Name KEY SP212 CDR Tucholski

1. Two equal charges, each +4.0 μC are located on the x-axis at the origin and at x = 6.0 m as shown. A third +1.0 μC charge is placed at the point (6.0m, 6.0m). Find the resulting force on the +1.0 μC charge. You can either report the magnitude and direction of the force or the Cartesian coordinates of the force.

Specifically: Draw the forces on the 1.0 μC charge (3 points)
Find the magnitude of these forces (4 points)
Properly combine the vectors to get the total force. (3 points)

$F_1 = \frac{kq_1q}{r_1^2} = \frac{\left(9\times10^9 \frac{N\cdot m^2}{C^2}\right)(4\mu C)(1\mu C)}{72\,m^2}$

$= \boxed{0.0005\ N}$

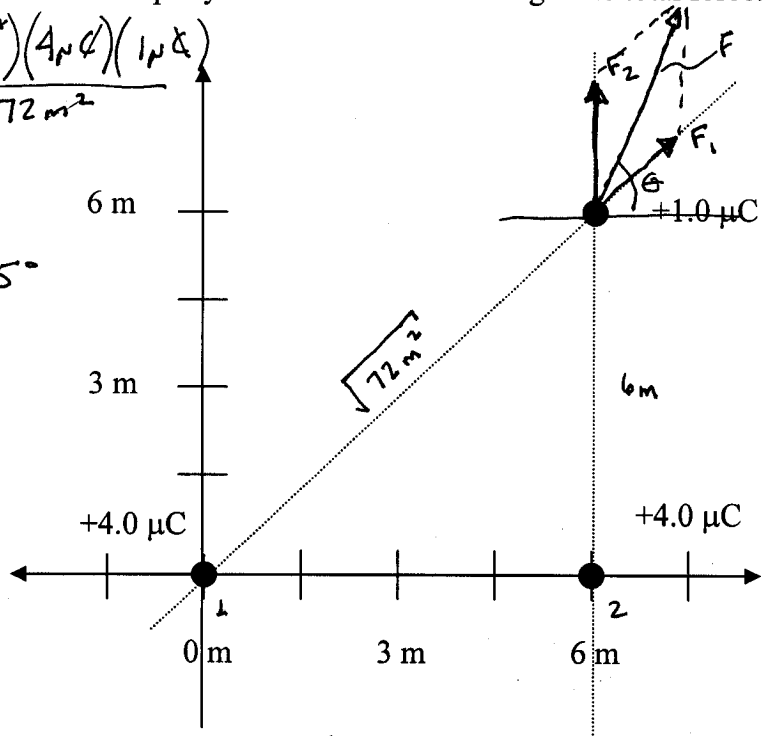
$F_{1x} = (0.0005\,N)\cos 45°$

$= 0.000354\,N$

$F_{2x} = 0.000354\,N$

$F_2 = \frac{kq_2q}{r_2^2} = \frac{\left(9\times10^9 \frac{N\cdot m^2}{C^2}\right)(4\mu C)(1\mu C)}{36\,m^2}$

$= \boxed{0.001\ N}$



$\vec{F} = \vec{F}_1 + \vec{F}_2 = 0.000354\,N\,\hat{i} + (.001\,N + .000354\,N)\hat{j}$

$= \boxed{0.000354\,N\,\hat{i} + .00135\,N\,\hat{j}}$

$|\vec{F}| = \sqrt{(.000354N)^2 + (.00135N)^2} = \boxed{.00139\ N}$

$\theta = \tan^{-1}\left(\frac{F_y}{F_x}\right) = \tan^{-1}\left(\frac{.00135\ N}{.000354\ N}\right) = \boxed{75.4°}$

Possibly useful information: $k = 9.0 \times 10^9\ N\text{-}m^2/C^2$

$\varepsilon_0 = 8.85 \times 10^{-12}\ C^2/N\text{-}m^2$

$e = 1.9 \times 10^{-19}\ C$

$\vec{F} = \frac{kq_1q_2}{r^2}\hat{r}$

E.C. Who quarterbacked the AFL Buffalo Bills in the 1960's prior to entering a career in politics? (1 point)

JACK KEMP