Recitation 4

Tuesday, September 29, 2020 2:47 PM

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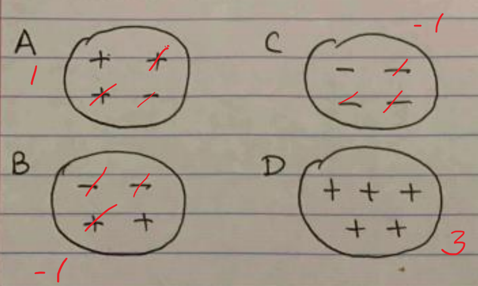
Problem # 1

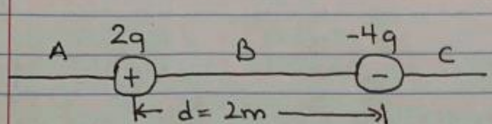


Given: Four charged spheres (A, B, C, D) where each +/- means 1 unit charge.

Want: If A touches B, then B touches D, then B touches A, THEN B touches C, what is the final charge at the end of all of the above?

Problem # 2

Given: Two charge particles locked in place on rod 2m apart.



Want: a) What region (A, B, C) can a third charge be placed to ensure equilibrium?
b) What is the distance (measured from 2q or -4q) that ensure equilibrium?
c) Is it stable?

A.) Region A

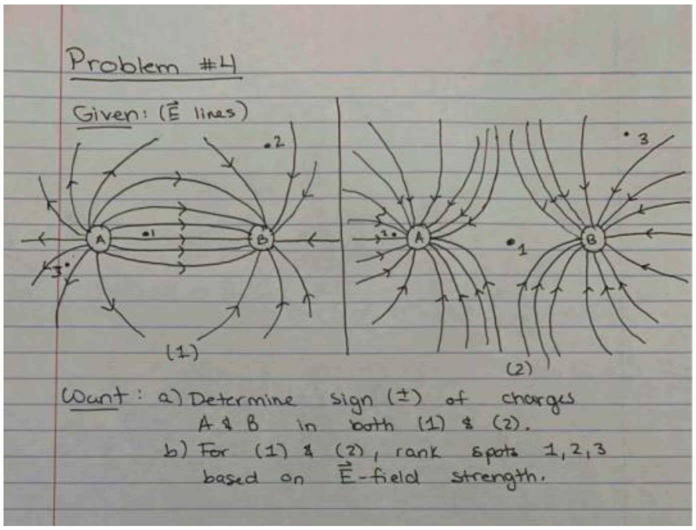
B.)

$$\frac{k(q)(4q)}{(r+2)^2} = \frac{k(q)(2q)}{r^2}$$

$$r^2\left(k(q)(4q)\right) = (r+2)^2\left(k(q)(2q)\right)$$

$$r = 4.8\ m.$$

c.) Yes


Problem #4

Given: ($\vec{E}$ lines)

Want: a) Determine sign (±) of charges A & B in both (1) & (2).
b) For (1) & (2), rank spots 1, 2, 3 based on $\vec{E}$-field strength.

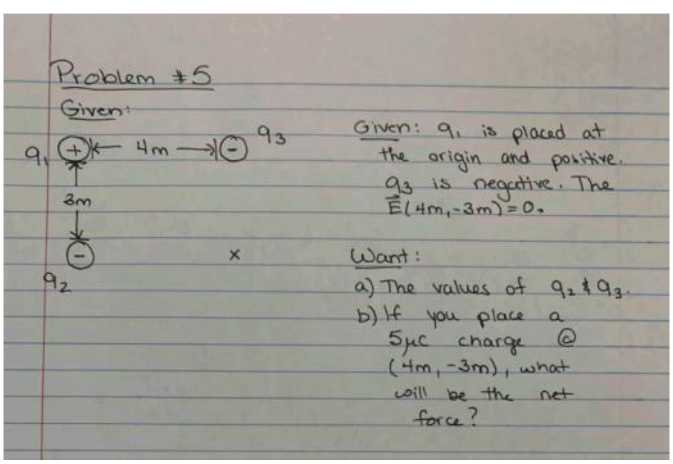
A.)

1: A = +
B = −

2: A = −
B = −

B.) 1: 1 > 3 > 2

2: 2 > 3 > 2


Problem #5

Given:

Given: q_1 is placed at the origin and positive. q_3 is negative. The $\vec{E}(4m, -3m) = 0$.

Want:
a) The values of q_2 & q_3.
b) If you place a 5μC charge @ (4m, −3m), what will be the net force?

$$\frac{\cancel{k}\, q_1 \cancel{q_2}}{} = \frac{\cancel{k}\, \cancel{q_2}\, q_3}{5^2}$$

$$\frac{k\, q_1 \cancel{q_2}}{3^2} = \frac{\ldots}{5^2}$$

$$25 q_1 = 16$$

$$q_1 = \frac{16}{25}$$

$$\frac{k q_1 q_3}{3^2}$$

$$\frac{k\left(\frac{16}{25}\right)\left(\frac{16}{9}\right)}{4^2} = 6.4 \times 10^8\ N$$

$$\frac{k(1)(5 \times 10^{-6})}{4^2} =$$

$$F_x = 6.3942860755 \times 10^8\ N$$

$$F_y = 6.3920897778 \times 10^8\ N$$

$$\boxed{F = 9.04 \times 10^8\ N}$$