CORRECTION DEVOIR 1 BIS PREMIÈRE S

Exercice 1 :

1. %(O) = 100 – (60 + 4,4) = **35,6 %**

2. $m = n.M = 1x180 = 180\ g \Longrightarrow \mathbf{m(C)} = \frac{60}{100}x180 = \mathbf{108\ g}$; $m(H) = \frac{4,4}{100}x180 = 7,92\ g$; $\mathbf{m(O)} = \frac{35,6}{100}x180 = \mathbf{64,08\ g}$

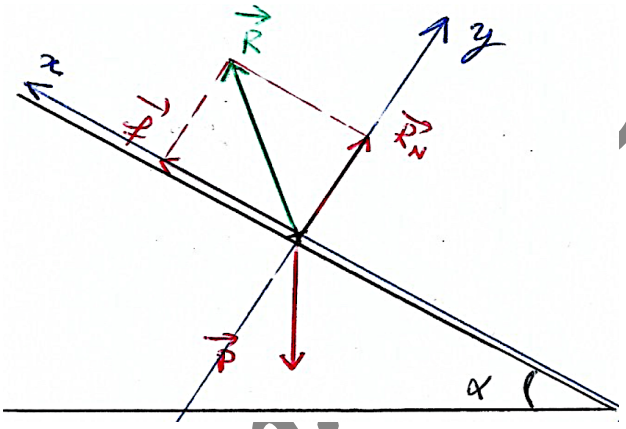
3. $\mathbf{n(C)} = \frac{m(C)}{M(C)} = \frac{108}{12} = \mathbf{9\ mol}$; $\mathbf{n(H)} = \frac{m(H)}{M(H)} = \frac{7,92}{1} = \mathbf{7,92\ mol}$; $\mathbf{n(O)} = \frac{m(O)}{M(O)} = \frac{64,08}{16} = \mathbf{4\ mol}$

4. $x = \frac{Mx\%(C)}{1200} = \frac{180x60}{1200} = 9$; $y = \frac{Mx\%(H)}{100} = \frac{180x4,4}{100} = 8$; $z = \frac{Mx\%(O)}{1600} = \frac{180x35,6}{1600} = 4$. F.B : $C_9H_8O_4$

5. $n = \frac{N}{N_A} = \frac{m}{M} \Longrightarrow \mathbf{N} = \frac{mxN_A}{M} = \frac{0,500x6,02.10^{23}}{180} = \mathbf{1,672.10^{21}\ molécules}$

Exercice 2 :

1. Calcul de f et R : principe d'inertie : $\vec{P} + \vec{f} + \overrightarrow{R_N} = \vec{0}$



Ox : $-P\sin\alpha + f = 0 \Longrightarrow f = mg\sin\alpha = 35x9,8x\sin 15 = \mathbf{88,8\ N}$

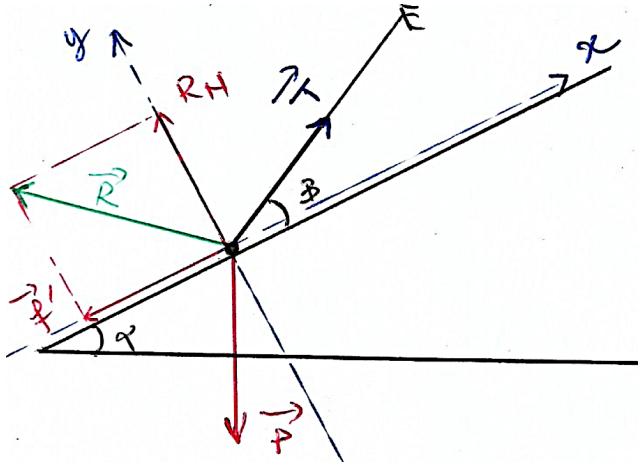
Oy : $-P\cos\alpha + R_N = 0 \Longrightarrow R_N = mg\cos\alpha = 35x9,8X\cos 15 = 331,3\ N \Longrightarrow R = \sqrt{88,8^2 + 331,3^2} = \mathbf{343\ N}$

2. Travaux des forces : $\mathbf{W_{D\rightarrow A}(\vec{f})} = -fxAD = -f.\frac{h}{\sin\alpha} = -88,8x\frac{150}{\sin(15)} = \mathbf{-51465\ J}$; $\mathbf{W_{D\rightarrow A}(\vec{P})} = mgh = 35x9,8x150 = 51450\ N$ et $W_{D\rightarrow A}(\overrightarrow{R_N}) = 0$ car $\overrightarrow{R_N} \perp \overrightarrow{DA} \Longrightarrow \mathbf{W(\vec{R})} = W(\vec{f}) = \mathbf{-51465\ J}$

3. Somme des travaux : $\mathbf{W_{D\rightarrow A}(\vec{f}) + W_{D\rightarrow A}(\vec{P}) + W_{D\rightarrow A}(\overrightarrow{R_N}) = -51465 + 51450 + 0 = 0}$

4. Puissance des forces : $\Delta t = \frac{DA}{V} = \frac{h}{V\sin\alpha} = \frac{150}{10x\sin 15} = 57,95\ s \Longrightarrow \mathbf{P(\vec{P})} = \frac{W_{D\rightarrow A}(\vec{P})}{\Delta t} = \frac{51450}{57,95} = \mathbf{887,83}\ w$ et $\mathbf{P(\vec{f})} = \frac{W_{D\rightarrow A}(\vec{f})}{\Delta t} = \frac{-51465}{57,95} = \mathbf{-888,1\ w}$

5.1. Bilan des forces : poids $\vec{P}$; la réaction $\vec{R} = \overrightarrow{R_N} + \vec{f}$ et la tension : $\vec{T}$



5.2. $\mathbf{P} = mxg = 5x9{,}8 = \mathbf{49\ N}$ et $\mathbf{f'} = \frac{P}{5} = \frac{49}{5} = \mathbf{9{,}8\ N}$

Principe d'inertie : $\vec{P} + \vec{R} + \vec{f'} = \vec{0}$

Ox : $-Psin\alpha - f + Tcos\alpha = 0 \Longrightarrow \mathbf{f} = \frac{mgsin\alpha + f'}{cos\beta} = \frac{49xsin15 + 9{,}8}{cos45} = \mathbf{31{,}79\ N}$

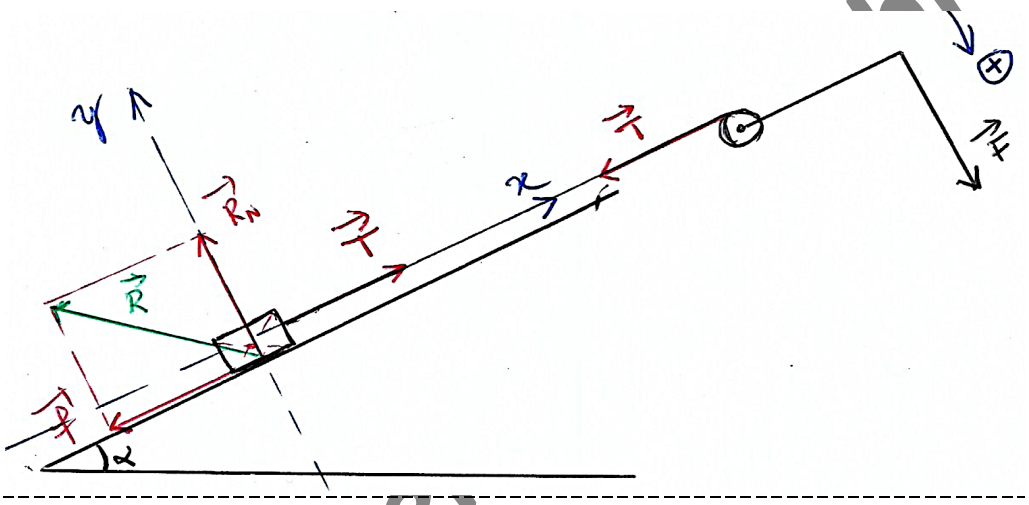
Oy : $-Psin\alpha + Tsin\beta + R_N = 0 \Longrightarrow R_N = m'gcos\alpha - Tsin\beta = 49xcos15 - 31{,}79xsin45 = 24{,}85\ N \Longrightarrow$

$$\mathbf{R} = \sqrt{f^2 + {R_N}^2} = \sqrt{9{,}8^2 + 24{,}85^2} = \mathbf{26{,}71\ N}$$

5.3. Travaux des forces : $\mathbf{W(\vec{T})} = TxADcos\beta = T.\frac{h}{sin\alpha}.cos\beta = 31{,}79x\frac{150}{sin15}xcos45 = \mathbf{13030\ J}$; $\mathbf{W(\vec{P})} = -m'gh = -5x9{,}8x150 = \mathbf{-7350\ J}$ et $\mathbf{W(\vec{R})} = W(\vec{f'}) = -f'xAD = -f'x\frac{h}{sin\alpha} = -9{,}8x\frac{150}{sin15} = \mathbf{-5680\ J}$

Somme des travaux : $\mathbf{W(\vec{T})} + \mathbf{W(\vec{P})} + \mathbf{W(\vec{R})} = \mathbf{13030 - 7350 - 5680 = 0}$

Exercice 3 :



1. Calcul de F :

Système treuil :

- B.F.A : $\vec{F}$ et $\vec{T}$
- Théorèmes des moments : $M_\Delta(\vec{F}) + M_\Delta(\vec{T}) = 0 \Longrightarrow FxL - Txr = 0 \Longrightarrow F = \frac{Txr}{L}$

Système charge :

- Principe d'inertie : $\vec{P} + \vec{f} + \vec{T} + \vec{R_n} = \vec{0}$
- Suivant x= $-Psin\alpha - f + T = 0 \Longrightarrow T = f + mgsin\alpha$ avec $f = \frac{P}{10}$

Ainsi : $\mathbf{F} = \frac{\left(Psin\alpha + \frac{P}{10}\right)r}{L} = \frac{Mgr}{L}\left(sin\alpha + \frac{1}{10}\right) = \frac{150x10x0{,}1}{0{,}4}\left(sin30 + \frac{1}{10}\right) = \mathbf{225\ N}$

2. Travail de $\vec{F}$: $\mathbf{W(\vec{F})} = M_\Delta(\vec{F}).\theta = FxLx2\pi N = 225x0{,}4x2\pi x40 = \mathbf{22608\ J}$

Puissance de $\vec{F}$: $\mathbf{P(\vec{F})} = M_\Delta(\vec{F}).w = FxLx\frac{2\pi N}{60} = 225x0{,}4x\frac{2\pi x20}{60} = \mathbf{188{,}4\ w}$

3. Calcul de la distance d : $\mathbf{d} = r\theta = 80\pi r = 80\pi x0{,}10 = \mathbf{25{,}13\ m}$

4. Calcul du travail du poids : $\mathbf{W(\vec{P})} = -Mgh = -Mgdsin\alpha = -150x10x25{,}13xsin30 = \mathbf{-18840\ J}$

5. Travail de $\vec{f}$: $\mathbf{W(\vec{f})} = -fxd = -150x25{,}13 = \mathbf{-3770\ J}$

Puissance de $\vec{f}$: $\mathbf{P(\vec{f})} = fxv$ or $v = rw = \frac{2\pi N}{60}xr \Longrightarrow P(\vec{f}) = -fx\frac{2\pi N}{60}xr = -150x\frac{80\pi}{60}x0{,}1 = \mathbf{-31{,}4\ w}$

BONNUS : On a le système suivant : $\begin{cases} x + y + z = 13 \\ y = 2x \\ 12x + y + 16z = 72 \end{cases} \Longrightarrow \begin{cases} x = 4 \\ y = 8 \\ z = 1 \end{cases}$. Donc **F.B : C_4H_8O**