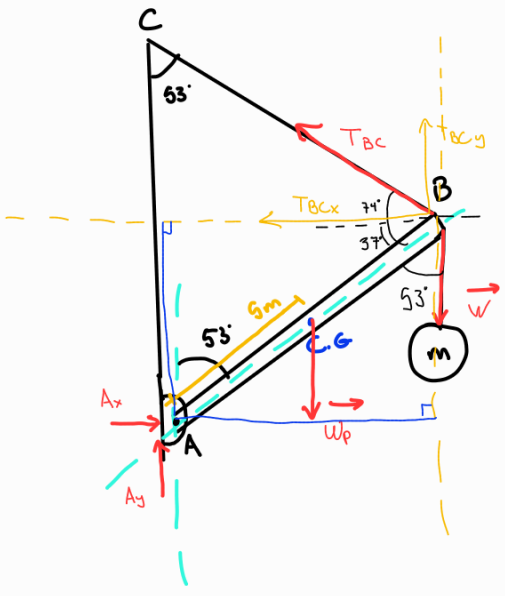
Exercices 11; 14 et 18 chapitre 3

#11



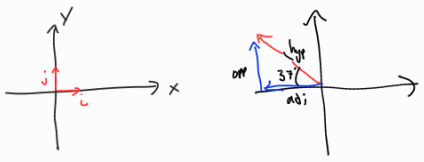
Hyp ⊢ est en équilibre

1) D.C.L

2) conditions équilibre

$\Sigma \vec{F}_{ext} = \vec{0}$

$\Sigma M_A = 0$

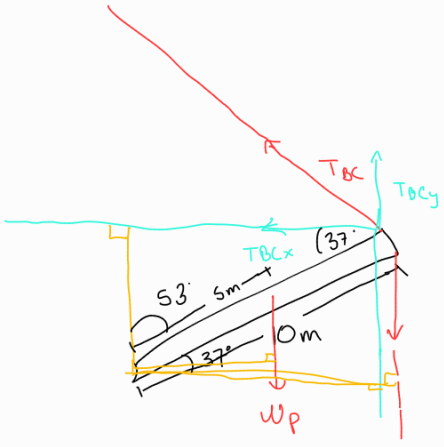


Données $M_p = 100Kg$

$m = 50Kg$

(1) $\Sigma F_x = A_x - T_{BC} \cdot \cos(37) = 0$

(2) $\Sigma F_y = A_y + T_{BC} \cdot \sin(37) - W_p \cdot g - W \cdot g$



$\Sigma M_A = M_A^{\vec{TB}} + M_A^{\vec{wp}} + M_A^{\vec{w}} = 0$

$M_A^{\vec{T_{BC}}} = +(T_{BC} \cdot \cos(37)) \cdot (10 \cdot \cos(53)) + (T_{BC} \cdot \sin(37)) \cdot (10 \cdot \cos(37))$

$M_A^{\vec{wp}} = -(W_p) \cdot (5 \cdot \cos(37))$

$M_A^{\vec{w}} = -(W) \cdot (10 \cdot \cos(37))$

(3)

$$\Sigma M_A = +(T_{BC} \cdot \cos(37)) \cdot (10 \cdot \cos(53)) + (T_{BC} \cdot \sin(37)) \cdot (10 \cdot \cos(37)) - (W_p \cdot g) \cdot (5 \cdot \cos(37)) - (W \cdot g) \cdot (10 \cdot \cos(37))$$

Inc = Ax, Ay, TBC

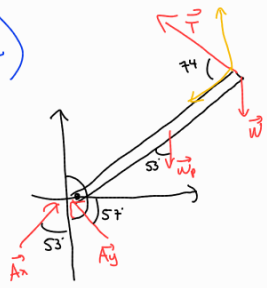
a) b)

$a_x = 650,915\ N$

$a_y = 981\ N$

$T_{BC} = 815,034\ N$

c)



$$\sum F_x = A_x - (T \cdot \cos(74)) - [(M_0 \cdot g) \cdot \cos(53)] - [(M \cdot g) \cdot \cos(53)] = 0$$

$$A_H = (A_x \cdot \sin(53)) - (A_y \cdot \cos(53))$$

Grandeur

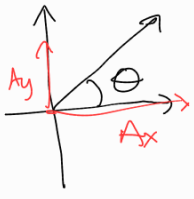
$$A = \sqrt{A_x^2 + A_y^2}$$

$$A = 1177{,}3\ N$$

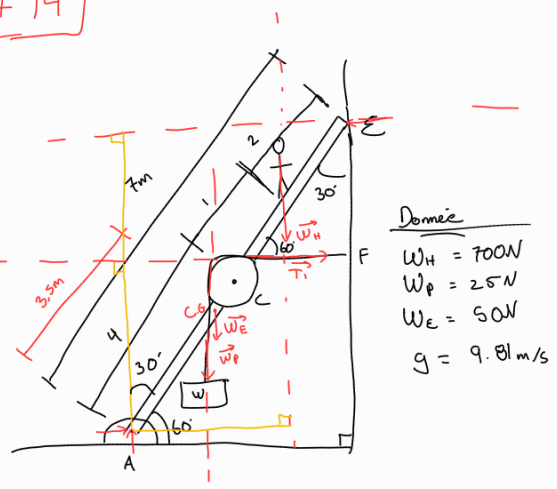
Direction

$$\tan\theta = \frac{A_y}{A_x}$$

$$\theta = 56{,}4°$$



#14



Donnée

$W_H = 700N$

$W_P = 25N$

$W_E = 50N$

$g = 9.81\ m/s$

$$\sum \vec{F_{ext}} = \vec{0}$$

$$\sum M_E = 0$$

① $\sum F_x = A_x + T_1 - E_x = 0$

② $\sum F_y = A_y - (W_H) - (W_E) - (W_P) = 0$

$$\sum M_A = M_A^{\vec{WH}} + M_A^{\vec{WE}} + M_A^{\vec{WP}} + M_A^{\vec{T_1}} + M_A^{\vec{E}}$$

$W_P = T_1 = 25N$

$$M_E^{\vec{WH}} = -(W_H) \cdot (5 \cdot \cos(60))$$

$$M_E^{\vec{WE}} = -(W_E) \cdot (3{,}5 \cdot \cos(60))$$

$$M_E^{\vec{WP}} = -(W_P) \cdot (4 \cdot \cos(60) - 0{,}1)$$

$$M_E^{\vec{T_1}} = -(T_1) \cdot (4 \cdot \sin(60) + 0{,}1)$$

$$M_E^{\vec{E}} = +(E) \cdot (7 \cdot \cos(30))$$

③

$$\sum M_E = -(W_H) \cdot (5 \cdot \cos(60)) - (W_E) \cdot (3{,}5 \cdot \cos(60)) - (W_P) \cdot (3{,}9 \cdot \cos(60))$$

$$-(T_1) \cdot (4{,}1 \cdot \cos(30)) + (E) \cdot (7 \cdot \cos(30)) = 0$$

$A_x = 300.64\ N$

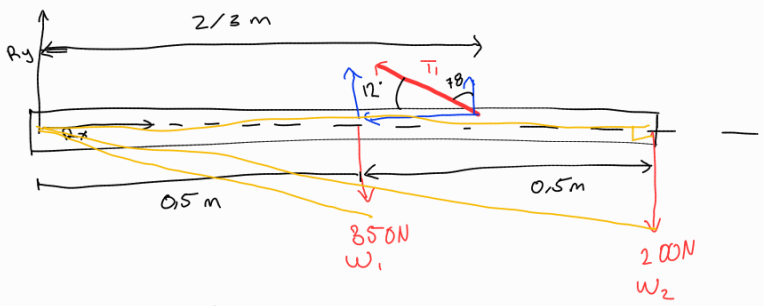
$A_y = 775\ N$

$N_E = 325{,}64\ N$

a) $N_E = -325.64\ \vec{i}\ N$

b) ✓

#18



$$\sum \vec{F}_{ext} = \vec{0}$$

$$\sum M_R = 0$$

$$\sum F_x = R_x - T \cdot \cos(12) = 0$$

$$\sum F_y = R_y + T \cdot \sin(12) - W_1 - W_2 = 0$$

$$\sum M_R = M_R^{\vec{T}} + M_R^{\vec{W_1}} + M_R^{\vec{W_2}}$$

$$M_R^{\vec{T}} = +(T \cdot \sin(12)) \cdot (2/3)$$

$$M_R^{\vec{W_1}} = -(W_1) \cdot (0{,}5)$$

$$M_R^{\vec{W_2}} = -(W_2) \cdot (1)$$

$$T = 2705{,}5\ N$$

$$R_x = 2646{,}35\ N$$

$$R_y = -12{,}5\ N \quad (\text{mal orienté})$$