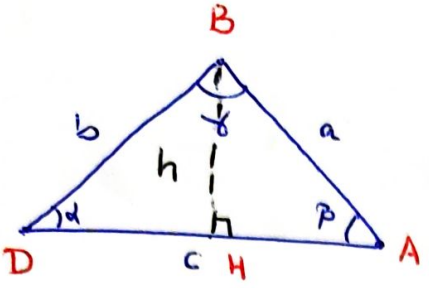
Exo1:

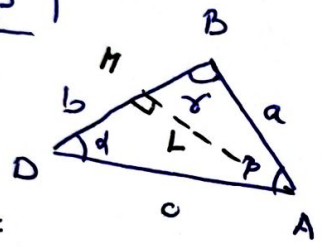


Du triangle ABH: $\sin\beta = \frac{h}{a}$

Du triangle DBH: $\sin\alpha = \frac{h}{b}$

donc $h = a\sin\beta = b\sin\alpha$

$$\boxed{\frac{a}{\sin\alpha} = \frac{b}{\sin\beta}}$$



Du triangle AMB:

$\sin\gamma = \frac{L}{a}$

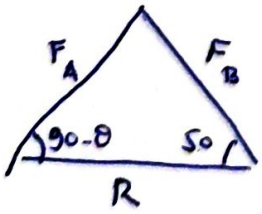
Du triangle ADM: $\sin\alpha = \frac{L}{c}$

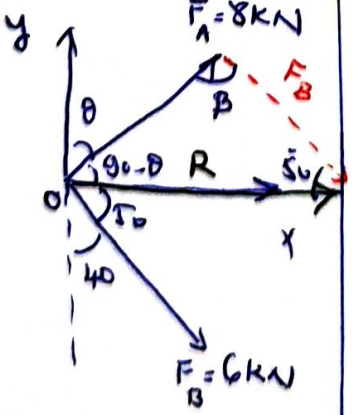
donc: $L = c\sin\alpha = a\sin\gamma$.

$$\boxed{\frac{a}{\sin\alpha} = \frac{c}{\sin\gamma} = \frac{b}{\sin\beta}}$$

La regle des sinus

Exo2:





D'après la regle des sinus:

$$\frac{F_B}{\sin(90-\theta)} = \frac{F_A}{\sin 50}$$

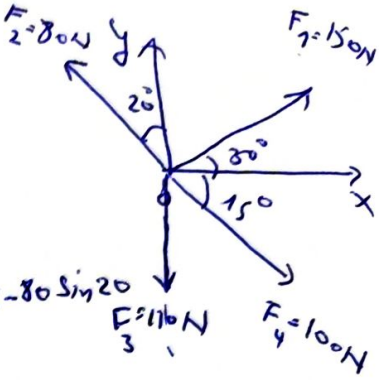
$\sin(90-\theta) = \frac{F_B}{F_A}\sin 50$, donc $\boxed{\theta = 55,3°}$.

L'amplitude de R:

$B = 180 - 50 - 34,7° = 95,3°$

$\frac{R}{\sin\beta} = \frac{F_1}{\sin 50} \Rightarrow \boxed{R = 10,39\,kN}$

Exo3:



$\vec{R} = \vec{F_1} + \vec{F_2} + \vec{F_3} + \vec{F_4}$

Par Projection:

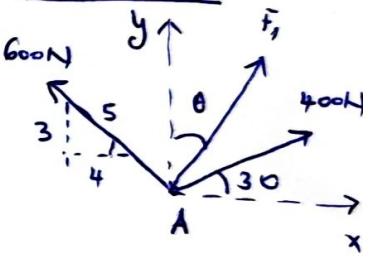
ox: $R_x = 150\cos 30 + 100\cos 15 - 80\sin 20$

oy: $R_y = 150\sin 30 - 100\sin 15 - 110 + 80\cos 20$

$R_x = 199,24N$ et $R_y = 14,22N$

donc $R = \sqrt{R_x^2 + R_y^2} \Rightarrow \boxed{R \simeq 200N}$

Exo4:



$\vec{R}$ verticale et positif

donc $\vec{R}\begin{pmatrix}0\\R\end{pmatrix} = \begin{pmatrix}0\\800\end{pmatrix}$

Par Projection: ox: $400\cos 30 + F_1\sin\theta - 600\frac{4}{5} = 0$ (1)

oy: $400\sin 30 + F_1\cos\theta + 600\frac{3}{5} = 800$ (2)

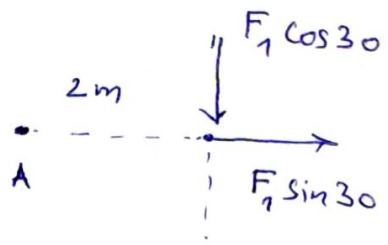
* $F_1\sin\theta = 133,6$ — (1)'
* $F_1\cos\theta = 240$ — (2)'

$\Rightarrow \boxed{\theta = 29,1°}$

$\boxed{F_1 = 275N}$

Exo5 :

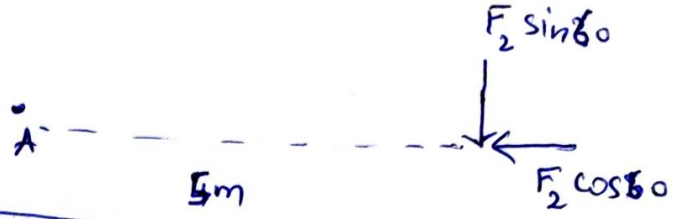
le moment de chaque force :



$$M_{/A}(\vec{F_1}) = M_{/A}(\vec{F_{1x}}) + M_{/A}(\vec{F_{1y}})$$

($M_{/A}(\vec{F_{1x}}) = 0$)

$$M_{/A}(\vec{F_1}) = -250 \cos 30 . 2 \Rightarrow \boxed{M_{/A}(\vec{F_1}) = -433 N.m}$$



$$M_{/A}(\vec{F_2}) = M_{/A}(\vec{F_{2x}}) + M_{/A}(\vec{F_{2y}})$$

($M_{/A}(\vec{F_{2x}}) = 0$)

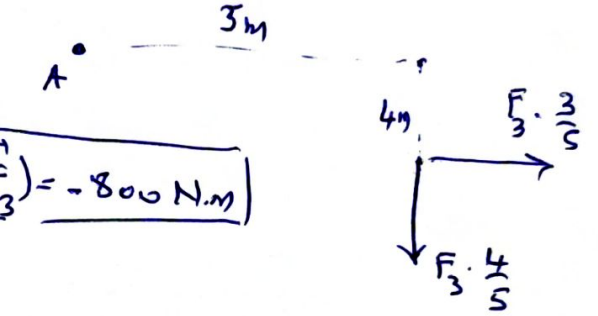
$$M_{/A}(\vec{F_2}) = -300 \sin 60 . 5$$

$$\boxed{M_{/A}(\vec{F_2}) = -1299 N.m}$$

$$M_{/A}(\vec{F_3}) = M_{/A}(\vec{F_{3x}}) + M_{/A}(\vec{F_{3y}}) =$$

$$M_{/A}(\vec{F_3}) = 500 . \frac{3}{5} . 4 - 500 . \frac{4}{5} . 5$$

$$\Rightarrow \boxed{M_A(\vec{F_3}) = -800 N.m}$$



Exo6 :

la somme des moments :

$$\Sigma M_{/O}(\vec{F_i}) = M_{/O}(\vec{F_1}) + M_{/O}(\vec{F_2}) + M_{/O}(\vec{F_3}) + M_{/O}(\vec{F_4})$$

($M_{/O}(\vec{F_2}) = 0$)

$$\Sigma M_{/O}(\vec{F_i}) = -50.2 + 20.3 \sin 30 - 40(4 + 3 \cos 30)$$

$$\boxed{\Sigma M_{/O}(\vec{F_i}) = -334 N.m}$$