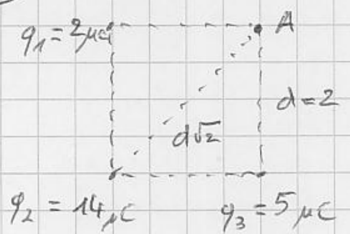
9.8.



• $W_{\infty \to A}^{\vec{F}_{ext}} = \Delta E_{méc} = \Delta E_{pot} = E_{pot}(A) - E_{pot}(\infty) = E_{pot}(A)$

car $v = cte$ car $E_{pot}(\infty) = 0$

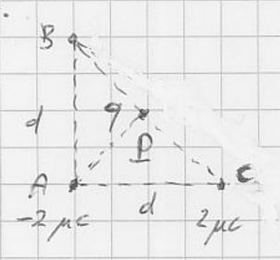
$= q \cdot V(A)$

• Calcul de $V(A)$. $\left(V(r) = k\frac{q}{r}\right)$ $\longrightarrow$ $V(A) = k \cdot 10^{-6}\left(\frac{2}{d} + \frac{14}{d\sqrt{2}} + \frac{5}{d}\right)$

$= \frac{k \cdot 10^{-6}}{2}\left(2 + \frac{14}{\sqrt{2}} + 5\right) = 4{,}5 \cdot 10^{+3}\left(7 + \frac{14}{\sqrt{2}}\right)$

$\Rightarrow W_{\infty \to A}^{\vec{F}_{ext}} = q \cdot V(A) = 8 \cdot 10^{-6} \cdot 4{,}5 \cdot 10^{3}\left(7 + \frac{14}{\sqrt{2}}\right) \cong \underline{\underline{0{,}61\,J}}$

9.9.



• $\overline{AP} = \frac{d\sqrt{2}}{2} = \overline{BP}$

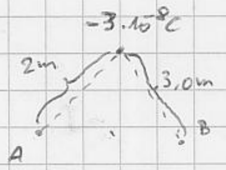
• $V(r) = k\frac{q}{r} \Rightarrow V(B) = \cancel{k}\frac{q_A}{\cancel{d}} + \cancel{k}\frac{q_C}{\cancel{d}\sqrt{2}} + \cancel{k}\frac{q_P}{\cancel{d}\sqrt{2}/2} = 0$

$\Rightarrow \frac{2}{\sqrt{2}} q_P = -q_A - \frac{q_C}{\sqrt{2}} \Rightarrow q_P = \frac{\sqrt{2}}{2}\left(-q_A - \frac{q_C}{\sqrt{2}}\right)$

$= \frac{\sqrt{2}}{2}\left(2 \cdot 10^{-6} - \frac{2 \cdot 10^{-6}}{\sqrt{2}}\right)$

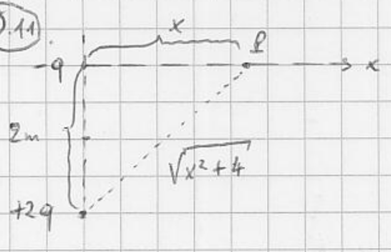
$= \sqrt{2} \cdot 10^{-6}\left(1 - \frac{1}{\sqrt{2}}\right) \cong \underline{\underline{4{,}1 \cdot 10^{-7} C}}$

9.10.



$V_B - V_A = k \cdot \frac{-3 \cdot 10^{-8}}{3} - k \cdot \frac{-3 \cdot 10^{-8}}{2} = -3 \cdot 10^{-8} \cdot k\left(\frac{1}{3} - \frac{1}{2}\right) = \underline{\underline{45\,V}}$

9.11

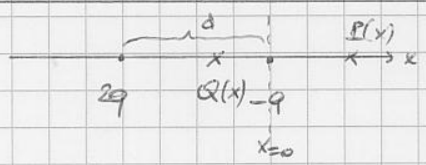


$V(P) = k \cdot \frac{-q}{x} + k\frac{2q}{\sqrt{x^2+4}} = 0$

$\Rightarrow \frac{1}{x} = \frac{2}{\sqrt{x^2+4}} \Rightarrow 2x = \sqrt{x^2+4} \Rightarrow 4x^2 = x^2 + 4$

$\Rightarrow 3x^2 = 4 \Rightarrow \underline{\underline{x = \pm\frac{2}{\sqrt{3}}\,m}}$ 2 solutions symétriques par rapport à $-q$ et à la droite reliant les 2 charges $-q$ et $+2q$

9.12



• $V(P) = \cancel{k}\frac{-\cancel{q}}{x} + \cancel{k}\frac{2\cancel{q}}{x+d} = 0$ (Solution 1) $x > 0$

$\Rightarrow \frac{1}{x} = \frac{2}{x+d} \Rightarrow 2x = x + d \Rightarrow \underline{\underline{x = d}}$ à droite de $-q$!

• $V(Q) = \cancel{k}\frac{-\cancel{q}}{x} + \cancel{k}\frac{2\cancel{q}}{d-x} = 0$ (Solution 2) $x > 0$

$\Rightarrow \frac{1}{x} = \frac{2}{d-x} \Rightarrow 2x = d - x \Rightarrow 3x = d \Rightarrow \underline{\underline{x = \frac{d}{3}}}$ à gauche de $-q$!