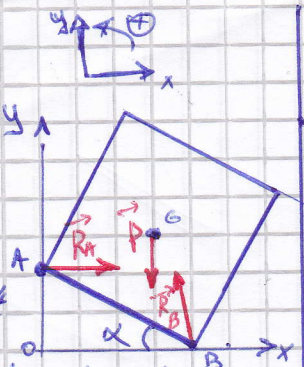
Ex. 5



le sol en B est rugueux (خشن)

⇒ le contact est avec frottement

⇒ $\vec{R_B}$ n'est pas ⊥ au plan de contact.

- $\vec{R_A} + \vec{R_B}$ $\sum \vec{F} = \vec{0}$ $\quad \vec{R_B} = \begin{pmatrix} -R_{Bx} \\ R_{By} \end{pmatrix}$

$\vec{R_A} + \vec{R_B} + \vec{P} = \vec{0}$

$$\begin{cases} R_A - R_{Bx} = 0 \quad \cdots (1) \\ R_{By} - Mg = 0 \quad \cdots (2) \end{cases}$$

- $\sum M_B(\vec{F}) = 0$ p

$$-R_A \cdot a \sin\alpha + Mg \cdot |\vec{BG}| \cos\left(\alpha + \frac{\pi}{4}\right) = 0$$

$$|\vec{BG}| = \frac{a}{\sqrt{2}}$$

$$\Leftrightarrow -R_A a \sin\alpha + Mg \frac{a}{\sqrt{2}} \cos\left(\alpha + \frac{\pi}{4}\right) = 0 \quad \cdots (3)$$

$$(3) \rightarrow R_A = \frac{Mg}{\sqrt{2}} \cdot \frac{\cos(\alpha + \pi/4)}{\sin\alpha}$$

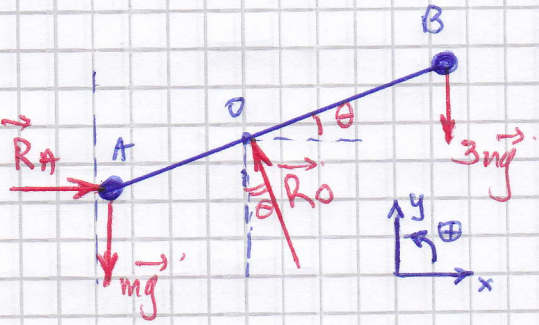
(1) $\rightarrow R_{Bx} = R_A$

(2) $R_{By} = Mg$.

$$R_B = \sqrt{R_{Bx}^2 + R_{By}^2} = \cdots$$

Ex. 6

isolation de la barre AB.



- $\sum \vec{F} = \vec{0} \rightarrow \vec{R_A} + \vec{R_O} + \vec{mg} + \vec{3mg} = \vec{0}$

$\sum F_x = 0 \rightarrow R_A - R_O \sin\theta = 0 \quad \cdots (1)$

$\sum F_y = 0 \rightarrow R_O \cos\theta - 4mg = 0 \quad \cdots (2)$

$\sum M_A = 0 \rightarrow$

$$R_O \cdot AO - 3mg \cdot L\cos\theta = 0 \quad \cdots (3)$$

$\Leftrightarrow$ (1) $\rightarrow$ $R_O = \frac{4mg}{\cos\theta}$ dans (3) $\Rightarrow$

$$4mg \frac{d}{\cos^2\theta} - 3mgL\cos\theta = 0 \quad (3)$$

(3) $\rightarrow$ $\cos^3\theta = \frac{3d}{4L}$.

A.N. : $\cos^3\theta = \frac{1}{3} \Rightarrow \cos\theta = \sqrt[3]{1/3}$

$\cos\theta = 0.69 \rightarrow \theta = 46.10°$.

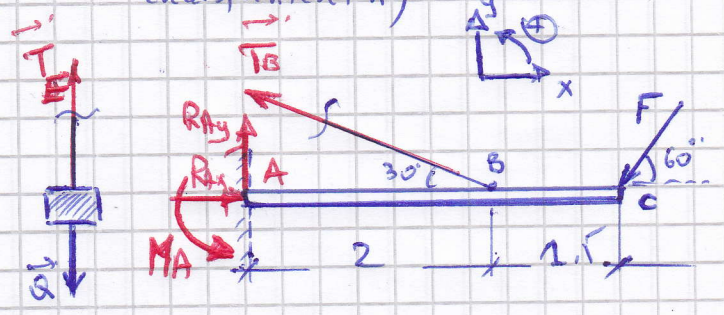
(2) $R_O = \frac{4mg}{\cos\theta} \simeq 5,8\ N$.

(1) $R_A = R_O \sin\theta \simeq 4,2\ N$.

Ex. 7 : Isolation de la barre ABC.

Donnée : la corde de BD fait 30° avec la barre.

(≡ coupure de la corde, élimination de l'appui encastrement A).



Pas de frottement ds la poulie donc :

$\vec{T_E} = \vec{T_B}$.

$\vec{Q} + \vec{T_E} = \vec{0} \Rightarrow Q = T_E = T_B$.

Equilibre de la barre

$\sum F_x = 0$ $R_{Ax} - Q\cos 30° - F\cos 60° = 0 \quad (1)$

$\sum F_y = 0$ $R_{Ay} + Q\sin 30° - F\sin 60° = 0 \quad (2)$

$\sum M_A = 0 \rightarrow M_A + Q\sin 30° \times 2 - F\sin 30° \times 3,5 = 0$

$\quad (3)$

Résultats :

$T_B = Q = 7$ kN.

$M_A = 21,31$ kNm

$R_{Ax} = 11,23$ kN ; $R_{Ay} = 5,5$ kN.

$R_A = \sqrt{R_{Ax}^2 + R_{Ay}^2} = 12,50$ kN