(3)

Estat #3 p525 Problems 15, 18
p570 Problems 7, ~~16~~ 8
Online - E field Concept

(5)

p525 - Problems

15) 3 1.0C charges Straight line, 100m b/t each

a) F on center object if all ⊕

$F_{net} = F_1 + F_2$ ⊕ ← F_2 ⊕ F_1 → ⊕

$F_{net} = 0N$

equally repelled by both

b) F on center object if all ⊖

$F_{net} = F_1 + F_2$ ⊖ ← F_2 ⊖ F_1 → ⊖

$= 0N$

(1)

equally repelled by both

c) F on center object if ⊕ ⊕ → F_1 F_2 ⊖

$$F_{net} = F_1 + F_2 = \frac{kqq}{r^2} + \frac{kqq}{r^2}$$

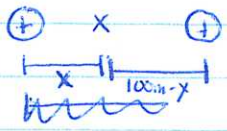
$$F_{net} = \frac{2kq^2}{r^2} = \frac{2(8.99\times10^9 \frac{Nm^2}{C^2})(1.0C)^2}{(100m)^2}$$

$$= 1.8\times10^6\ N$$

18) $q_1 = +1C$ Where should q_3 $(-1.0\times10^{-3}C)$
$q_2 = +2.0C$ be so F_{net} is zero
$r = 100m$

$\Sigma F = 0N$

$F_{1,3} - F_{2,3} = 0N$ $\quad F_{1,3} = F_{2,3}$



$$\frac{Kq_1q_3}{r^2} = \frac{Kq_2q_3}{r^2}$$

(i)

$$\frac{q_1}{x^2} = \frac{q_2}{(100m-x)^2}$$

$q_1(100m-x)^2 = q_2x^2$

$1.0C(100m-x)^2 = 2.0Cx^2$

sqrt sides $\quad 100m - x = \sqrt{2}x$

$100m = x(\sqrt{2}+1)$

$x = 100m/(\sqrt{2}+1)$

$x = 41m$

p570 - Problems

7) $q_1 = +4.0\times10^{-9}C$ Find where $E_{net} = 0\ N/C$
$q_2 = +3.0\times10^{-9}C$
$r = 50cm$

$\Sigma E = 0N/C$

$E_1 - E_2 = 0\ N/C$

$E_1 = E_2$

(i)

$$\frac{Kq_1}{r^2} = \frac{Kq_2}{r^2}$$

$$\frac{q_1}{x^2} = \frac{q_2}{(.50m-x)^2}$$

$q_1(.50m-x)^2 = q_2x^2$

$(4.0\times10^{-9}C)(.50m-x)^2 = (3.0\times10^{-9}C)(x^2)$

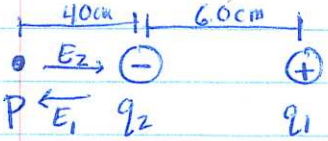
$\sqrt{4E-9}(.50m-x) = \sqrt{3E-9}\,x$

$.5\sqrt{4E-9} - \sqrt{4E-9}\,x = \sqrt{3E-9}\,x$

$.5\sqrt{4E-9} = .000118x$ $\quad x = .268m$

8) $q_1 = +4.0\times10^{-9}$ C 6.0cm to right of q_2

$q_2 = -3.0\times10^{-9}$ C Enet at 4.0cm left



$\Sigma E = ?$ $\Sigma E = E_2 - E_1$

$$\Sigma E = \frac{kq_2}{r^2} - \frac{kq_1}{r^2}$$

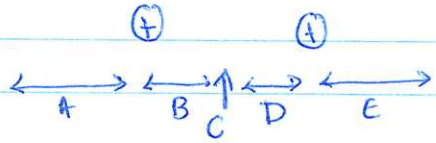
(1)

$$= \frac{(8.99\times10^9\ Nm^2/C^2)(3.0\times10^{-9}\ C)}{(.04\ m)^2} - \frac{(8.99\times10^9\ Nm^2/C^2)(4.0\times10^{-9}\ C)}{(.10m)^2}$$

$$= 13,300\ N/C$$

- Online E field Concept

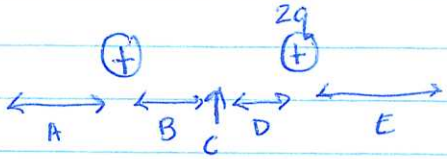
Part A)



Where is E zero?

C

Part B)



Where is E zero?

(1)

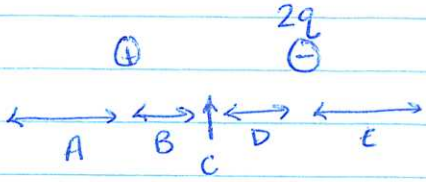
B

Part C)

Where is E zero?

Nowhere

Part D)



Where is E zero?

A