TSOKOS 5.2 p. 296 #5-8   SL2 HW #2

(5) $E = 100\ N/C \rightarrow e^-$ $F = E \cdot q = 100 \frac{N}{C} \times 1.60\times10^{-19} C = \boxed{1.60\times10^{-17} N}$

$a = \frac{F}{m} = \frac{1.60\times10^{-17} N}{9.11\times10^{-31} kg} = \boxed{1.76\times10^{13}\ m\cdot s^{-2}}$

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(6) $Q = +5\mu C$ experiences $F = 3.0\times10^{-5} N$

$E = \frac{F}{Q} = \frac{3.0\times10^{-5} N}{5\times10^{-6} C} = \boxed{6\ N\cdot C^{-1}}$

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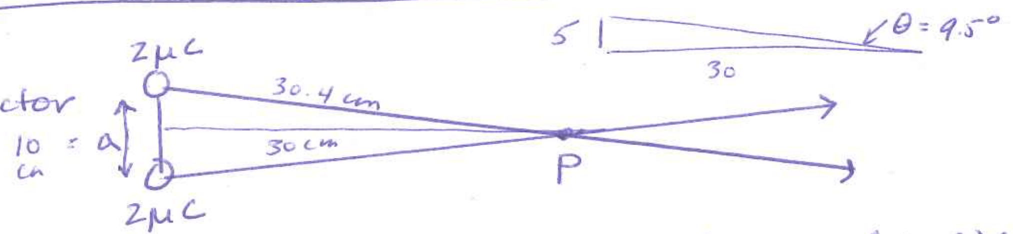
(7) E = vector

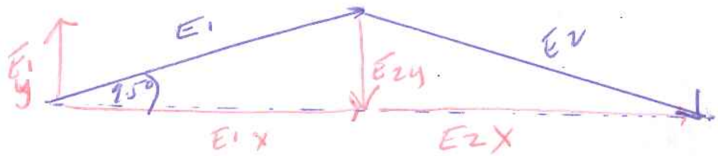


E due to a point charge $= \frac{KQ}{r^2} = \frac{(8.99\times10^9 \frac{N\cdot m^2}{C^2})(2\times10^{-6} C)}{(30.4\ m)^2}$

$E_1 = 1.95\times10^5\ N\cdot C^{-1}$ at 9.5° below +X

$E_2 = 1.95\times10^5\ N\cdot C^{-1}$ at 9.5° above +X

Vector Addition



Since y-components = 0, only need to add x-components

$\Sigma E = E_{1x} + E_{1y} = 2(1.95\times10^5\ N\cdot C^{-1})\cdot \cos(9.5°) = \boxed{3.85\times10^5\ N\cdot C^{-1}\ \text{Right}}$

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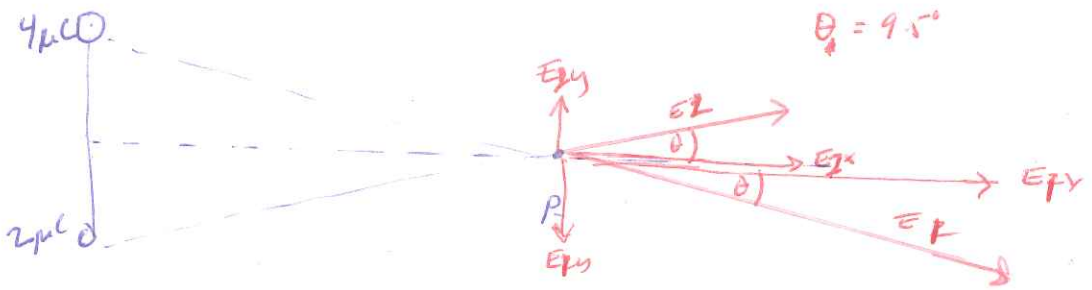
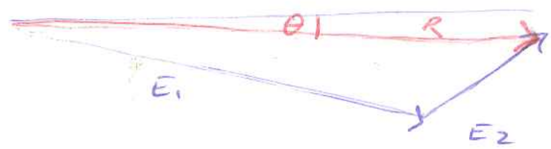
⑧ Repeat #7 w/ $Q_1 = {}^+4.00\,\mu C$ and $Q_2 = +2.00\,\mu C$.



Vector	x-comp	y-comp
E_1	$+E_1 \cdot \cos(9.5°)$ $= 3.838 \times 10^5$	$\ominus E_1 \cdot \sin(9.5°)$ $= {}^-6.422 \times 10^4$
E_2	$+E_2 \cdot \cos(9.5°)$ $= 1.919 \times 10^5$	$+E_2 \cdot \sin(9.5°)$ $= 3.212 \times 4$
	$\Sigma E_x = E_{1x} + E_{2x}$	$\Sigma E_y = E_{1y} + E_{2y}$

$E_1 = 3.891 \times 10^5\ N \cdot C^{-1}$

$E_2 = 1.946 \times 10^5\ N \cdot C^{-1}$



$\Sigma E_x = {}^+5.757 \times 10^5\ N \cdot C^{-1}$

$\Sigma E_y = {}^-3.210 \times 10^4\ N \cdot C^{-1}$

$\Sigma E = \sqrt{\Sigma E_x^2 + \Sigma E_y^2} = \boxed{5.77 \times 10^5\ N \cdot C^{-1}}$

$\theta = \tan^{-1}\left(\frac{3.210 \times 10^4}{5.757 \times 10^5}\right) = \boxed{3.2° \text{ below } +x}$