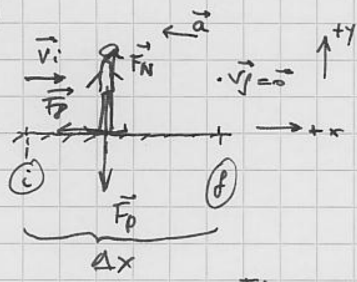
4.34



a). $\sum \vec{F} = m\vec{a}$ $\qquad F_f = \mu_c F_N$

$\vec{F}_f + \vec{F}_N + \vec{F}_p = m\vec{a}$

$$\begin{cases} \text{Sur } x: & -F_f = ma & \Rightarrow a = -\dfrac{F_f}{m} & (1) \\ \text{Sur } y: & F_N - F_p = 0 & \Rightarrow F_N = F_p & (2) \end{cases}$$

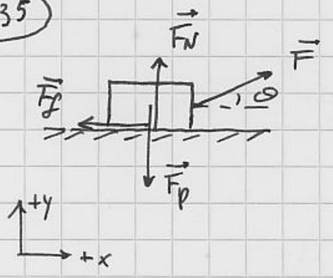
De (1) : $a = -\dfrac{F_f}{m} = -\dfrac{\mu_c F_p}{m} = -\mu_c \cdot \dfrac{mg}{m} = -g\mu_c = \underline{\underline{-0{,}98\ m/s^2}}$ (vers la gauche)

b). $v_f^2 - v_i^2 = 2a\Delta x$

$\Rightarrow \Delta x = \dfrac{v_f^2 - v_i^2}{2a} = \dfrac{0 - 7{,}6^2}{2\cdot(-0{,}98)} \cong \underline{\underline{29{,}5\ m}}$

c). la même chose, car a ne dépend pas de m !

4.35



$\sum \vec{F} = m\vec{a} = \vec{0}$ (imminence de glissement)

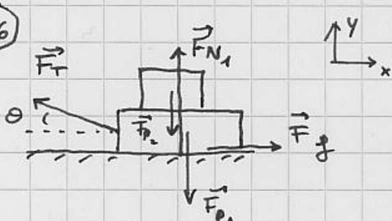
$\vec{F}_f + \vec{F} + \vec{F}_N + \vec{F}_p = \vec{0}$ (2ème loi de Newton)

$F_f = \mu_s F_N \Rightarrow \mu_s = \dfrac{F_f}{F_N}$

$$\begin{cases} \text{Sur } x: & -F_f + F\cos\theta = 0 & \Rightarrow F_f = F\cos\theta \\ \text{Sur } y: & F\sin\theta + F_N - F_p = 0 & \Rightarrow F_N = F_p - F\sin\theta \end{cases}$$

$\Rightarrow \mu_s = \dfrac{F_f}{F_N} = \dfrac{F\cos\theta}{F_p - F\sin\theta} = \dfrac{142\cos 60}{425 - 142\sin 60} \cong \underline{\underline{0{,}235}}$

4.36



$\sum \vec{F} = \vec{F}_T + \vec{F}_{N_1} + \vec{F}_f + \vec{F}_{p_1} = m\vec{a} = \vec{0}$

Sur x : $-F_T\cos\theta + F_f = 0$ $\qquad (1)$

Sur y : $F_{N_1} + F_T\sin\theta - F_{p_1} - F_{p_2} = 0$ $\qquad (2)$

$F_f = \mu_s F_{N_1}$ $\qquad (3)$

forces agissant sur (1)

F_{p_2} est une force de contact exercée par 2/1

De (1) : $F_f = F_T\cos\theta \Rightarrow F_{N_1} = \dfrac{F_f}{\mu_s} = \dfrac{F_T\cos\theta}{\mu_s}$ dans (2) : $\dfrac{F_T\cos\theta}{\mu_s} + F_T\sin\theta - m_1 g - m_2 g = 0$

$\Rightarrow m_2 g = F_T\left(\sin\theta + \dfrac{\cos\theta}{\mu_s}\right) - m_1 g \Rightarrow m_2 = \dfrac{F_T}{g}\left(\sin\theta + \dfrac{\cos\theta}{\mu_s}\right) - m_1 = \dfrac{661}{9{,}8}\cdot\left(\sin 20 + \dfrac{\cos 20}{0{,}41}\right) - 121$

$\cong \underline{\underline{56{,}7\ kg}}$