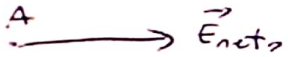
1)

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

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

SUMA DE VECTORES ("CASO 1")

$$E_{neto} = E_1 + E_2 = \boxed{6{,}7\times10^{3}\ \frac{N}{C}}$$ HACIA LA DERECHA.



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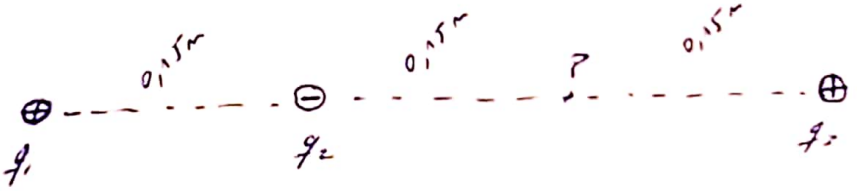
2)



$q_1 = 2{,}3\times10^{-9}\,C$

$q_2 = -3{,}0\times10^{-9}\,C$

$q_3 = 1{,}2\times10^{-9}\,C$

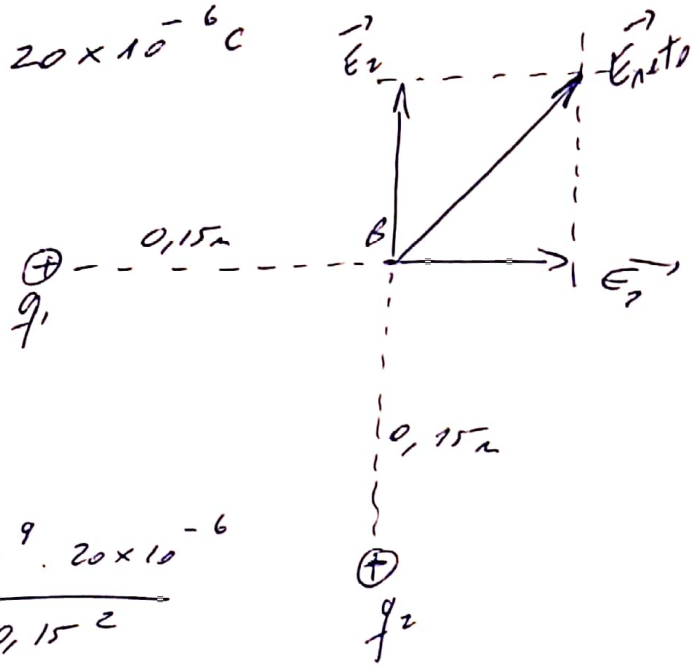
$$E_1 = \frac{9{,}0\times10^{9}\ \frac{Nm^2}{C^2}\cdot 2{,}3\times10^{-9}\,C}{(0{,}30m)^2} = 2{,}3\times10^{2}\ \frac{N}{C}$$

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

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

$$E_{neto} = E_2 + E_3 - E_1 = 1{,}2\times10^{3} + 4{,}8\times10^{2} - 2{,}3\times10^{2} = \boxed{1{,}5\times10^{3}\ \frac{N}{C}}$$

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

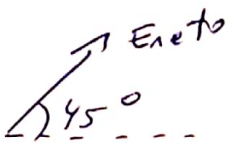


$$E_1 = E_2 = \frac{9,0 \times 10^9 \cdot 20 \times 10^{-6}}{0,15^2}$$

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

"CASO 3"

$$E_{neto} = \sqrt{(8 \times 10^6{}^2 + 8 \times 10^6{}^2)} = 11 \times 10^6 \frac{N}{C} = \boxed{1,1 \times 10^7 \frac{N}{C}}$$



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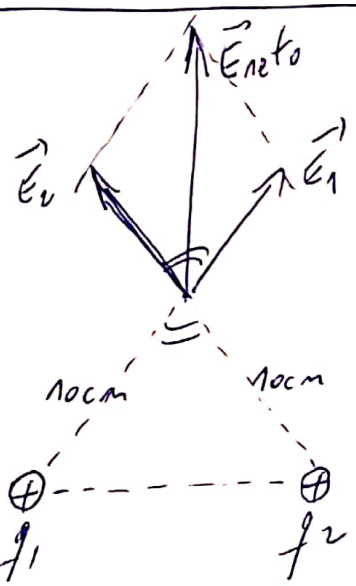
4)



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

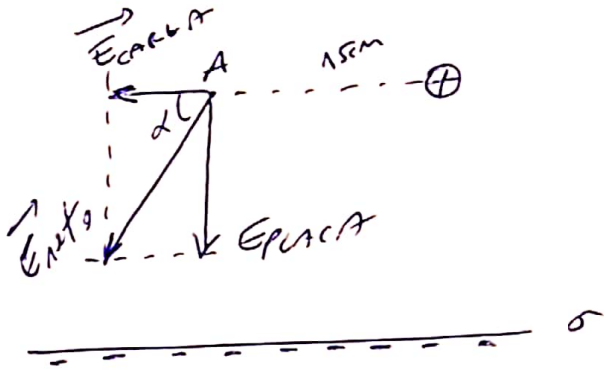
$$= 2,7 \times 10^3 \frac{N}{C}$$

SUMA VECTORIAL ("CASO 4")

$$E_{neto} = \sqrt{E_1^2 + E_2^2 + 2 \cdot E_1 \cdot E_2 \cdot \cos(60)} = \boxed{4,7 \times 10^3 \frac{N}{C}}$$

↳ VERTICAL CON SENTIDO HACIA ARRIBA.

5) $\sigma = -3,0 \times 10^{-6} \ C/m^2$ $\quad q = 2,0 \times 10^{-7} \ C$



a) $E_{CARGA} = \dfrac{9,0 \times 10^9 \cdot 2,0 \times 10^{-7}}{0,15^2} = 8,0 \times 10^4 \ \frac{N}{C}$

$E_{PLACA} = \dfrac{3,0 \times 10^{-6}}{(2 \cdot 8,85 \times 10^{-12})} = 1,7 \times 10^5 \ \frac{N}{C}$

b) SUMA VECTORIAL (CASO 3)

$E_{neto} = \sqrt{(8 \times 10^4{}^2 + 1,7 \times 10^5{}^2)}$

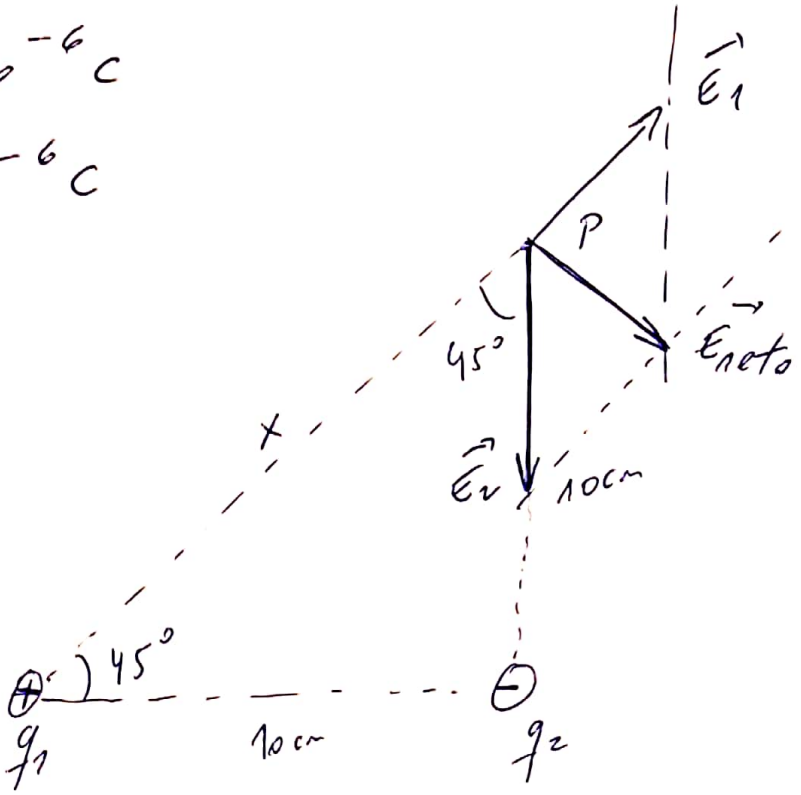
$\boxed{E_{neto} = 1,9 \times 10^5 \ \frac{N}{C}}$

$\alpha = tg^{-1}\left(\frac{OP}{AO}\right)$

$\alpha = tg^{-1}\left(\frac{E_{PLACA}}{E_{CARGA}}\right) = 65^\circ$

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

$q_2 = 2 \times 10^{-6} C$



CALCULO PRIMERO LA DISTANCIA DE q_1 AL PUNTO P.

$$x = \sqrt{(10^2 + 10^2)} = 14 \text{ cm}$$

$$E_1 = \frac{9,0 \times 10^9 \frac{Nm^2}{C^2} \cdot 3 \times 10^{-6} C}{(0,14m)^2} = 1,4 \times 10^6 \frac{N}{C}$$

$$E_2 = \frac{9,0 \times 10^9 \frac{Nm^2}{C^2} \cdot 2 \times 10^{-6} C}{(0,10m)^2} = 1,8 \times 10^6 \frac{N}{C}$$

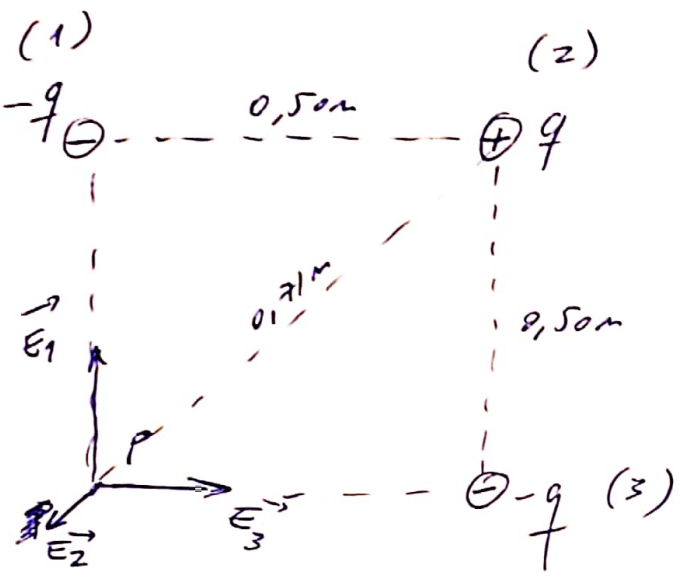
SUMO LOS VECTORES ("CASO 4")

EL ÁNGULO ENTRE LOS VECTORES $\vec{E}_1$ y $\vec{E}_2$ ES 135° (180° − 45°)

$$E_{neto} = \sqrt{E_1^2 + E_2^2 + 2 \cdot E_1 \cdot E_2 \cdot \cos(135)}$$

$$\boxed{E_{neto} = 1,3 \times 10^6 \frac{N}{C}}$$

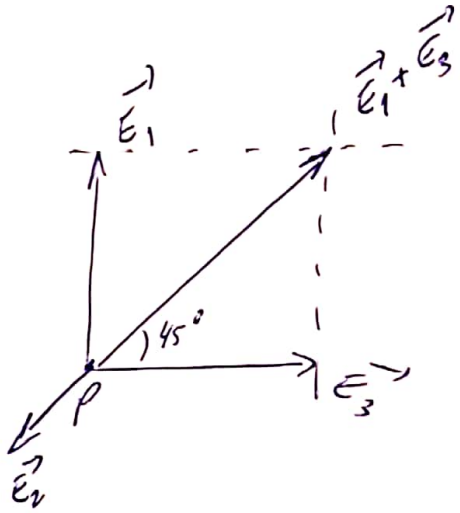
7/ (a)



$\sqrt{0,50^2 + 0,50^2} = 0,71m$

$$E_1 = E_3 = \frac{9,0\times10^9 \frac{Nm^2}{C^2} \cdot 3,0\times10^{-6} C}{(0,50m)^2} = 1,1\times10^5 \frac{N}{C}$$

$$E_2 = \frac{9,0\times10^9 \frac{Nm^2}{C^2} \cdot 3,0\times10^{-6} C}{(0,71m)^2} = 5,4\times10^4 \frac{N}{C}$$



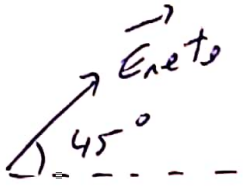
$E_{1y3} = \sqrt{1,1\times10^5{}^2 + 1,1\times10^5{}^2}$

$E_{1y3} = 1,6\times10^5 \frac{N}{C}$

AHORA HAGO "CASO 2"

$E_{neto} = E_{1y3} - E_2$

$E_{neto} = 1,6\times10^5 \frac{N}{C} - 5,4\times10^4 \frac{N}{C} = \boxed{1,1\times10^5 \frac{N}{C}}$

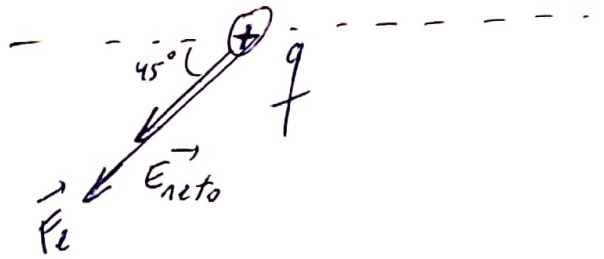


7/ (b) El $\vec{E}_{neto}$ donde está la partícula (+) es

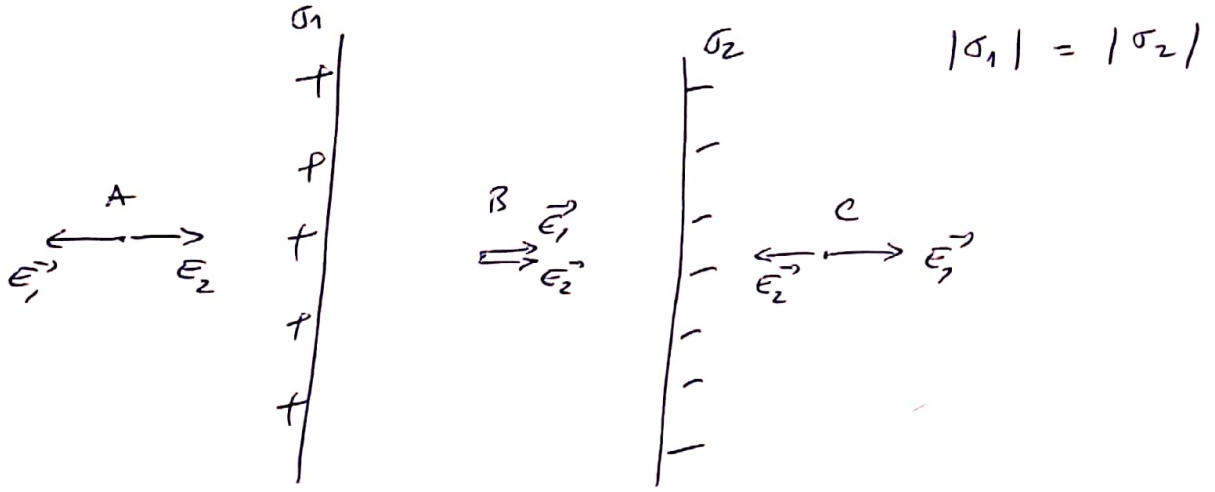
$$E_{neto} = E_{1y3} = 1{,}6 \times 10^5 \frac{N}{C}$$

$$F_e = |q| \cdot E = 3{,}0 \times 10^{-6}\,C \cdot 1{,}6 \times 10^5 \frac{N}{C}$$

$$\boxed{F_e = 4{,}8 \times 10^{-1}\,N}$$



8/



$|\sigma_1| = |\sigma_2|$

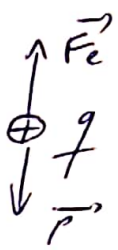
En A y C $E_{neto} = 0$ "caso 1"

En B: $E_{neto} = E_1 + E_2 = \frac{|\sigma_1|}{2\varepsilon_0} + \frac{|\sigma_2|}{2\varepsilon_0}$

$|\sigma_1| = |\sigma_2| = \sigma$

$= \frac{\sigma}{2\varepsilon_0} + \frac{\sigma}{2\varepsilon_0} = \frac{2\sigma}{2\varepsilon_0} = \boxed{\frac{\sigma}{\varepsilon_0}}$ → el doble que con una sola placa.

9/ $m = 8 \times 10^{-10}\,kg$ $\quad q = 1,6 \times 10^{-12}\,C$



~~[illegible]~~

LA PLACA ESTÁ CARGADA POSITIVA, LO SABEMOS PORQUE LA $\vec{F_e}$ ES HACIA ARRIBA SOBRE LA PARTÍCULA (REPULSIÓN)

ESTÁ EN REPOSO LA PARTÍCULA $\Rightarrow F_{neta} = 0 \Rightarrow \boxed{F_e = P}$

$$P = m \cdot g = 8 \times 10^{-10}\,kg \cdot 10\,\frac{m}{s^2} = 8 \times 10^{-9}\,N$$

a) $$E = \frac{F_e}{q} = \frac{8 \times 10^{-9}\,N}{1,6 \times 10^{-12}\,C} = \boxed{5,0 \times 10^{3}\,\frac{N}{C}}$$

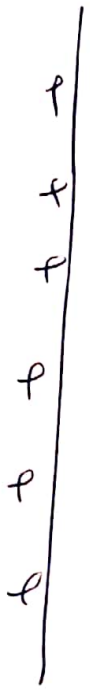
VERTICAL Y HAC. A ARRIBA.

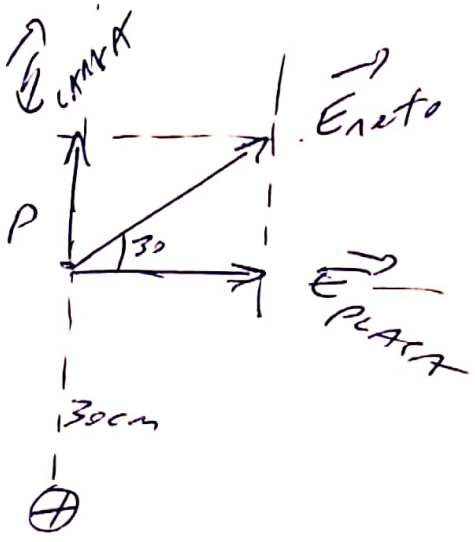
b) $$E = \frac{|\sigma|}{2\varepsilon_0} \Rightarrow |\sigma| = E \cdot 2\varepsilon_0$$

$$|\sigma| = 5,0 \times 10^{3} \cdot 2 \cdot 8,85 \times 10^{-12}$$

$$\boxed{|\sigma| = 8,9 \times 10^{-8}\,\frac{C}{m^2}}$$

10)





POR COMO ES LA DIRECCIÓN Y SENTIDO DEL CAMPO $\vec{E}$ NETO, TANTO LA PLACA COMO LA PARTÍCULA SON POSITIVAS.

$$Sen(30) = \frac{OP}{H}$$

$$Sen(30) = \frac{E_{CARGA}}{E_{neto}} \Rightarrow E_{CARGA} = E_{neto} \cdot Sen(30)$$

$$E_{CARGA} = 20\,\frac{N}{C}$$

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

$$\cos(30) = \frac{E_{PLACA}}{E_{neto}} \Rightarrow E_{PLACA} = E_{neto} \cdot \cos(30)$$

$$E_{PLACA} = 35\,N$$

$$E_{CARGA} = 20 \frac{N}{C}$$

$$\frac{9,0 \times 10^9 \cdot |q|}{d^2} = 20 \frac{N}{C}$$

$$|q| = \frac{20 \frac{N}{C} \cdot (0,30 m)^2}{9,0 \times 10^9} = \boxed{2,0 \times 10^{-10} C}$$

$$E_{PLACA} = 35 N$$

$$\frac{|\sigma|}{2\varepsilon_0} = 35 N$$

$$|\sigma| = 35 N \cdot 2 \cdot \varepsilon_0 = \boxed{6,2 \times 10^{-10} \frac{C}{m^2}}$$