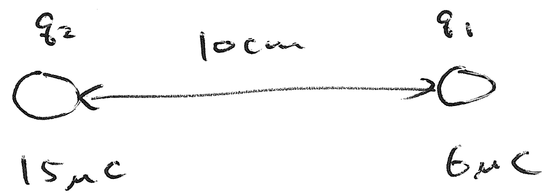
EXAMPLE



$r = 0.1\ m$

$\varepsilon_0 = 8.85\times10^{-12}\ C^2/N\cdot m^2$

$|\vec{F}| =$

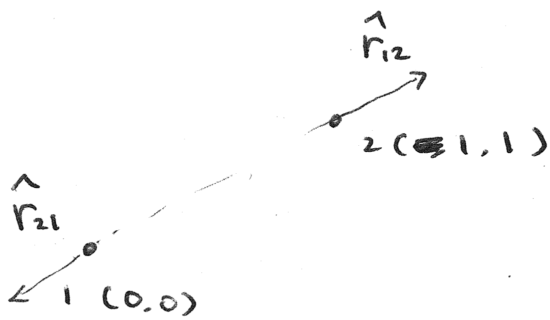
$$= \frac{1}{4\pi\varepsilon_0}\ \frac{q_1 q_2}{r^2}$$

$$= \frac{1}{4\cdot3.14\times 8.85\times10^{-12}\ C^2/N\cdot m^2}\ \frac{(15\times10^{-6}\ C)(6\times10^{-6}\ C)}{(0.1\ m)^2}$$

$$\cong \frac{1}{\cancel{12\times 9}\times\cancel{10^{-12}}\ \cancel{C^2}/N\cdot\cancel{m^2}}\ \frac{\cancel{90\times10^{-12}}\ \cancel{C^2}}{0.01\ \cancel{m^2}} \sim \underline{100\ N}$$

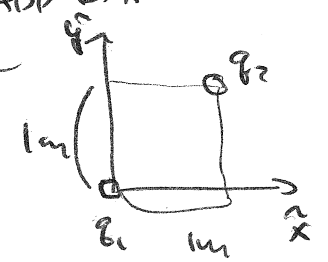
$\cancel{108}$

2. WHAT IS $\hat{r}_{12}$?

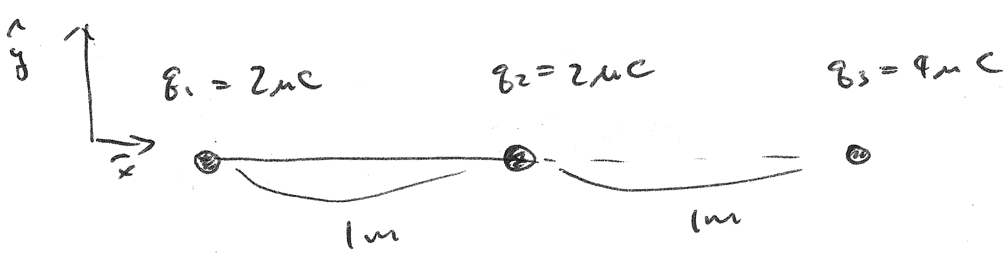


$$\hat{r}_{12} = \frac{(1,\ 1)}{\sqrt{2}} \quad \text{OR} \quad \frac{1}{\sqrt{2}}(\hat{i} + \hat{j})$$

ADD EXAMPLE



SEE TWO PAGES LATER



WHAT IS $\vec{F}_3$?

$$\vec{F}_3 = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_3}{(2m)^2}\hat{r}_{13} + \frac{1}{4\pi\varepsilon_0}\frac{q_2 q_3}{(1m)^2}\hat{r}_{12}$$

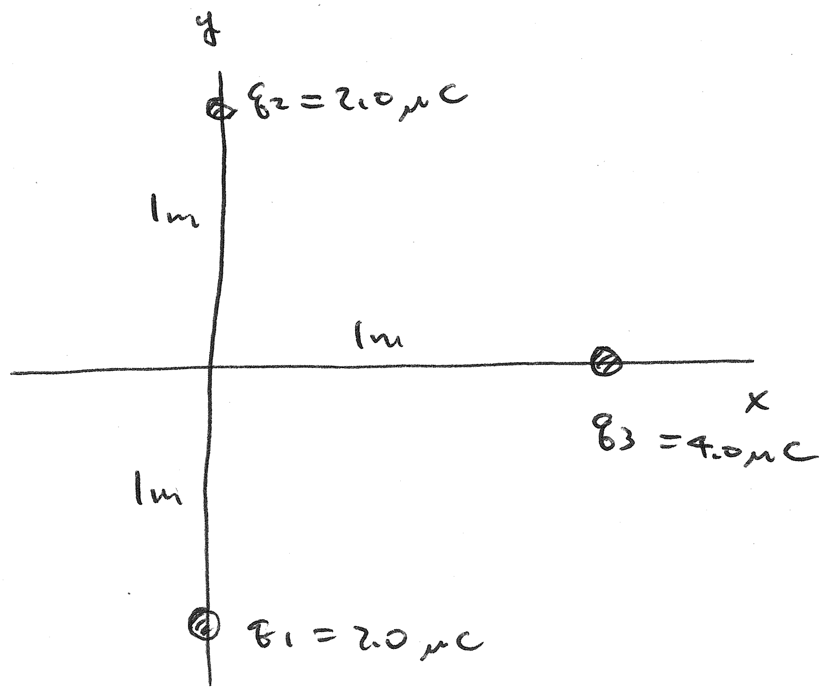
$$\hat{r}_{13} = \hat{x} \qquad \hat{r}_{12} = \hat{x}$$

$$= \frac{1}{4\pi\varepsilon_0}\left[\frac{(2\times10^{-6}C)\cdot(4\times10^{-6}C)}{4m^2} + \frac{(2.0\times10^{-6}C)(4.0\times10^{-6}C)}{1m^2}\right]$$

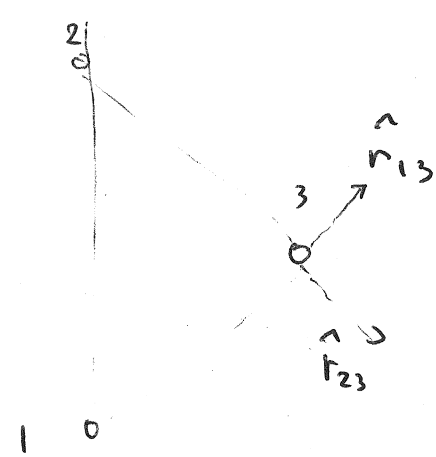
$\Rightarrow$ JUST NEED TO CALCULATE THIS

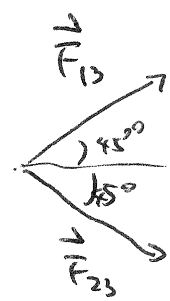
FORCES ADDING: LAW OF SUPER POSITION

LAW OF SUPER POSITION #2



WHAT IS THE FORCE ON CHARGE 3?





$|\vec{F}_{13}| = |\vec{F}_{23}|$

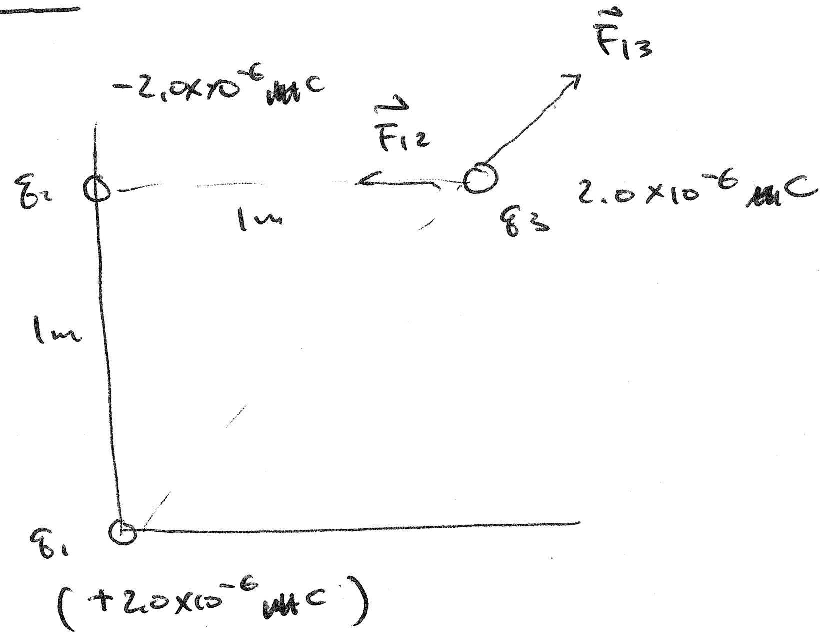
SINCE $q_1 = q_2$

$|\vec{r}_{13}| = |\vec{r}_{23}|$

$\therefore$ RESULTANT FORCE

$$\left[|F_{13}| \cos 45^\circ + |\vec{F}_{23}| \cos 45^\circ \right] \hat{i}$$

EXAMPLE #3



$$\vec{F}_{13} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_3}{|r_{13}|^2}\hat{r}_{13}$$

$$= 8.99\times10^{9}\ N\text{-}m^2/C^2 \quad \frac{4.0\times10^{-12}}{(\sqrt{2})^2}\hat{r}_{13}$$

$$= \frac{3.6\times10^{-2}}{2}\hat{r}_{13} = 1.8\times10^{-2}\ \hat{r}_{13}\ N$$

$$\hat{r}_{13} = \frac{(1,1)}{\sqrt{2}} \qquad \vec{F}_{13} = 1.8\times10^{-2} * \frac{(1,1)}{\sqrt{2}}$$

$$\vec{F}_{12} = \frac{1}{4\pi\varepsilon_0}\frac{q_1 q_2}{|r_{12}|^2} = 8.99\times10^{9}\ N\text{-}m^2/C^2 \ \frac{-4.0\times10^{-12}}{(1m)^2}\hat{r}_{12}$$

$$= -3.6\times10^{-2}\ N\ (1,0)$$

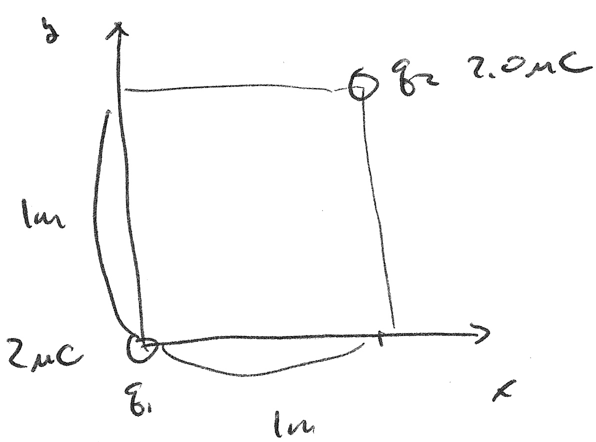
$\vec{F}_{12} + \vec{F}_{13} =$ [illegible]

$$-3.6\times10^{-2}\,(1,0) + \frac{1.8\times10^{-2}\,(1,1)}{\sqrt{2}}\ \mathrm{N}$$

$=$ JUST ADD

$\Downarrow$

$$\left(-3.6\times10^{-2} + \frac{1.8\times10^{-2}}{\sqrt{2}},\ \frac{1.8\times10^{-2}}{\sqrt{2}}\right)\mathrm{N}$$



$$\hat{r}_{12} = \frac{(1,1)}{\sqrt{2}}$$

$$|\hat{r}_{12}| = 1$$

OR

$$\hat{r}_{12} = (\sin 45^\circ,\ \cos 45^\circ)$$

$$\vec{F}_{12} = \frac{1}{4\pi\varepsilon_0}\,\frac{(2\mu C)(2\mu C)}{(\sqrt{2})^2}$$

$$\frac{1}{4\pi\varepsilon_0} = 8.99\times10^{9}\ \mathrm{N\text{-}m^2/C^2}$$

2×10^{-12}

$$= \frac{1}{4\pi\varepsilon_0}\,\frac{4\times10^{-12}\,C^2}{2\ m^2} = 8.99\times10^{9}\ \mathrm{N\text{-}m^2/C^2}\ \frac{C^2}{m^2}$$

$$= 1.8\times10^{-2}\,\mathrm{N}\ \underline{(1,1)}$$