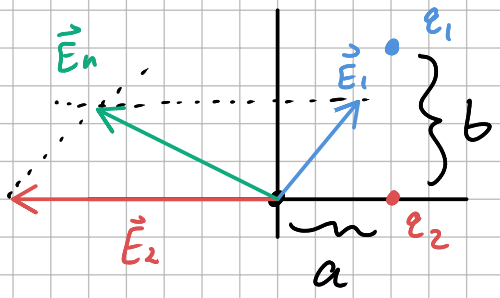
A point charge q1=-4.00nC is at point x=0.60m, y=0.80m,
and a second point charge q2=+6.00nC is at the point x=0.60m, y=0m.

(A) Find the net electric field at the origin.
(B) Find the angle Enet makes wrt the +x-axis.

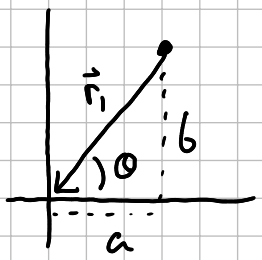


Gibbons
q1=4e-9 (neg)
q2=6e-9 (pos)

a=0.6m
b=0.8m

$$\vec{E}_n = \vec{E}_1 + \vec{E}_2 \implies E_{nx} = E_{1x} + E_{2x} \quad \& \quad E_{ny} = E_{1y} + E_{2y}$$

Find the magnitude of E1

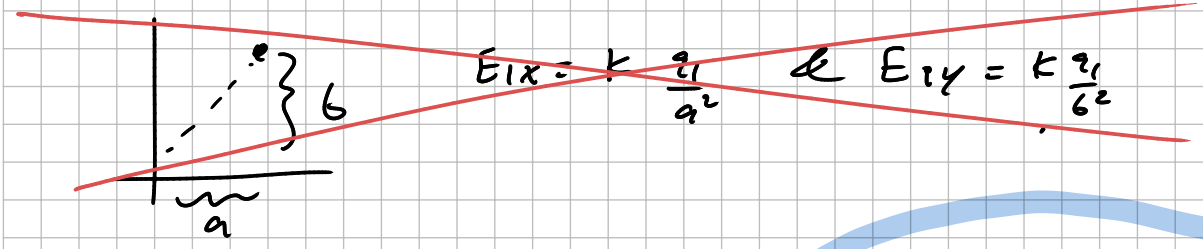


$$r_1 = \sqrt{a^2 + b^2} = 1$$

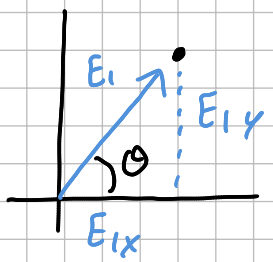
$$E_1 = k\frac{|q_1|}{(r_1)^2} = 35.96 N/C$$

Find the components of E1

most common mistake that I see

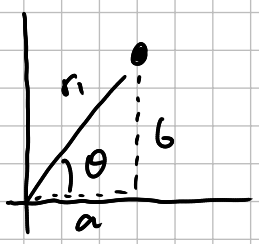


$$E_{1x} = k\frac{q_1}{a^2} \quad \& \quad E_{1y} = k\frac{q_1}{b^2}$$



$$\cos\theta = \frac{E_{1x}}{E_1}$$

$$E_{1x} = E_1 \cos\theta$$



$$\cos\theta = \frac{a}{r_1}$$

$$E_{1x} = E_1\left(\frac{a}{r_1}\right)$$

similarly

$$E_{1y} = E_1\left(\frac{b}{r_1}\right)$$

$$\vec{E}_1 = E_1\left(\frac{a}{r_1}\right)\hat{x} + E_1\left(\frac{b}{r_1}\right)\hat{y}$$

Find the magnitude of E2

$$E_2 = k\frac{q_2}{r_2^2}$$

Find components of E2

$$\vec{E}_2 = -E_2\,\hat{x} + 0\,\hat{y}$$

Find Enet through vector addition

$$\vec{E}_n = \vec{E}_1 + \vec{E}_2$$

most common mistake I see here is

~~$E_n = 36\,N/C + (-150\,N/C)$~~

DON'T ADD MAGNITUDES
ADD COMPONENTS!

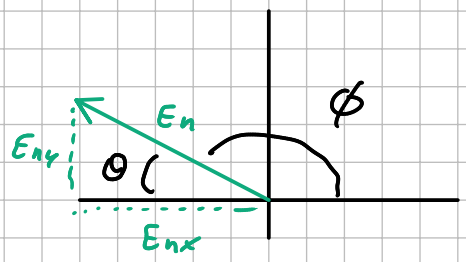
E_{nx} E_{ny}

$$\vec{E}_n = -128.26\,N/C\,\hat{x} + 28.77\,N/C\,\hat{y}$$

Compute the magnitude of En

$$E_n = \sqrt{(E_{nx})^2 + (E_{ny})^2}$$
$$= 131.44\,N/C$$

Find angle wrt +x-axis



$$\tan\theta = \left|\frac{E_{ny}}{E_{nx}}\right|$$

$$\theta = \arctan\left(\left|\frac{E_{ny}}{E_{nx}}\right|\right)$$

$$\phi = \pi - \theta = 167.36^\circ$$