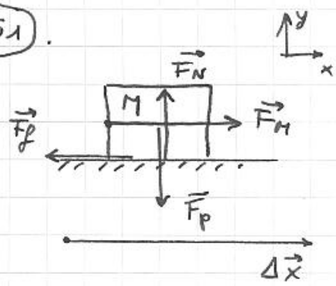
6.51.



Dynamique :

$\Sigma \vec{F} = \vec{F_f} + \vec{F_N} + \vec{F_p} + \vec{F_M} = m\vec{a}$

· Sur x : $F_M - F_f = ma$

· Sur y : $F_N - F_p = 0$

· Frottement : $F_f = \mu_c F_N = \mu_c mg$

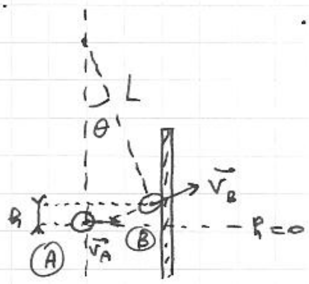
a). $W_{\vec{F_M}} = F_M \cdot \Delta x \cdot 1 = 150 \cdot 7 = 1050\,J$

b). $W_{\vec{F_p}} = F_p \cdot \Delta x \cdot 0 = 0\,J$

c). $W_{\vec{F_f}} = F_f \cdot \Delta x \cdot (-1) = -\mu_c mg\,\Delta x \cong -943\,J$

d). $W_{\vec{F_N}} = F_N \cdot \Delta x \cdot 0 = 0\,J$

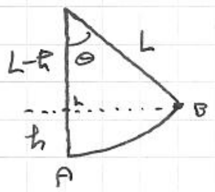
6.52.



· L'énergie mécanique est conservée entre (A) et (B), car le travail des forces NC est nul. $\Rightarrow E_{méc}(A) = E_{méc}(B)$

$$\begin{cases} E_{méc}(A) = \frac{1}{2} m v_A^2 \\ E_{méc}(B) = \frac{1}{2} m v_B^2 + mgh \end{cases}$$

Calcul de h :



$\cos\theta = \frac{L-h}{L}$

$\Rightarrow L - h = L\cos\theta$

$\Rightarrow h = L(1-\cos\theta)$

Résolution :

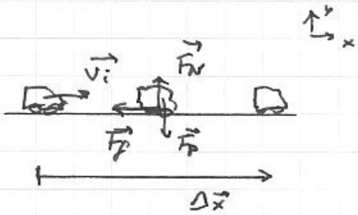
$\frac{1}{2} \cancel{m} v_A^2 = \frac{1}{2} \cancel{m} v_B^2 + \cancel{m} g\,L(1-\cos\theta)$

$V_A^2 = V_B^2 + 2gL(1-\cos\theta)$

$V_B^2 = V_A^2 - 2gL(1-\cos\theta)$

$V_B = \sqrt{V_A^2 - 2gL(1-\cos\theta)} = \sqrt{36 - 19{,}6 \cdot 10 \cdot (1-\cos 30)} \cong 3{,}1\,m/s$

6.53



· Théorème de l'énergie cinétique : $W_{\vec{F_f}} = F_f \cdot \Delta x \cdot \cos\theta = -F_f \cdot \Delta x = \Delta E_{cin} = -\frac{1}{2} m v_i^2$

$\Rightarrow F_f\,\Delta x = \frac{1}{2} m v_i^2$

$\Rightarrow v_i = \sqrt{\frac{2 F_f\,\Delta x}{m}}$

· Calcul de F_f :

$\vec{F_N} + \vec{F_p} + \vec{F_f} = m\vec{a}$

Sur x : $-F_f = -ma$

Sur y : $F_N - F_p = 0 \Rightarrow F_N = F_p$

frottement : $F_f = \mu_c F_N = \mu_c mg$

· Résolution :

$V_i = \left(\frac{2\mu_c mg\,\Delta x}{m}\right)^{1/2} = \sqrt{2\mu_c g\,\Delta x} = \sqrt{2 \cdot 0{,}85 \cdot 9{,}8 \cdot 50}$

$\cong 28{,}9\,m/s$