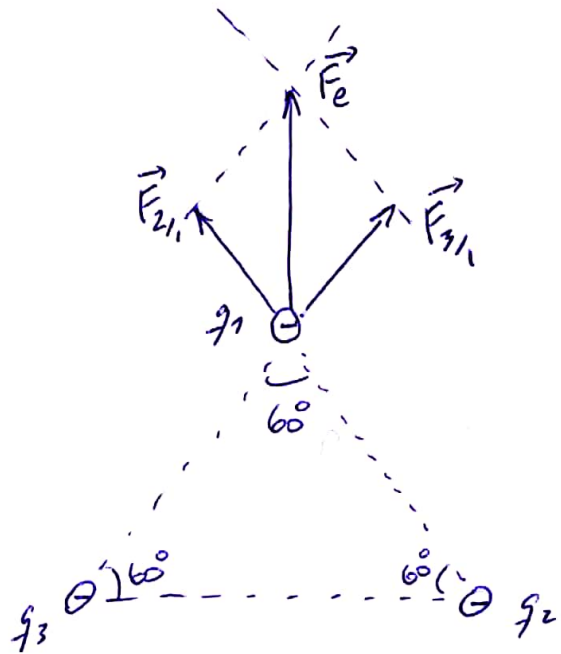


Ejercicio 2

②

2)

$$q_1 = q_2 = q_3 = -15 \text{ nC}$$



$$F_{31} = F_{21} = \frac{9,0 \times 10^9 \cdot 15 \times 10^{-9} \cdot 15 \times 10^{-9}}{3,0^2} = 2,3 \times 10^{-7} \text{ N}$$

$$\vec{F}_e = \vec{F}_{31} + \vec{F}_{21}$$

"CASO 4"

EL VALOR DE F_e ES :

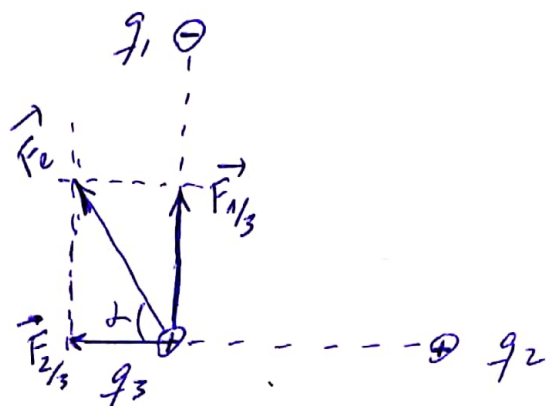
$$F_e = \sqrt{(2,3 \times 10^{-7})^2 + (2,3 \times 10^{-7})^2 + 2 \cdot 2,3 \times 10^{-7} \cdot 2,3 \times 10^{-7} \cdot \cos(60)}$$

$$\boxed{F_e = 4,0 \times 10^{-7} \text{ N}}$$

DIRECCIÓN VERTICAL
SENTIDO HACIA ARRIBA.

- x -

$$3) \quad q_1 = -12 \times 10^{-12} \text{ C} \quad q_2 = 4,0 \times 10^{-12} \text{ C} \quad q_3 = 8,5 \times 10^{-12} \text{ C}$$



$$F_{1/3} = \frac{9,0 \times 10^9 \cdot 12 \times 10^{-12} \cdot 8,5 \times 10^{-12}}{3,0^2} = 1,0 \times 10^{-13} \text{ N}$$

$$F_{2/3} = \frac{9,0 \times 10^9 \cdot 4,0 \times 10^{-12} \cdot 8,5 \times 10^{-12}}{2,0^2} = 7,7 \times 10^{-14} \text{ N}$$

$$\vec{F}_e = \vec{F}_{1/3} + \vec{F}_{2/3}$$

"CASO 3" EL VALOR DE F_e ES: $F_e = \sqrt{F_{2/3}^2 + F_{1/3}^2}$

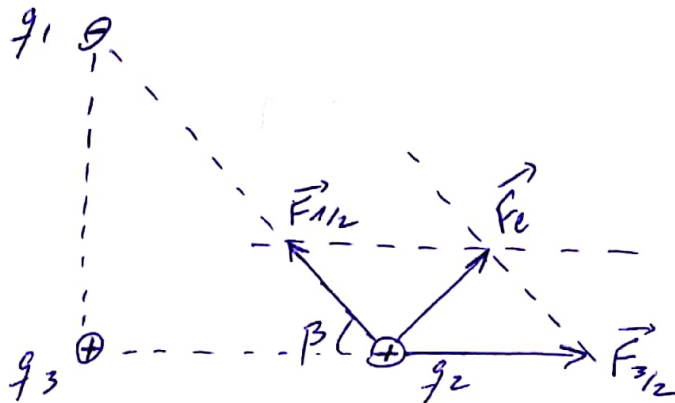
$F_e = 1,3 \times 10^{-13} \text{ N}$

Y SU DIRECCIÓN:

$$\alpha = \tan^{-1} \left(\frac{1,0 \times 10^{-13}}{7,7 \times 10^{-14}} \right) = 52^\circ$$

Ejercicio 2

3) $\vec{F}_e$ sobre q_2



DISTANCIA DE

q_1 a q_2

$$D = \sqrt{3^2 + 2^2}$$

$$D = 3,6 \text{ metros}$$

$$\beta = \tan^{-1}\left(\frac{3}{2}\right)$$

$$\beta = 56^\circ$$

$$F_{3/2} = F_{2/3} = 7,7 \times 10^{-14} \text{ N}$$

$$F_{1/2} = \frac{9,0 \times 10^9 \cdot 12 \times 10^{-12} \cdot 4,0 \times 10^{-12}}{3,6^2} = 3,3 \times 10^{-14} \text{ N}$$

$$\vec{F}_e = \vec{F}_{1/2} + \vec{F}_{3/2}$$

RESOLVEMOS

"CASO 4"

EL VALOR DE F_e ES:

$$F_e = \sqrt{(7,7 \times 10^{-14})^2 + (3,3 \times 10^{-14})^2 + 2 \cdot 7,7 \times 10^{-14} \cdot 3,3 \times 10^{-14} \cdot \cos(124^\circ)}$$

$$\boxed{F_e = 6,5 \times 10^{-14} \text{ N}}$$

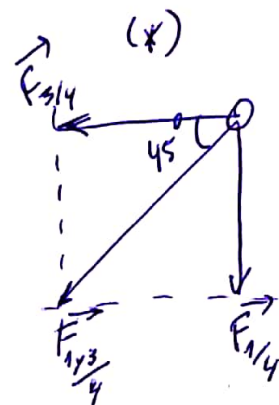
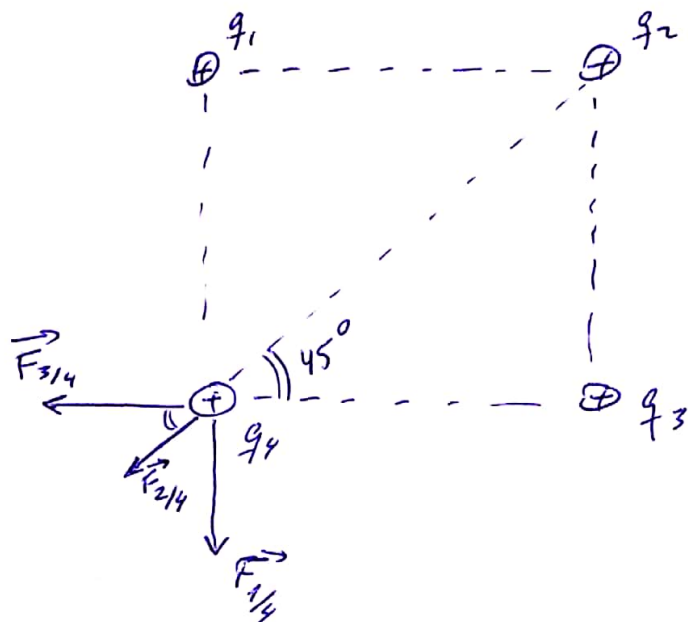
— x —

Ejercicio 2

(5)

4) $q_1 = q_2 = q_3 = q_4 = 30 \times 10^{-9} \text{ C}$

DETERMINAR $\vec{F}_e$ SOBRE q_4 .



$$F_{1/4} = F_{3/4} = \frac{9,0 \times 10^9 \cdot 30 \times 10^{-9} \cdot 30 \times 10^{-9}}{(3,0)^2} = 9,0 \times 10^{-7} \text{ N}$$

$$F_{2/4} = \frac{9,0 \times 10^9 \cdot 30 \times 10^{-9} \cdot 30 \times 10^{-9}}{(4,2)^2} = 4,6 \times 10^{-7} \text{ N}$$

$$\vec{F}_e = \vec{F}_{1/4} + \vec{F}_{3/4} + \vec{F}_{2/4}$$

(*)

"CASO 3" $F_{13/4} = \sqrt{(9,0 \times 10^{-7})^2 + (9,0 \times 10^{-7})^2}$

LUEGO "CASO 1" $F_{123/4} = 12,7 \times 10^{-7} \text{ N}$

$$F_e = 12,7 \times 10^{-7} + 4,6 \times 10^{-7} = \boxed{1,7 \times 10^{-6} \text{ N}} \quad \text{--- } 45^\circ \swarrow \vec{F}_e$$