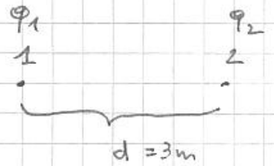
8.15.



- $q_1 + q_2 = 9 \cdot 10^{-6}\, C$
- $|F_{el}| = k \dfrac{|q_1 q_2|}{d^2} = 8 \cdot 10^{-3} N$

a). $q_1 \cdot q_2 > 0$ (les charges sont de même signe)

dans ce cas, $k \dfrac{q_1 q_2}{d^2} = 8 \cdot 10^{-3}$

$$\Rightarrow \begin{cases} q_1 \cdot q_2 = 8 \cdot 10^{-3} \cdot \dfrac{d^2}{k} = 8 \cdot 10^{-12} & (1) \\ q_1 + q_2 = 9 \cdot 10^{-6} & (2) \end{cases}$$

On voit tout de suite que $q_1 = 1 \cdot 10^{-6}\, C$

$$\underline{\underline{q_2 = 8 \cdot 10^{-6}\, C}}$$

b). $q_1 \cdot q_2 < 0$ (les charges sont de signe opposé)

dans ce cas, $k \dfrac{q_1 q_2}{d^2} = -8 \cdot 10^{-3}$

$$\Rightarrow \begin{cases} q_1 \cdot q_2 = -8 \cdot 10^{-12} & (1) \\ q_1 + q_2 = 9 \cdot 10^{-6} & (2) \end{cases}$$

de (1) : $q_1 = -\dfrac{8 \cdot 10^{-12}}{q_2} \Rightarrow -\dfrac{8 \cdot 10^{-12}}{q_2} + q_2 = 9 \cdot 10^{-6} \quad \Big| \cdot q_2$

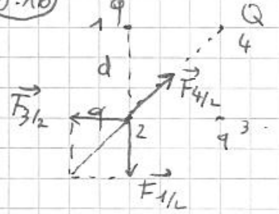
$$-8 \cdot 10^{-12} + q_2^2 = 9 \cdot 10^{-6} q_2 \Rightarrow q_2^2 - 9 \cdot 10^{-6} q_2 - 8 \cdot 10^{-12} = 0$$

$$q_2^{\prime,\prime\prime} = \frac{9 \cdot 10^{-6} \pm \sqrt{(9 \cdot 10^{-6})^2 + 32 \cdot 10^{-12}}}{2} \begin{array}{l} \nearrow 9{,}8 \cdot 10^{-6}\, C \\ \searrow -8{,}2 \cdot 10^{-7}\, C \end{array}$$

Par conséquent, on a $q_1 = 9{,}8 \cdot 10^{-6}\, C$

$$\underline{\underline{q_2 = -8{,}2 \cdot 10^{-7}\, C}}$$

8.16



- Q doit être < 0
- Il suffit que $F_{4/2}^2 = F_{3/2}^2 + F_{1/2}^2 = 2 F_{3/2}^2$

$\Rightarrow |F_{4/2}| = k \dfrac{|q\,Q|}{2d^2} \quad \Rightarrow F_{4/2}^2 = k^2 \dfrac{Q^2 q^2}{4 d^4}$

$\Rightarrow F_{3/2} = k \dfrac{q^2}{d^2}$ et $F_{3/2}^2 = k^2 \dfrac{q^4}{d^4}$

D'où $\cancel{k^2} \dfrac{Q^2 \cancel{q^2}}{4 \cancel{d^4}} = 2 \cancel{k^2} \dfrac{q^{\cancel{4}}\, q^2}{\cancel{d^4}}$

$\Rightarrow \dfrac{Q^2}{4} = 2 q^2$

$\Rightarrow Q^2 = 8 q^2$

et $\underline{\underline{Q = -q\sqrt{8}}}$