Correction D.S 2016/2017

Physique 1.

Exercice 1:

1. Les forces impliquées dans le travail :

Une seule force la force de frottement.

$F = \mu_c N = \mu_c mg$ (0,25) (0,5)

2. $W = \Delta E_c$ (0,25)

$W = \vec{F} \cdot \vec{L} = \mu_c mg L \cos\pi$ (0,25)

$\Delta E_c = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_0^2$ (0,25) (0,25)

à L on a $v_f = 0$ arrêt (0,25)

$\Rightarrow -\frac{1}{2} m v_0^2 = -\mu_c mg L$ (0,25)

$$\boxed{L = \frac{v_0^2}{2g\mu_c}}$$ (0,5)

3. si $\mu_c' = 2\mu_c \rightarrow L' = \frac{L}{2}$ (0,5)

si $v_i' = 2v_i \rightarrow L' = 4L$ (0,5)

si $\mu' = 2\mu_c$ et $v_i' = 2v_i \rightarrow L' = 2L$ (0,5)

Exercice 2.

$P = 890\,N$ $\quad \Rightarrow m = \frac{890}{9,8} = 90,81\,kg$ (0,5)

$h = 1,20\,m$

1. Soit $V^2 - V_0^2 = -2g(h)$ (ou $W = \Delta E_c$; $-mgh = -\frac{1}{2}mv_i^2$; $\Rightarrow v_i = \sqrt{2gh}$)

$V_0 = \sqrt{2 \times 9,8 \times 1,2} = 4,84\,m/s$ (01)

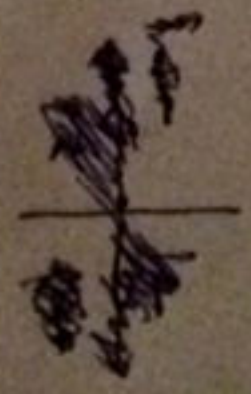
$V = 0$ $\rightsquigarrow$ h hauteur maximale. (0,5)

2. si $\Delta t = 0,3\,s$ et $\Delta v = V_0 = 4,84\,m/s$ (0,5)

($v_i = 0$ et $V_f = V_0$) (0,5)

$\gamma_{moy} = \frac{\Delta v}{\Delta t} = 16,15\,m/s^2$ (0,5)

et sa direction vers $+y$ (0,5)

3. 

$\vec{P} + \vec{N} + \vec{f} = m\vec{\gamma}$ $\Rightarrow f = m\gamma$ (01)

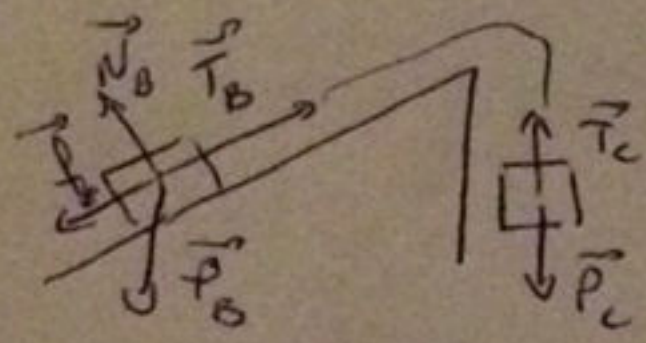
$P + N = 0$ $\quad f = 1466,58\,N$

et la force exercée sur le sol sera

$F = \vec{P} + \vec{f} = 1466,58 + 890 \simeq 2356\,N$ (01)

(Suite Exercice 3)

(4)



0,5

(B) $\vec{N}_B + \vec{T}_B + \vec{P}_B + \vec{f} = m_B \vec{\gamma}$ (0,5)

(C) $\vec{T}_C + \vec{P}_C = m_C \vec{\gamma}$ (0,5)

$P_B = m_B g = 25\,N \Rightarrow m_B = 2,55\ kg$ (0,5)

$N_B = 20\,N \qquad P_B = 25\,N$

de la question précédente.

$f = \mu_c N_B = 7\,N$ (0,25)

$P_{Bx} = P_B \sin 36,9°$

de (B) $\Rightarrow \gamma = \dfrac{T_B - 7 - 15}{m_B} = \dfrac{T_B - 22}{2,55}$ (0,5)

de (C) $\Rightarrow \gamma = \dfrac{P_C - T_C}{m_C} = \dfrac{30,8 - T_C}{m_C}$ (0,5)

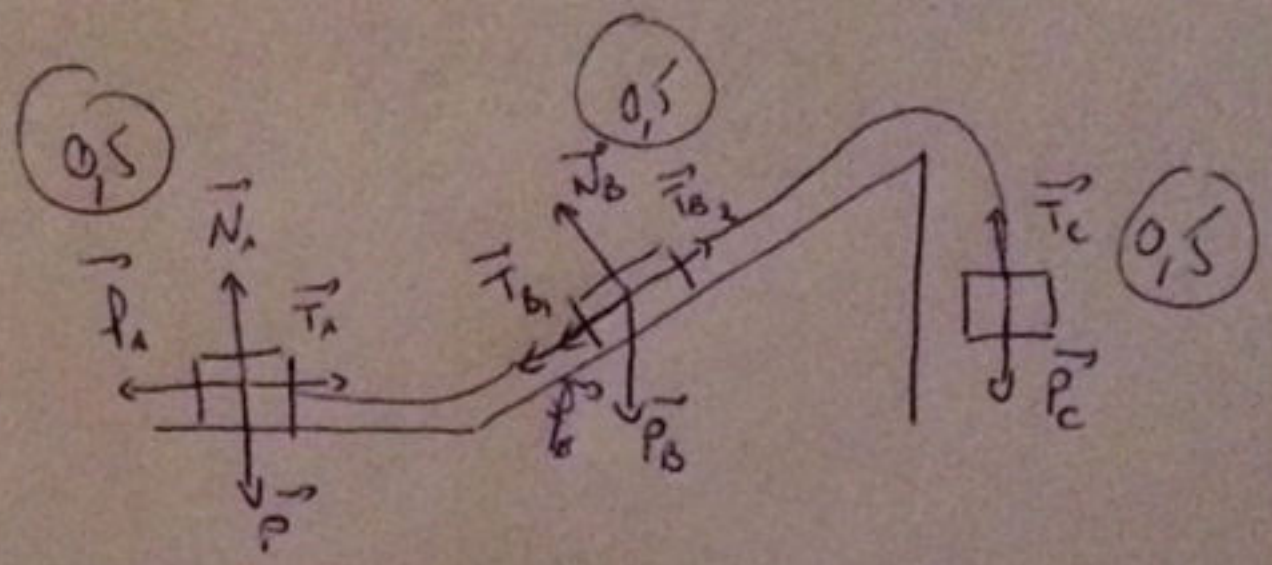
or $T_C = T_B = 2,55\,\gamma + 22$ (0,5)

et $m_C = \dfrac{30,8}{9,8} = \dfrac{P_C}{g} = 3,14\,kg$

$\Rightarrow$ $\boxed{\gamma = 1,54\ m/s^2}$ (0,5)

Exercice 3

(1)



(2) le bloc (C) descend avec une vitesse constante $\Rightarrow a = 0$

$\vec{N_A} + \vec{T_A} + \vec{P_A} + \vec{f_A} = \vec{0}$ (0,5)

$\vec{f_B} + \vec{N_B} + \vec{T_{B_1}} + \vec{P_B} + \vec{T_{B_2}} = \vec{0}$ (0,5) et $\vec{T_C} + \vec{P_C} = \vec{0}$ (0,5)

$N_A = P_A = 25\,N$ (0,25)

$T_A = f_A = \mu_c N_A$ (0,25) $\rightarrow T_A = T_{B_1}$ (même fil) (0,25)

$T_A = T_{B_1} = 0{,}35 \cdot 25 = 8{,}75\,N$ (0,25)

(3) $P_C = T_C$ (0,25) et $T_C = T_{B_2}$ (0,25)

Le bloc (B) $\rightsquigarrow N_B - P_B \cos 36{,}9 = 0 \Rightarrow N_B = 20\,N$ (0,5)

et $-f_B - T_{B_1} - P_B \sin 36{,}9 + T_{B_2} = 0$ (0,5) $\Rightarrow T_{B_2} = \mu_c N_B + T_{B_1} + 25 \sin 36{,}9$ (0,25)

$\Rightarrow T_C = T_{B_2} = P_C = 30{,}8\,N$ (0,25)