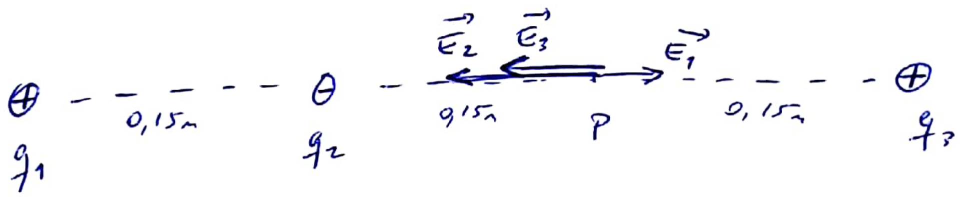
1)

$$E_1 = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot 3\times10^{-9}C}{(0{,}16m)^2} = 1{,}1\times10^3 \frac{N}{C}$$

$$E_2 = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot 4{,}0\times10^{-9}C}{(0{,}08m)^2} = 5{,}6\times10^3 \frac{N}{C}$$

$$E_{neto} = 1{,}1\times10^3 \frac{N}{C} + 5{,}6\times10^3 \frac{N}{C} = \boxed{6{,}7\times10^3 \frac{N}{C}}$$

2)



$$E_1 = \frac{9\times10^9 \frac{Nm^2}{C^2}\ 2{,}3\times10^{-9}C}{(0{,}30m)^2} = 2{,}3\times10^2 \frac{N}{C}$$

$$E_2 = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot 3{,}0\times10^{-9}C}{(0{,}15m)^2} = 1{,}2\times10^3 \frac{N}{C}$$

$$E_3 = \frac{9\times10^9 \frac{Nm^2}{C^2} \cdot 1{,}2\times10^{-9}C}{(0{,}15m)^2} = 4{,}8\times10^2 \frac{N}{C}$$

$$\vec{E}_{neto} = \vec{E}_1 + \vec{E}_2 + \vec{E}_3$$

$$E_{neto} = E_2 + E_3 - E_1$$

$$E_{neto} = 1,2 \times 10^3 \frac{N}{C} + 4,8 \times 10^2 \frac{N}{C} - 2,3 \times 10^2 \frac{N}{C}$$

$$\boxed{E_{neto} = 1,5 \times 10^3 \frac{N}{C}}$$ Horizontal y hacia la izquierda.

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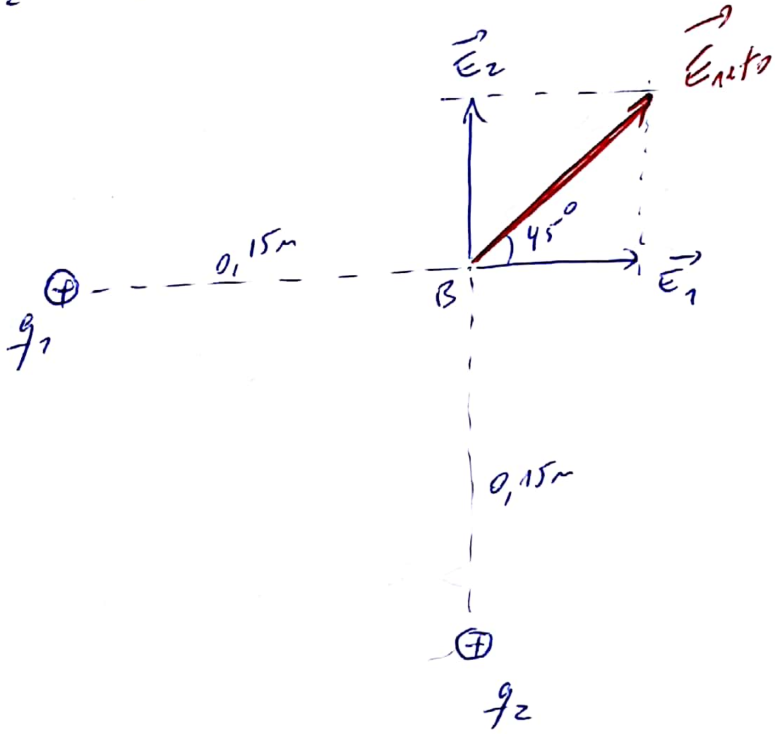
3) $q_1 = q_2 = 20 \times 10^{-6}\, C$



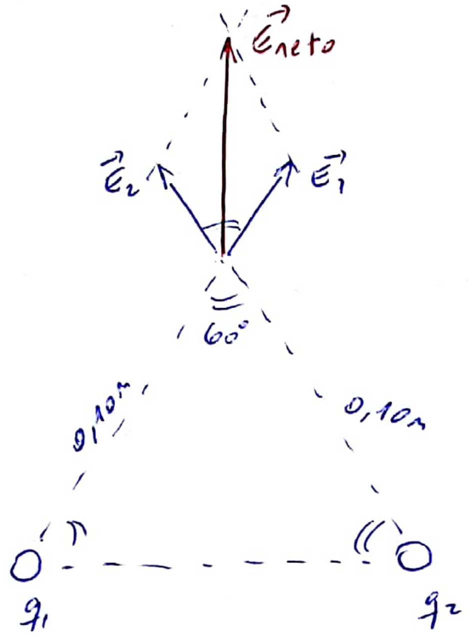
$$E_1 = \frac{9 \times 10^9 \frac{Nm^2}{C^2} \cdot 20 \times 10^{-6}}{(0,15m)^2} = 8,0 \times 10^6 \frac{N}{C}$$

$$E_2 = 8,0 \times 10^6 \frac{N}{C}$$

$$E_{neto} = \sqrt{(8 \times 10^6)^2 + (8 \times 10^6)^2} = \boxed{1,1 \times 10^7 \frac{N}{C}}$$

③

4)



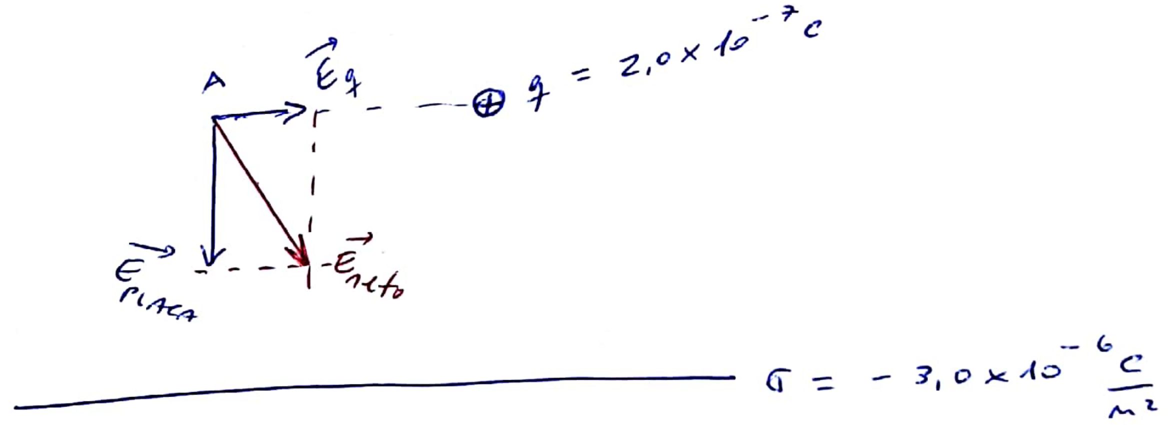
$q_1 = q_2 = 3{,}0 \times 10^{-9}\, C$

$$E_1 = E_2 = \frac{9 \times 10^{9} \frac{Nm^2}{C^2} \cdot 3{,}0 \times 10^{-9}\, C}{(0{,}10m)^2} = 2{,}7 \times 10^{3} \frac{N}{C}$$

$$E_{neto} = \sqrt{(2{,}7 \times 10^3)^2 + (2{,}7 \times 10^3)^2 + 2 \cdot (2{,}7 \times 10^3)(2{,}7 \times 10^3) \cdot \cos(60°)}$$

$$\boxed{E_{neto} = 4{,}7 \times 10^{3} \frac{N}{C}}$$ VERTICAL Y ~~HACIA~~ ARRIBA.

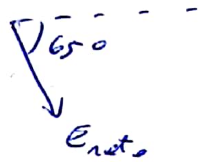
5)



a) $$E_q = \frac{9\times10^{9}\frac{Nm^2}{C^2} \cdot 2{,}0\times10^{-7}C}{(0{,}15m)^2} = 8{,}0\times10^{4}\frac{N}{C}$$

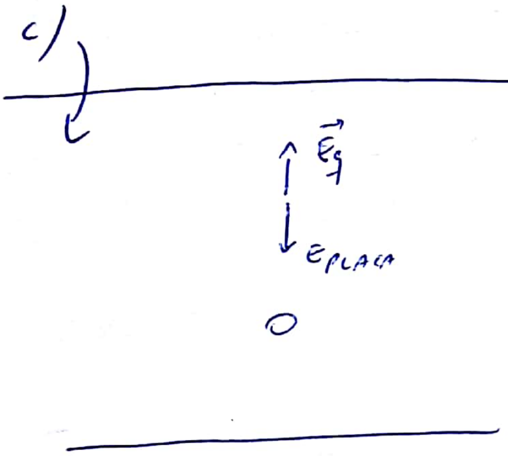
$$E_{PLACA} = \frac{3{,}0\times10^{-6}\frac{C}{m^2}}{2 \cdot 8{,}85\times10^{-12}\frac{C^2}{Nm^2}} = 1{,}7\times10^{5}\frac{N}{C}$$

b) $$E_{neto} = \sqrt{(8{,}0\times10^{4})^2 + (1{,}7\times10^{5})^2} = \boxed{1{,}9\times10^{5}\frac{N}{C}}$$



$$\alpha = tg^{-1}\left(\frac{1{,}7\times10^{5}}{8\times10^{4}}\right) = 65°$$

c)



PARA QUE E_{neto} SEA CERO,

$E_q = E_{PLACA}$ CON SENTIDOS CONTRARIOS. (VECTORES OPUESTOS)

$\Rightarrow E_q = 1{,}7\times10^{5}\frac{N}{C}$

LUEGO DESPEJAMOS LA DISTANCIA:

$$E_q = \frac{Kq}{d^2}$$

$$d = \sqrt{\frac{Kq}{E_q}}$$

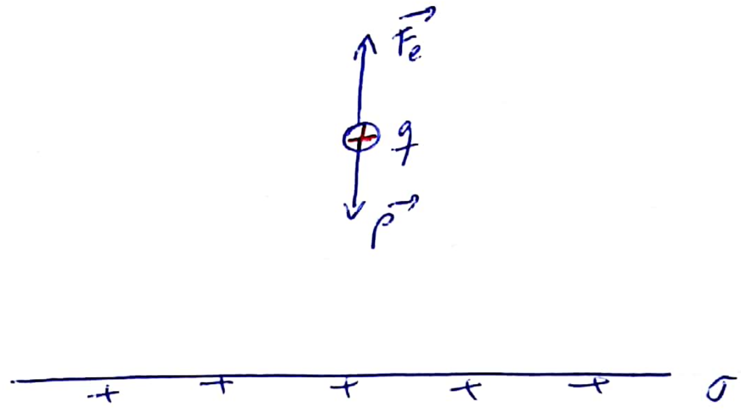
$$d = 0{,}10m \quad (*)$$

(*) EL PUNTO SOLUCIÓN ESTÁ A 0,10m ARRIBA DE LA PARTÍCULA.

— x —

6) NO VA.

7)



PARTÍCULA $\rightarrow$ $m = 5 \cdot m_{p+} = 8{,}35 \times 10^{-27}\ kg$

$\rightarrow$ $q = 5 \cdot q_{p+} = 8 \times 10^{-19}\ C$

SUPONEMOS QUE LA PARTÍCULA SOLO CONTIENE 5 PROTONES

PARTÍCULA EN REPOSO $\Rightarrow$ $F_{neta} = 0$

$\Rightarrow$ $F_e = P = 8{,}35 \times 10^{-26}\ N$

$$E = \frac{|\sigma|}{2\varepsilon_0}$$

$$|\sigma| = 2\varepsilon_0 \cdot \vec{E}\ ?$$

PRECISAMOS HALLAR EL CAMPO GENERADO POR LA PARTÍCULA PARA LUEGO HALLAR SU DENSIDAD.

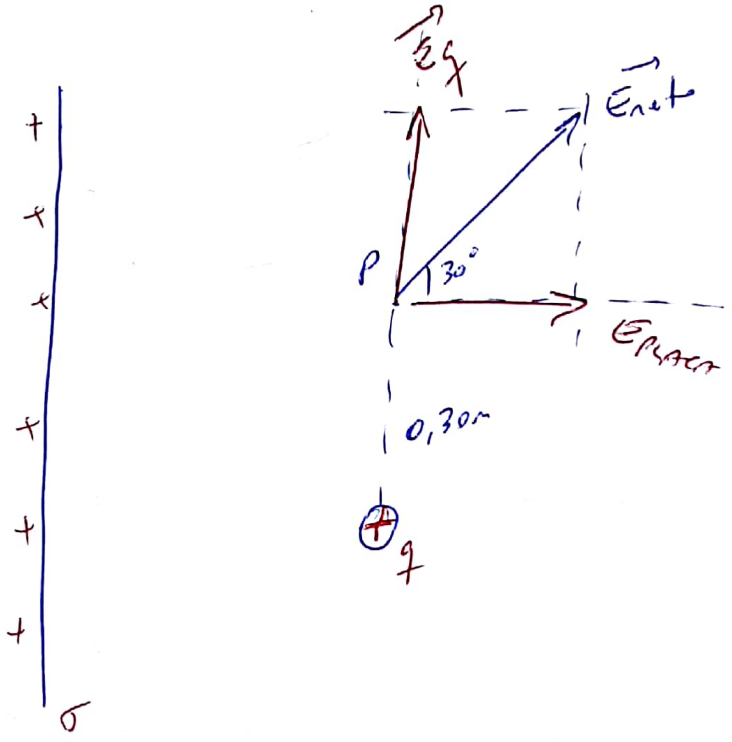
$$E = \frac{F_e}{q} = \frac{8{,}35 \times 10^{-26}\ N}{8 \times 10^{-19}\ C} = 1{,}04 \times 10^{-7}\ \frac{N}{C}$$

$$\Rightarrow |\sigma| = 2 \cdot 8{,}85 \times 10^{-12}\ \frac{C^2}{Nm^2} \cdot 1{,}04 \times 10^{-7}\ \frac{N}{C}$$

$$\boxed{|\sigma| = 1{,}84 \times 10^{-18}\ \frac{C}{m^2}}$$

Y ESTÁ CARGADA POSITIVAMENTE.

11)



DATO :

$$E_{neto} = 5 \times 10^{-2} \frac{N}{C}$$

USAMOS TRIGONOMETRÍA PARA HALLAR EL CAMPO DE LA PLACA Y EL CAMPO DE LA PARTÍCULA.

$$\operatorname{sen}(30) = \frac{OP}{H}$$

$$\operatorname{sen}(30) = \frac{E_q}{E_{neto}}$$

$$\Rightarrow \quad E_q = E_{neto} \cdot \operatorname{sen}(30) = 2,5 \times 10^{-2} \frac{N}{C}$$

$$\cos(30) = \frac{ADY}{H}$$

$$\cos(30) = E_{PLACA} / E_{neto}$$

$$\Rightarrow \quad E_{PLACA} = E_{neto} \cdot \cos(30) = 4,3 \times 10^{-2} \frac{N}{C}$$

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TENIENDO LOS CAMPOS AHORA PODEMOS HALLAR q Y σ.

$$E_q = \frac{Kq}{d^2}$$

$$\Rightarrow \quad q = \frac{E_q \cdot d^2}{K} = \frac{2{,}5\times10^{-2}\frac{N}{C} \cdot (0{,}30m)^2}{9\times10^9}$$

$$\boxed{q = 2{,}5\times10^{-13}C}$$

$$E_{PLACA} = \frac{|\sigma|}{2\varepsilon_0}$$

$$\Rightarrow \quad |\sigma| = 2\varepsilon_0 \cdot E_{PLACA}$$

$$|\sigma| = 2 \cdot 8{,}85\times10^{-12} \cdot 4{,}3\times10^{-2}\frac{N}{C} = \boxed{7{,}6\times10^{-13}\frac{C}{m^2}}$$

— x —