Corrigé de la fiche n°2 : Notions de force, résultante, moment, et couple

Exercice 1

Repère (*oxy*)	Repère (*ox'y'*)	Repère (*ox'y*)
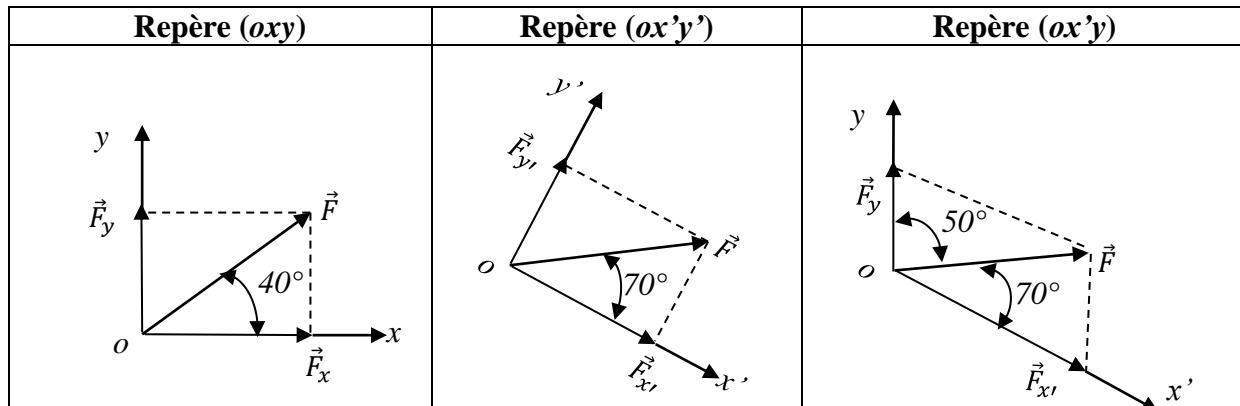
1) 1ère méthode (0≤angles géométriques≤90°)

$F_x = 200 \times cos40° = 153N$

$F_y = 200 \times sin40° = 129N$

2ème méthode (-π≤angles directeurs≤π)

$F_x = 200 \times cos40° = 153N$

$F_y = 200 \times cos50° = 129N$

2) 1ère méthode (0≤angles géométriques≤90°)

$F_{x'} = 200 \times cos70° = 68N$

$F_{y'} = 200 \times sin70° = 188N$

2ème méthode (-π≤angles directeurs≤π)

$F_{x'} = 200 \times cos70° = 68N$

$F_{y'} = 200 \times cos20° = 188N$

3)
$$\frac{200}{sin60°} = \frac{F_{x'}}{sin50°} = \frac{F_y}{sin70°}$$
$$F_{x'} = \frac{200}{sin60°} \times sin50° = 177N$$
$$F_y = \frac{200}{sin60°} \times sin70° = 217N$$

Exercice 2

1) $T_{1x} = 200 \times cos45° = 141daN = T_{1y}$

2) $T_{3y} = -T_3 . sin30° = -100daN \Leftrightarrow T_3 = \frac{100}{sin30°} = 200daN$

$T_{3x} = +T_3 \times cos30° = 173daN$

3) $141 - T_2 + 173 = 0$

$T_2 = 141 + 173 = 314daN$

Exercice 3

1ère méthode (Varignon)

$M_A = M_A(\vec{F_x}) + M_A(\vec{F_y})$

$M_A = 0 \times 200 \times sin25° - 0.05 \times |-200 \times cos25°| = -0,9daN.m$

2ème méthode (Déterminant)

$AB_X = 0.005m \; ; \; AB_Y = 0; \; AB_Z = 0m$

$F_X = 200 \times \sin 25° \; ; \; F_Y = -200 \times \cos 25°$

$M_A = M_{Az} = AB_X \times F_Y - F_X \times AB_Y = 0.005 \times (-200 \times cos25°) - 0 = -0,9daN.m$

$\vec{M_A} = \vec{M_{Az}} = -0,9\vec{k}$

Exercice 4

$M_A = -10 \times 2 + 30 \times cos25° \times 1.4 - 30 \times sin25° \times 5 = -45.3kN.m$

$M_B = -10 \times 0 + 30 \times cos25° \times 1.4 - 30 \times sin25° \times 3 = 0.03kN.m$

$M_C = -10 \times 0 + 30 \times cos25° \times 0 - 30 \times sin25° \times 3 = -38kN.m$

$M_D = 10 \times 3 + 30 \times cos25° \times 0 - 30 \times sin25° \times 0 = 30kN.m$

Exercice supplémentaire

1) $M_O = 240 \times 50 = \text{P} \times 60$

$\text{P} = \frac{240 \times 50}{60} = 200kN$

2) $d = \frac{240 \times 50}{600} = 20mm$