1

MP, Correction DS de SI, octobre 24

Q1 $\Delta L_2 = \Delta[AB]$ $\quad AB = 1 - 0{,}52 - 0{,}285 = 0{,}195$

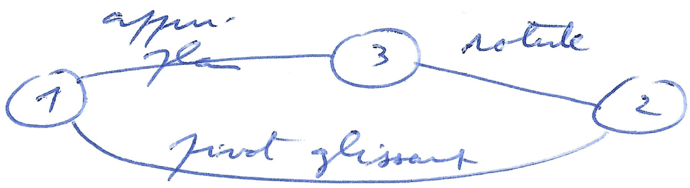
Taille de 150 à 190 cm.

$$\Delta L_2 = 0{,}195 \times (190 - 150) = 7{,}8 \text{ cm}$$

$\Delta L_3 = \Delta(BC)$ $\quad BC = 0{,}285 - 0{,}039 = 0{,}246$

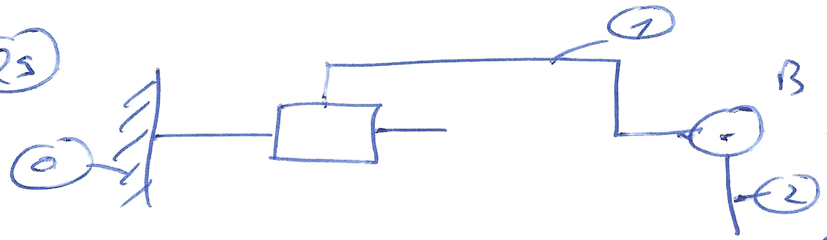
$$\Delta L_3 = 0{,}246 \times (40) = 9{,}84 \text{ cm.}$$

Q7



Q8 Glissière

Q9

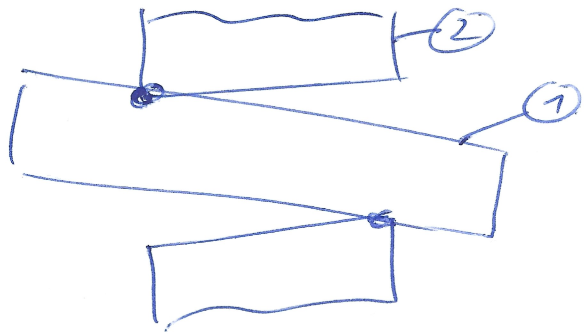


$$\{\mathcal{T}_{1\to 2}\} = \begin{Bmatrix} X & * \\ Y & * \\ 0 & 0 \end{Bmatrix}_B$$

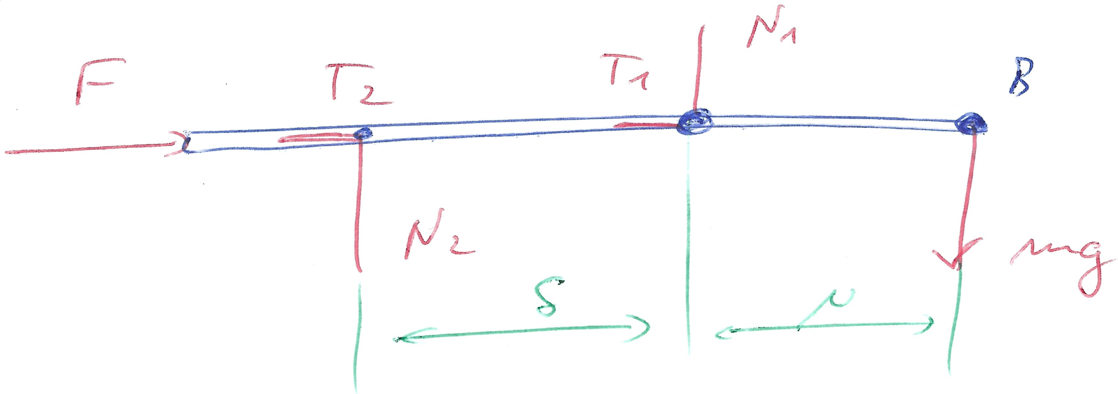
$$\{\mathcal{T}_{pes\to 2}\} = \begin{Bmatrix} 0 & * \\ -mg & * \\ * & 0 \end{Bmatrix}_B$$

$$Y = mg$$

Q10



Q11



2

PFS

$$T_1 + T_2 = F$$
$$N_1 = N_2 + mg$$
$$N_2 \times \delta = mg \times a$$

<u>Limite glissement</u>

$$T_1 = f \cdot N_1$$
$$T_2 = f \cdot N_2$$

5 équations, 5 inconnues : T_1, T_2, N_1, N_2, F

Calcul $\Rightarrow F = f\,mg\left(\frac{2a+\delta}{\delta}\right)$

Q12 Arc boutement.

Q13 Cahier des charges $F < 150\ N \Rightarrow \delta < 89\ mm$

Q14 $x =$; $y = ..$

Q15 Basculement $Y_{02} < 0$

Q25 $\vec{S}(G_2', 2/0) = A_2 \dot{\theta}_1^2 \vec{z}$

(3)

Q25 $\vec{\delta}(G_2, 2/0) = A_2 \ddot{\theta}_1 \vec{z}$

$\vec{AG_2} = -\frac{L_2}{2}\vec{y_1}$; $\vec{v}(G \in 2/0) = \frac{L_2}{2}\dot{\theta}_1 \vec{x_1}$;

$\vec{a}(G \in 2/0) = \frac{L_2}{2}\left(\ddot{\theta}_1 \vec{x_1} + \dot{\theta}_1^2 \vec{y_1}\right)$

$$\vec{\delta}(A, 2/0) = \vec{\delta}(G_2, 2/0) + \vec{AG_2} \wedge m_2 \vec{a}(G_2 \in 2/0)$$

$$= \left[A_2 + m_2\left(\frac{L_2}{2}\right)^2\right]\ddot{\theta}_1 \vec{z}$$

de même : $\vec{\delta}(A, 3/0) = \left[A_3 + m_3\left(L_2 + \frac{L_3}{2}\right)^2\right]\ddot{\theta}_1 \vec{z}$

$$\vec{\delta}(A, 4/0) = \left[C_4 + m_4\left(L_2 + L_3 + L_4\right)^2\right]\ddot{\theta}_1 \vec{z}$$

$\vec{\delta}(A, \Sigma/0) = J_{\Sigma}\, \ddot{\theta}_1$ avec $J_{\Sigma} = \dots$

Q26 On isole (Σ+moteur) TMD sur $(A, \vec{z})$

$$J_{\Sigma}\, \ddot{\theta}_1 + J_m \dot{\omega}_m = C_1 - L_G M_t g \sin\theta_1$$

Q27 On a $\omega_1 = k_r \omega_m$ et $C_1 = \frac{C_m}{k_r}$

$$J_{\Sigma} k_r \dot{\omega}_m + J_m \dot{\omega}_m = \frac{C_m}{k_r} - L_G M_t g \sin\theta_1$$

$$\underbrace{\left(J_{\Sigma} k_r + J_m\right)}_{J_{eq}} k_r \dot{\omega}_m = C_m - \underbrace{k_r L_G M_t g \sin\theta_1}_{C_r(t)}$$