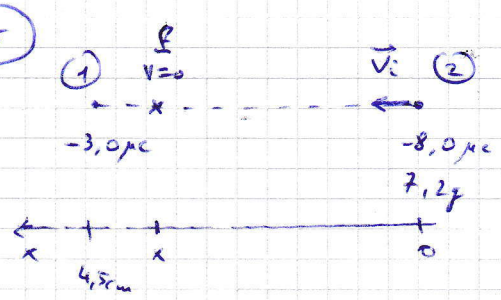
9.15



* (2) freine sous l'action de la force électrique.
Seule cette force agit sur (2). $\Rightarrow \Delta E_{méc} = 0$

$\Rightarrow E_{méc}(P) - E_{méc}(0) = 0$

$E_{méc}(P) = E_{PE}(P) = k \dfrac{q_1 q_2}{\left(\frac{4,5}{100} - x\right)}$

$E_{méc}(2) = E_{PE}(2) + E_{cin}(2)$

$= k \dfrac{q_1 q_2}{\left(\frac{4,5}{100}\right)} + \frac{1}{2} m_1 v_1^2$

$\Rightarrow k \dfrac{q_1 q_2}{\underbrace{\left(\frac{4,5}{100} - x\right)}_{=d}} = k \dfrac{q_1 q_2}{\underbrace{\left(\frac{4,5}{100}\right)}_{=d}} + \frac{1}{2} m_1 v_1^2$

Résolution littérale : $\dfrac{k q_1 q_2}{d-x} = \dfrac{k q_1 q_2}{d} + \frac{1}{2} m_1 v_1^2 = \dfrac{k q_1 q_2 + \frac{1}{2} m_1 d v_1^2}{d}$

$\Rightarrow \dfrac{d-x}{k q_1 q_2} = \dfrac{d}{k q_1 q_2 + \frac{1}{2} m_1 d v_1^2} \Rightarrow d - x = \dfrac{d\, k q_1 q_2}{k q_1 q_2 + \frac{1}{2} m_1 d v_1^2} \Rightarrow x = d\left(1 - \dfrac{k q_1 q_2}{k q_1 q_2 + \frac{1}{2} m_1 d v_1^2}\right)$

$x = \dfrac{4,5}{100}\left(1 - \dfrac{8,99 \cdot 10^9 \cdot 3,0 \cdot 10^{-6} \cdot 8,0 \cdot 10^{-6}}{8,99 \cdot 10^9 \cdot 3,0 \cdot 10^{-6} \cdot 8,0 \cdot 10^{-6} + \frac{1}{2} \frac{7,2}{1000} \cdot \frac{4,5}{100} \cdot 65^2}\right) \simeq \underline{\underline{3,4 \cdot 10^{-2}\ m}}$