Name KEY
Section

SP222 CDR Tucholski
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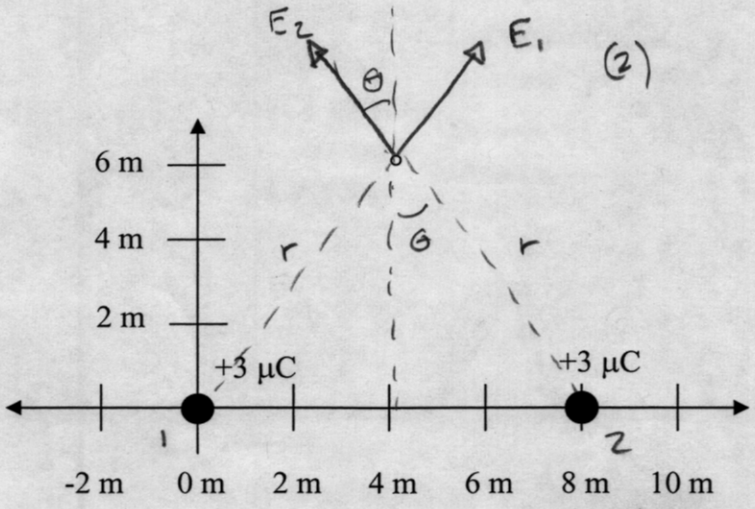
1. Two charges, each +3.0 μC are located on the x-axis at the origin and at x = 8.0 m as shown. Find the electric field the point (x= 4.0 m, y = 6.0 m) shown in the sketch below. Show all work, including properly drawing, labeling, and combining the electric field vectors.



(2)

$r = \sqrt{(4m)^2 + (6m)^2}$

$= \sqrt{16m^2 + 36m^2}$

$= \sqrt{52m^2}$ (2)

$|\vec{E}_1| = |\vec{E}_2| = \frac{kq}{r^2} = \frac{\left(9 \times 10^9 \frac{N\text{-}m^2}{C^2}\right)(3 \times 10^{-6} C)}{52 m^2} = 5.19 \times 10^2 \frac{N}{C}$ (2)

$E_{1y} = E_{2y} = |E_1| \cos\theta = 5.19 \times 10^2 N/C \, \frac{6m}{\sqrt{52m^2}}$ (2)

$= 4.32 \times 10^2 N/C$

$E_{1x} = E_{2x}$ AND OPPOSITE DIRECTION ⇒ CANCELS (1)

$\vec{E} = \vec{E}_1 + \vec{E}_2 = 2(4.32 \times 10^2 N/C)\,\hat{j}$ (1)

$= \boxed{8.6 \times 10^2 N/C \, \hat{j}}$

Possibly useful information: $k = 9 \times 10^9$ N-m^2/C^2
$\varepsilon_o = 8.85 \times 10^{-12}$ C^2/ N-m^2
$e = 1.9 \times 10^{-19}$ C

$\vec{F}_{12} = \frac{kq_1q_2}{r_{12}^2}\hat{r}_{12}$ $\quad \vec{E} = \lim_{q\to 0}\frac{\vec{F}}{q}$ $\quad \vec{E} = \frac{kq}{r^2}\hat{r}$ $\quad E = \frac{2k\lambda}{r}$ $\quad E = \frac{\sigma}{2\varepsilon_o}$

Extra Credit: Who played in Super Bowl I? Who won? Name either starting QB.
You get a second EC point if you can name both starting QBs.