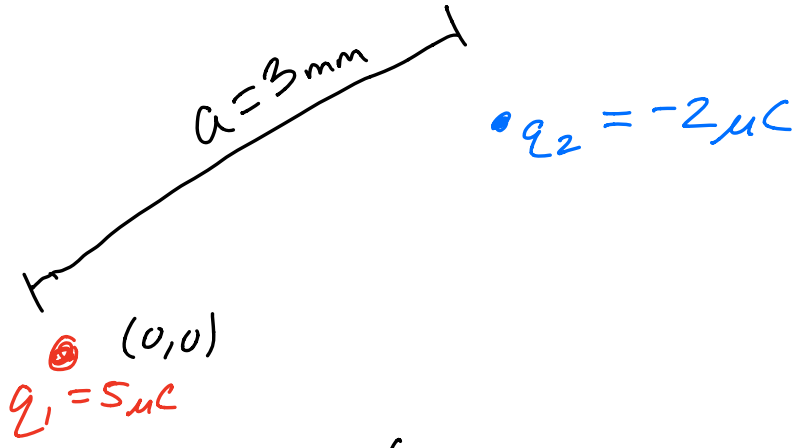
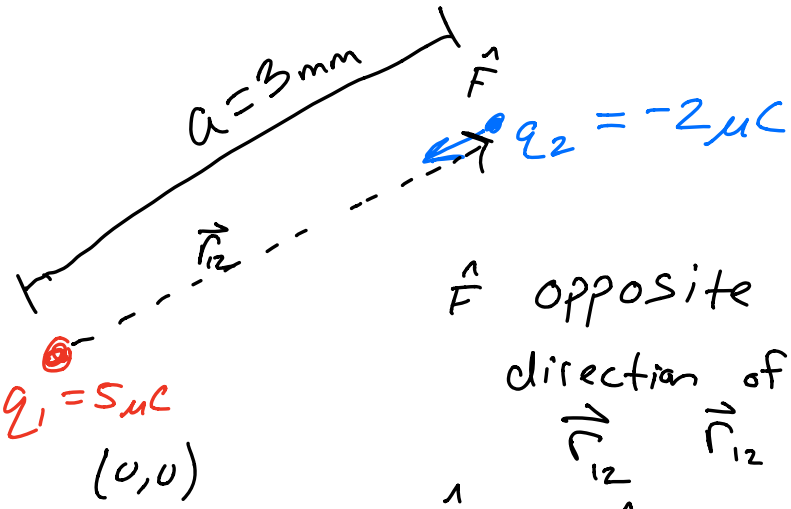


$|\vec{F}_2| = ?$ (Force ON q_2)

$$F = \frac{K(5e\text{-}6)(-2e\text{-}6)}{0.003^2} =$$



$\hat{F}$ opposite direction of $\vec{r}_{12}$

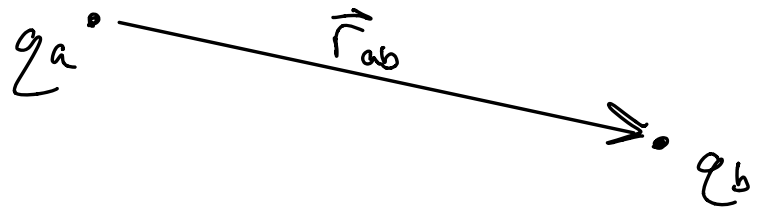
$\vec{r}_{12}$ FROM SRC TO OBS

$\hat{F} = -\hat{r}_{12}$

$\vec{F} = -(\quad)\hat{r}_{12}$

Direction is +/- $\hat{r}_{12}$. If $q_1 q_2 < 0$ $\hat{F} = -\hat{r}_{12}$

Find vector pointing FROM source of the force TO the point where force is felt.



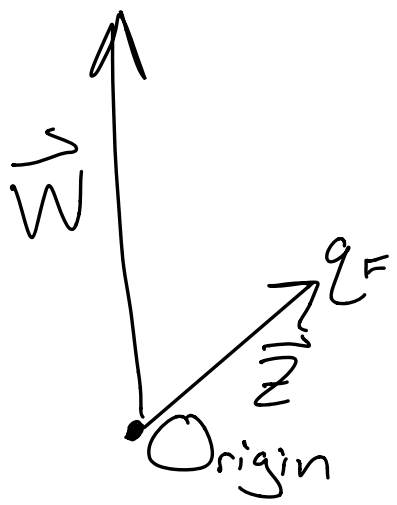
$\vec{F}_b$? Find $\vec{r}_{ab}$

$$\vec{F}_b = \frac{k\, q_a q_b}{|\vec{r}_{ab}|^2}\, \hat{r}_{ab}$$

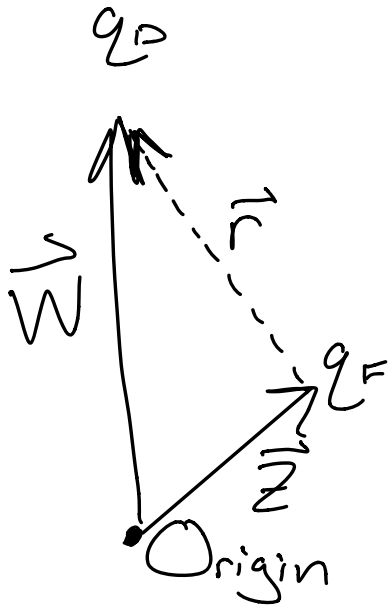
a = Source of force

b = point force is felt

q_D What if not @ origin?



Force on q_D ?



q_F is Source

vector $\vec{r}$

END at $\vec{W}$

STARTS at $\vec{Z}$

$\vec{r} = \vec{W} - \vec{Z}$

$\vec{W} = \vec{r}_{obs}$ $\vec{Z} = \vec{r}_{src}$

$\vec{r} = \vec{r}_{obs} - \vec{r}_{src}$

$\vec{r} = \langle W_x - Z_x, W_y - Z_y \rangle$

1) Find $\vec{r}_{src}$

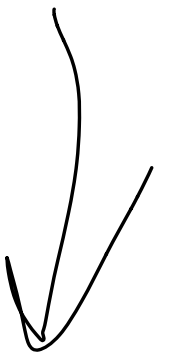
(origin $\longrightarrow$ src of force)

2) Find $\vec{r}_{obs}$

(origin $\longrightarrow$ Force observed)

3) $\vec{r} = \vec{r}_{obs} - \vec{r}_{src}$

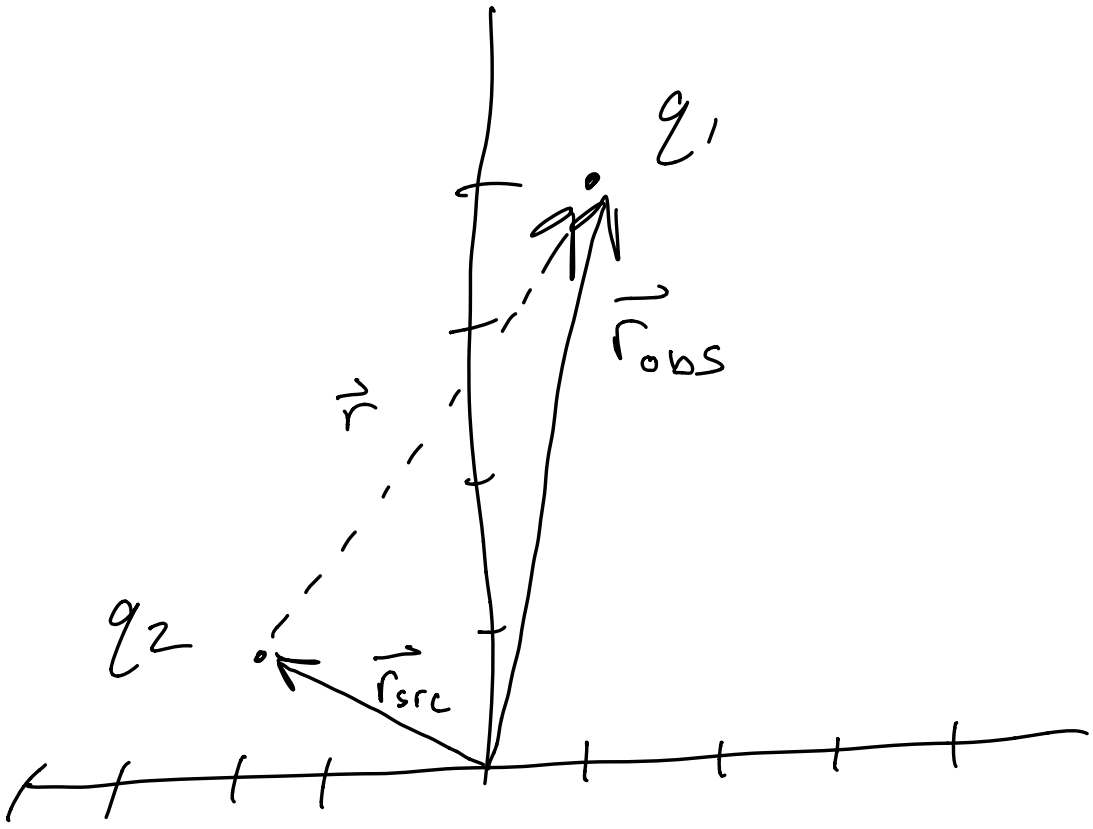
EX



Ex:

$q_1 = 5\,\mu C \quad \langle 1, 4 \rangle$

$q_2 = 2\,\mu C \quad \langle -2, 1 \rangle$



F_1 ?

1) Find r_{src}

2) Find r_{obs}

3) Find $\vec{r} = \vec{r}_{obs} - \vec{r}_{src}$

$$\vec{r}_{obs} = \langle 1, 4 \rangle$$

$$\vec{r}_{src} = \langle -2, 1 \rangle$$

$$\vec{r} = \vec{r}_{obs} - \vec{r}_{src} = \langle 3, 3 \rangle$$

$$\vec{F} = \frac{K q_1 q_2}{|\vec{r}|^2} \hat{r}$$

$$|\vec{r}| = \sqrt{3^2 + 3^2} = \sqrt{18}$$

$$\hat{r} = \frac{1}{|\vec{r}|} \vec{r} = \frac{1}{\sqrt{18}} \langle 3, 3 \rangle$$

$$\frac{(9e9)(5e\text{-}6)(2e\text{-}6)}{18} \left\langle \frac{3}{\sqrt{18}}, \frac{3}{\sqrt{18}} \right\rangle$$

$\vec{E}$ works the same way!

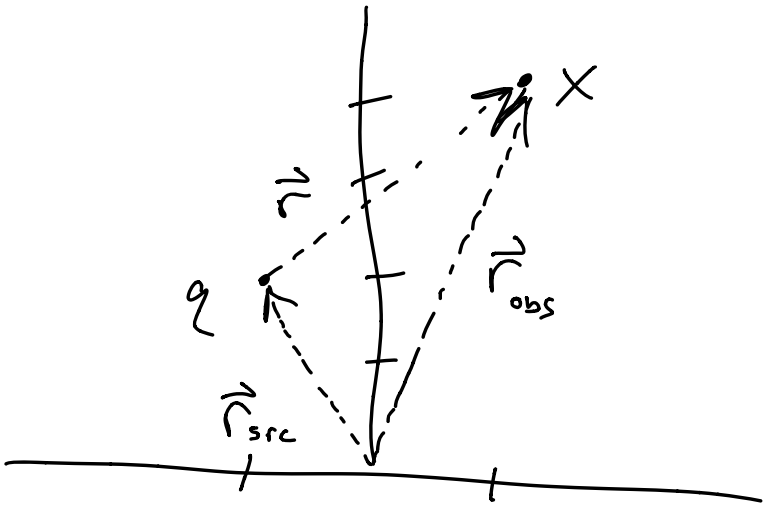
Find r_{src},

Find r_{obs} ($r \to E$)

$\vec{r} = \vec{r}_{obs} - \vec{r}_{src}$

$q = -2nC$ @ $\langle -1, 2 \rangle$

what is $\vec{E}$ @ $\langle 1, 4 \rangle$?



$\vec{r}_{src} = \vec{r}_q$

$\vec{r}_{obs} = \vec{r}_E$

$\vec{r} = \vec{r}_{obs} - \vec{r}_{src} = \langle 1, 4 \rangle - \langle -1, 2 \rangle$

$= \langle 2, 2 \rangle$

$$\vec{E} = \frac{kq}{|\vec{r}|^2}\hat{r}$$

$$|\vec{r}| = \sqrt{2^2+2^2} = \sqrt{8}$$

$$\hat{r} = \frac{\vec{r}}{|\vec{r}|} = \left\langle \frac{2}{\sqrt{8}}, \frac{2}{\sqrt{8}} \right\rangle$$

$$\vec{E} = \frac{(9e9)(-2e-9)}{8}\left\langle \frac{2}{\sqrt{8}}, \frac{2}{\sqrt{8}} \right\rangle$$