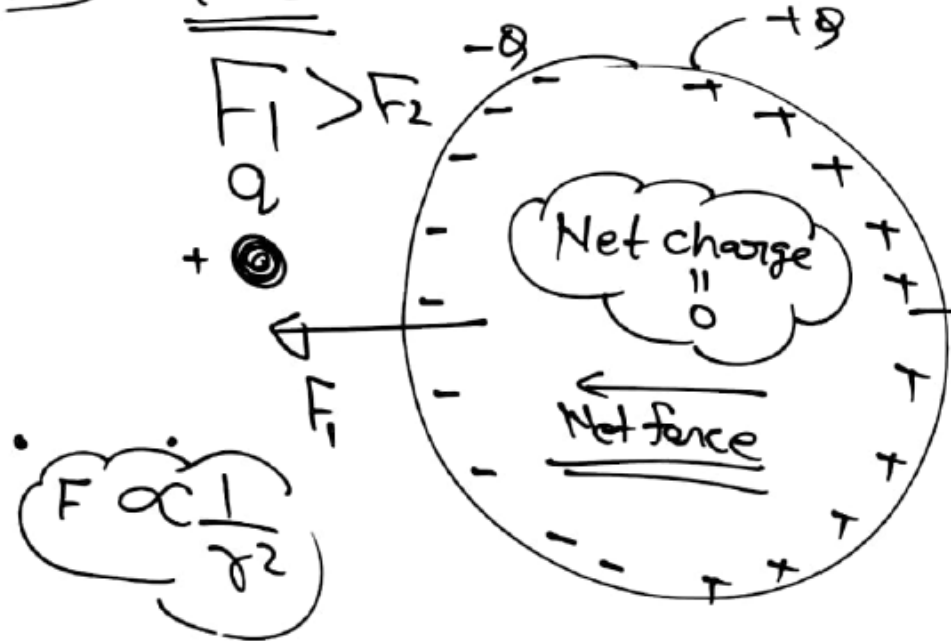
electrification:



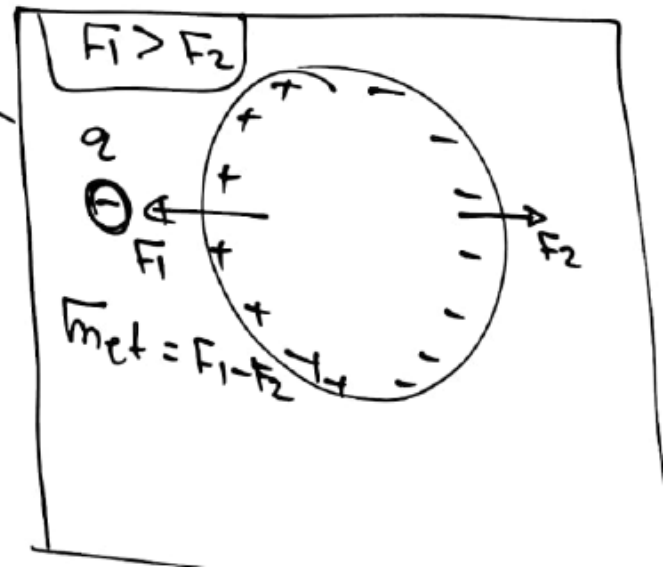
Q1: Can a point charge attract a neutral body.

Ans) Yes

$$Q = q \left[1 - \frac{1}{K} \right]$$



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

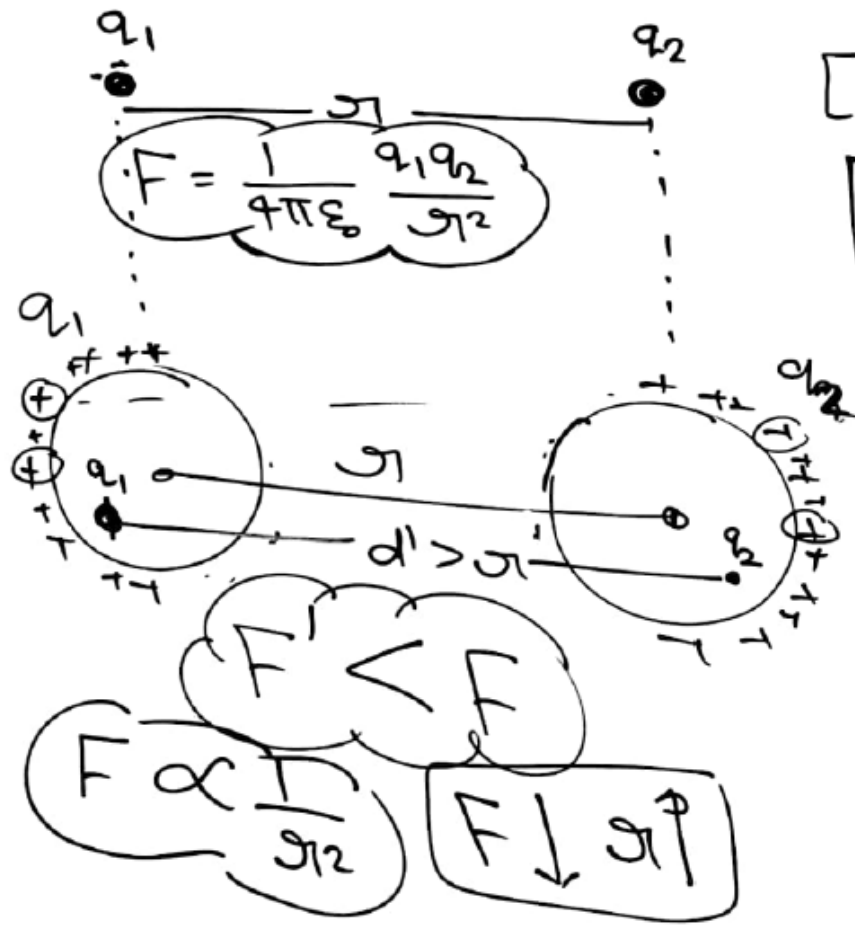


⇒ Can a point charge attract a neutral point mass.
sol NO

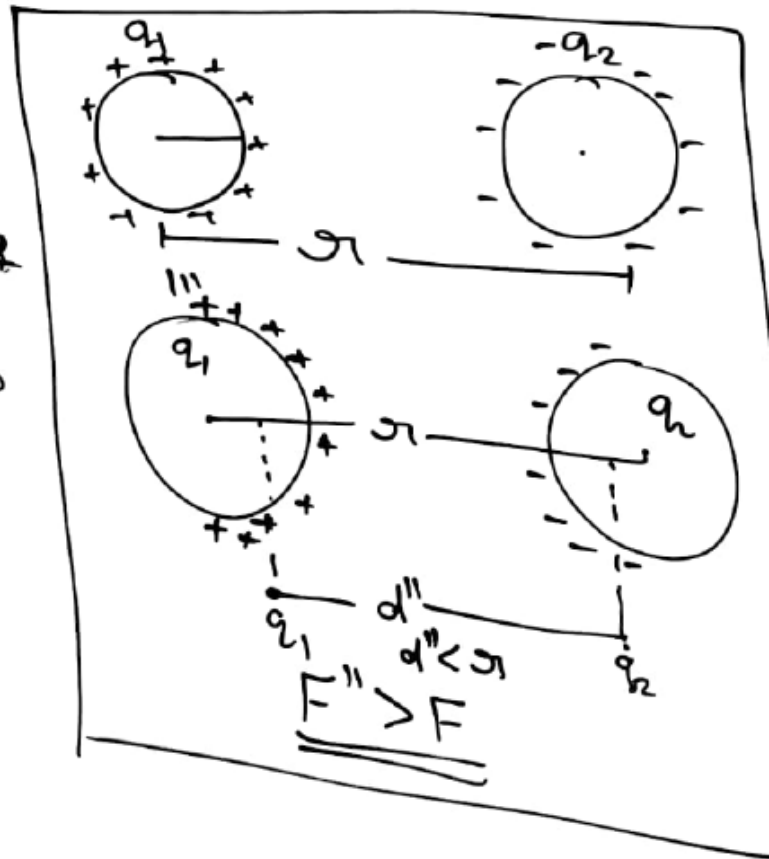
⇒ Q:- Can a \oplus point charge attract a \oplus charge body

⇒ $F_1 > F_2$
 Attraction
Ans) may be

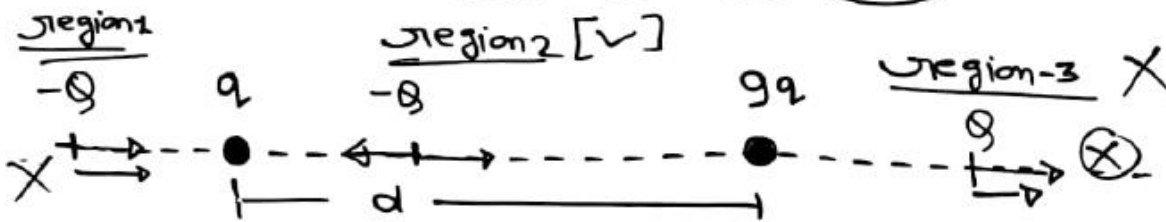
The diagram illustrates two spheres. The larger sphere on the right has a central region labeled 'Net charge q1'. It is surrounded by a distribution of charges: negative charges (-) and positive charges (+). A point charge 'q' is shown near it, with a force vector F_1 pointing towards it. The smaller sphere on the left has a central region labeled '2c'. It is also surrounded by positive charges (+) and negative charges (-). A point charge '2c' is shown near it, with a force vector F_2 pointing towards it. A note at the bottom of the diagram states: 'Since $+1c + 1c = 2c$ and $-1c - 1c = -2c$ '.



[q_1 & q_2 both are +ve]

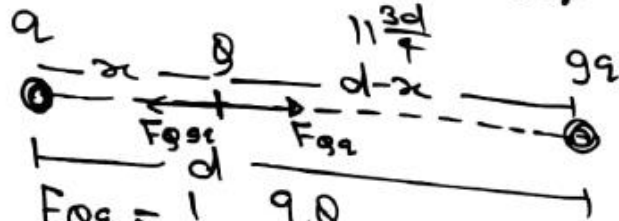


Equilibrium of point charge



If Net Force on Q is zero.

Find Location of third charge, where Net Force on third charge is zero.



$$F_{qQ} = \frac{1}{4\pi\epsilon_0} \frac{qQ}{x^2}$$

$$F_{9qQ} = \frac{1}{4\pi\epsilon_0} \frac{(9q)Q}{(d-x)^2}$$

$$F_{Qq} = F_{Q(9q)}$$

$$\frac{1}{4\pi\epsilon_0} \frac{qQ}{x^2} = \frac{1}{4\pi\epsilon_0} \frac{Q(9q)}{(d-x)^2}$$

$$(d-x)^2 = 9x^2$$

$$(d-x)^2 = (3x)^2$$

$$d-x = 3x$$

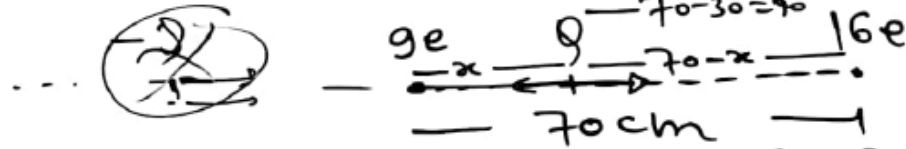
$$d = 4x$$

$\frac{d}{4}$ from q

$\frac{3d}{4}$ from $9q$

$$x = \frac{d}{4}$$

Q2) Two charges are placed as shown in figure. where should a third charge be placed so that it remains at rest.



$$\left(\frac{3}{x}\right)^2 = \left(\frac{4}{70-x}\right)^2$$

(a) 30 cm from 9e

$$F_q(9e) = \frac{1}{4\pi\epsilon_0} \frac{(9e)q}{x^2} \quad (\rightarrow)$$

$$\frac{3}{x} = \frac{4}{70-x}$$

$$\Rightarrow 210 - 3x = 4x$$

(b) 40 cm from 9e

$$F_q(16e) = \frac{1}{4\pi\epsilon_0} \frac{(16e)q}{(70-x)^2} \quad (\leftarrow)$$

$$210 = 7x$$

$$x = \underline{\underline{30 \text{ cm}}}$$

(c) 40 cm from 16e

$$F_q(9e) = F_q(16e)$$

$$\frac{1}{4\pi\epsilon_0} \frac{(9e)q}{x^2} = \frac{1}{4\pi\epsilon_0} \frac{(16e)q}{(70-x)^2}$$

$$\frac{9}{x^2} = \frac{16}{(70-x)^2}$$

~~(a)~~ 30 cm

Equilibrium of charge:

↳ Equilibrium Location of third charge does not depends.
 Nature of third charge. & Magnitude of third charge.

$$F \propto q_1 q_2$$

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

$$(d+x)^2 = 9x^2$$

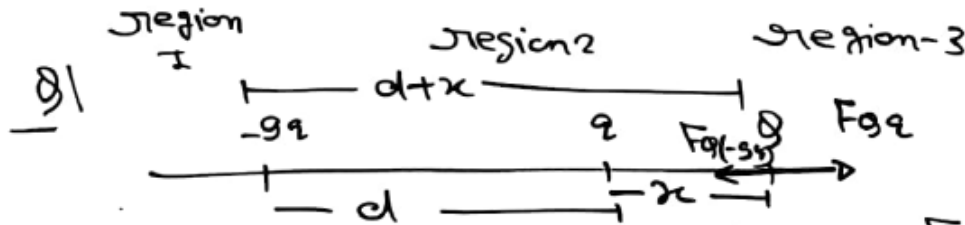
$$(d+x)^2 = (3x)^2$$

$$d+x = 3x$$

$$d = 3x - 2x$$

$$d = 2x$$

$$x = \frac{d}{2}$$



$$F_{q q} = \frac{1}{4\pi\epsilon_0} \frac{q q}{x^2}$$

$$F_{q(-9q)} = \frac{1}{4\pi\epsilon_0} \frac{9(9q)}{(d+x)^2}$$

$$F_{q q} = F_{q(-9q)}$$

$$\frac{1}{4\pi\epsilon_0} \frac{q^2}{x^2} = \frac{1}{4\pi\epsilon_0} \frac{9(9q)}{(d+x)^2}$$

$$\frac{1}{x^2} = \frac{9}{(d+x)^2}$$