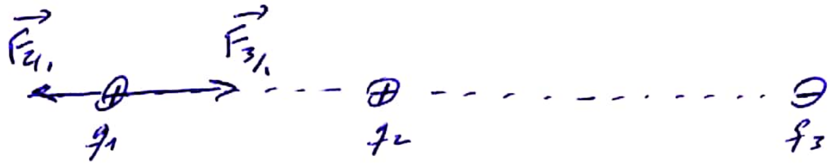
Ejercicio 2

1) $q_1 = 7{,}0 \times 10^{-6}\,C \qquad q_2 = 4{,}5 \times 10^{-6}\,C \qquad q_3 = -16 \times 10^{-6}\,C$

DETERMINAR $\vec{F_e}$ SOBRE LA PARTÍCULA 1



$$F_{2/1} = \frac{9{,}0 \times 10^{9} \cdot 4{,}5 \times 10^{-6} \cdot 7{,}0 \times 10^{-6}}{2{,}0^2} = 7{,}1 \times 10^{-2}\ N$$

$$F_{3/1} = \frac{9{,}0 \times 10^{9} \cdot 16 \times 10^{-6} \cdot 7{,}0 \times 10^{-6}}{3{,}0^2} = 11 \times 10^{-2}\ N$$

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

RESOLVEMOS LA SUMA VECTORIAL :

"CASO 2"

$$F_e = 11 \times 10^{-2} - 7{,}1 \times 10^{-2}$$

$$\boxed{F_e = 3{,}9 \times 10^{-2}\ N}$$

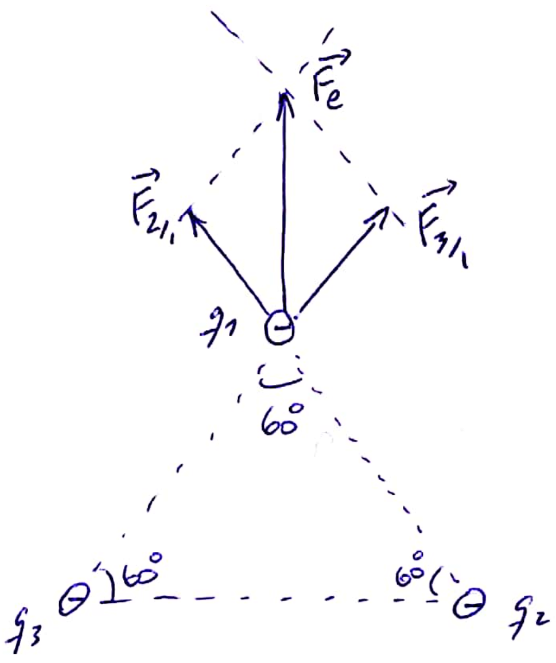
Dirección horizontal
Sentido hacia la derecha.

— x —

Ejercicio 2

2)

$q_1 = q_2 = q_3 = -15\,nC$



$$F_{3/1} = F_{2/1} = \frac{9{,}0\times10^{9} \cdot 15\times10^{-9} \cdot 15\times10^{-9}}{3{,}0^2} = 2{,}3\times10^{-7}\,N$$

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

"CASO 4"

EL VALOR DE F_e ES:

$$F_e = \sqrt{(2{,}3\times10^{-7})^2 + (2{,}3\times10^{-7})^2 + 2 \cdot 2{,}3\times10^{-7} \cdot 2{,}3\times10^{-7} \cdot \cos(60)}$$

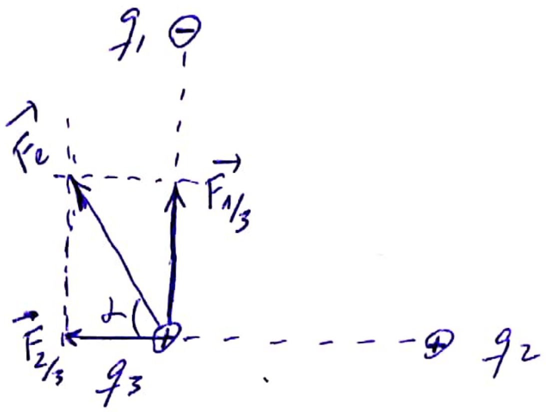
$$\boxed{F_e = 4{,}0\times10^{-7}\,N}$$

DIRECCIÓN VERTICAL
SENTIDO HACIA ARRIBA.

— x —

Ejercicio 2

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



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

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

$$\vec{F_e} = \vec{F_{1/3}} + \vec{F_{2/3}}$$

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

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

Y SU DIRECCIÓN :

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

④

Ejercicio 2

3) $\vec{F_e}$ SOBRE q_2

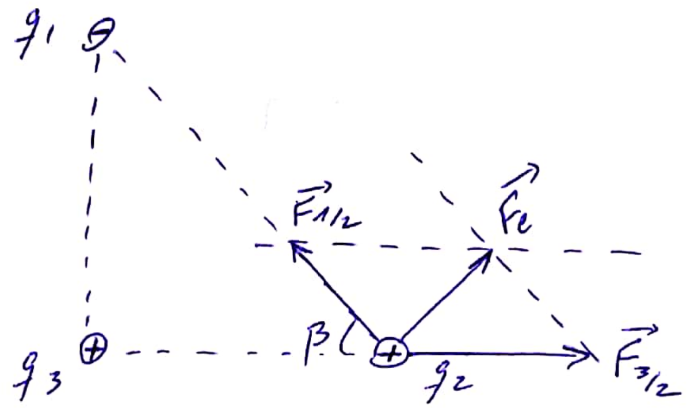
DISTANCIA DE q_1 a q_2

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

$D = 3,6$ metros

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

$\beta = 56°$



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

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

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

RESOLVEMOS "CASO 4"

EL VALOR DE F_e ES:

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

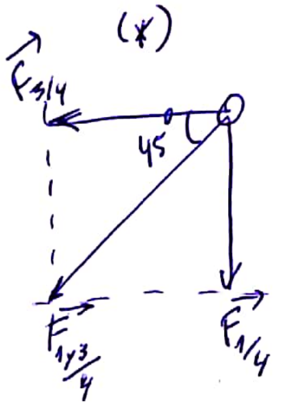
$\boxed{F_e = 6,5 \times 10^{-14}\ N}$

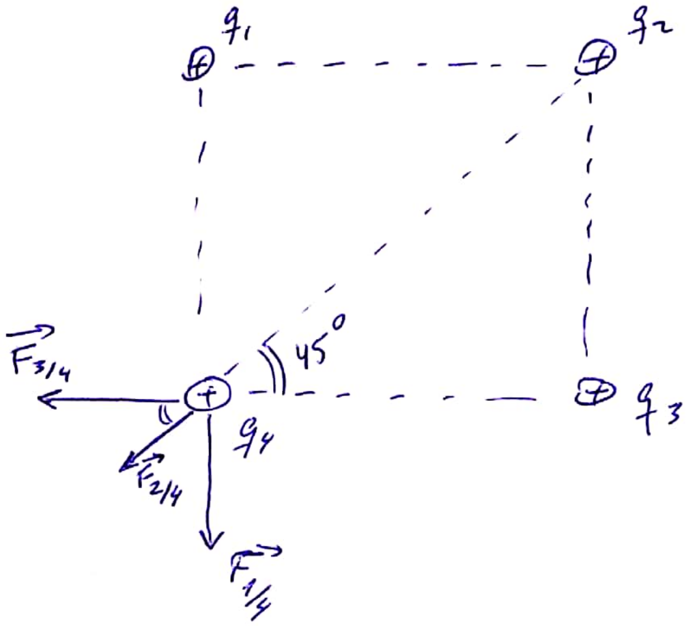
— x —

Ejercicio 2

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

DETERMINAR $\vec{F_e}$ SOBRE q_4.





$$F_{1/4} = F_{3/4} = \frac{9{,}0\times10^{9} \cdot 30\times10^{-9} \cdot 30\times10^{-9}}{(3{,}0)^2} = 9{,}0\times10^{-7}\,N$$

$$F_{2/4} = \frac{9{,}0\times10^{9} \cdot 30\times10^{-9} \cdot 30\times10^{-9}}{(4{,}2)^2} = 4{,}6\times10^{-7}\,N$$

$$\vec{F_e} = \underbrace{\vec{F}_{1/4} + \vec{F}_{3/4}}_{(*)} + \vec{F}_{2/4}$$

"CASO 3" $F_{1y3/4} = \sqrt{(9{,}0\times10^{-7})^2 + (9{,}0\times10^{-7})^2}$

$F_{1y3/4} = 12{,}7\times10^{-7}\,N$

LUEGO "CASO 1"

$F_e = 12{,}7\times10^{-7} + 4{,}6\times10^{-7} = \boxed{1{,}7\times10^{-6}\,N}$