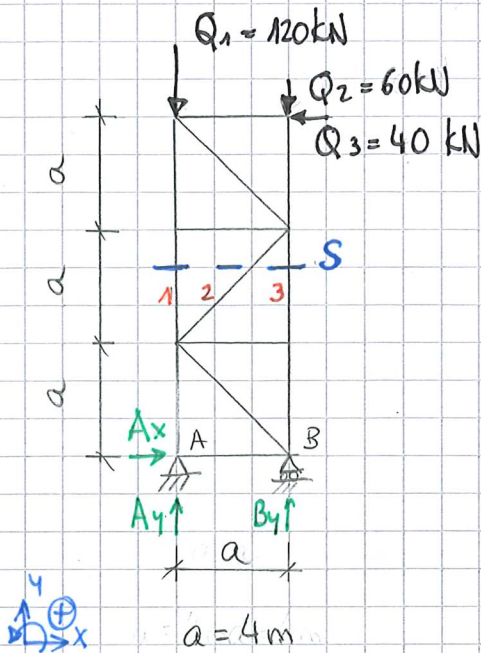


Exercice 12



Réactions d'appui (pas nécessaires ici)

$$\sum F_x = 0 : A_x - Q_3 = 0 \Rightarrow A_x = Q_3 = 40 \text{ kN}$$

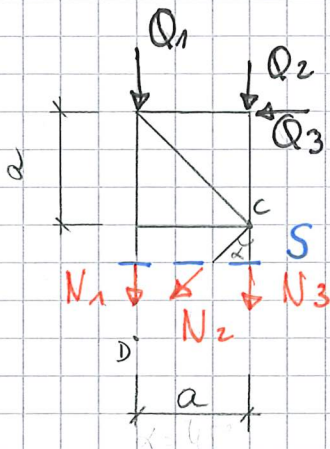
$$\sum M_A = 0 : -Q_2 \cdot a + Q_3 \cdot 3a + B_y \cdot a = 0$$

$$\Rightarrow B_y = Q_2 - 3Q_3 = 60 - 3 \cdot 40 = -60 \text{ kN}$$

$$\sum F_y = 0 : A_y + B_y - Q_1 - Q_2 = 0$$

$$\Rightarrow A_y = Q_1 + Q_2 - B_y = 120 + 60 - (-60) = 240 \text{ kN}$$

Efforts intérieurs



$$\alpha = 45^\circ$$

$$\sum F_x = 0 : -N_2 \cdot \sin \alpha - Q_3 = 0$$

$$\Rightarrow N_2 = \frac{-Q_3}{\sin \alpha} = \frac{-40}{\sin 45^\circ} = -56,6 \text{ kN}$$

$$\sum M_c = 0 : N_1 \cdot a + Q_1 \cdot a + Q_3 \cdot a = 0$$

$$\Rightarrow N_1 = -Q_1 - Q_3 = -120 - 40 = -160 \text{ kN}$$

$$\sum M_D = 0 : -Q_2 \cdot a + Q_3 \cdot 2a - N_3 \cdot a = 0$$

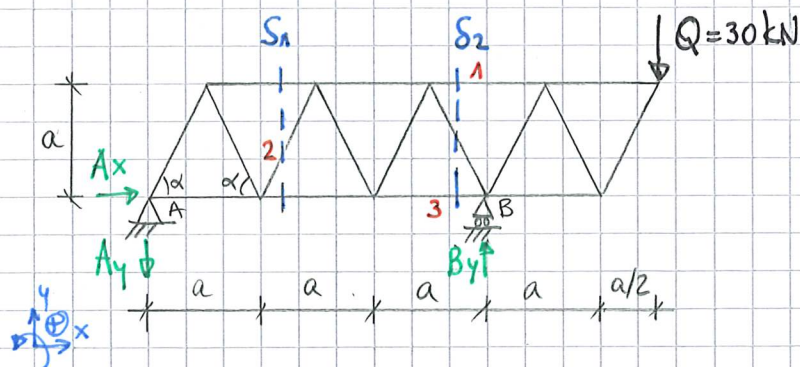
$$\Rightarrow N_3 = -Q_2 + 2Q_3 = -60 + 2 \cdot 40 = 20 \text{ kN}$$

ou

$$\sum F_y = 0 : -N_1 - N_2 \cos \alpha - N_3 - Q_1 - Q_2 = 0$$

$$\begin{aligned} \Rightarrow N_3 &= -N_1 - N_2 \cos \alpha - Q_1 - Q_2 \\ &= -(-160) - (-56,6) \cos 45^\circ - 120 - 60 \\ &= 20 \text{ kN} \end{aligned}$$

Exercice 13



$$\tan \alpha = \frac{a}{a/2} = 2 \rightarrow \alpha = 63,4^\circ$$

Réactions d'appui:

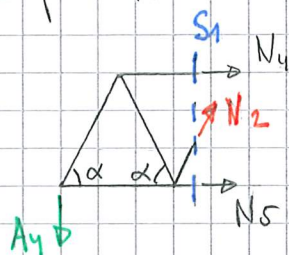
$$\sum F_x = 0 : A_x = 0$$

$$\sum M_A = 0 : B_y \cdot 3a - Q \cdot \left(4a + \frac{a}{2}\right) = 0 \Rightarrow B_y = \frac{9}{3 \cdot 2} Q = \frac{3}{2} Q = \frac{3}{2} \cdot 30 = 45 \text{ kN}$$

$$\sum F_y = 0 : -A_y + B_y - Q = 0 \Rightarrow A_y = B_y - Q = \frac{3}{2} Q - Q = \frac{1}{2} Q = \frac{30}{2} = 15 \text{ kN}$$

Efforts intérieurs

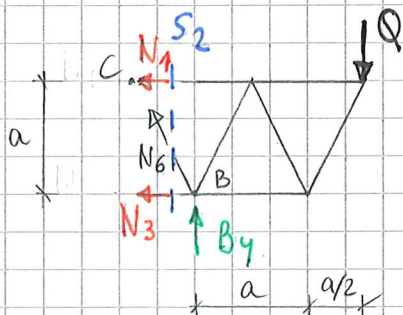
Coupe S_1 :



$$\sum F_y = 0 : -A_y + N_2 \cdot \sin \alpha = 0$$

$$\Rightarrow N_2 = \frac{A_y}{\sin \alpha} = \frac{15}{\sin 63,4^\circ} = 16,8 \text{ kN}$$

Coupe S_2 :



$$\sum M_B = 0 : N_1 \cdot a - Q \left(a + \frac{a}{2}\right) = 0$$

$$\Rightarrow N_1 = \frac{3}{2} Q = \frac{3}{2} \cdot 30 = 45 \text{ kN}$$

$$\sum M_C = 0 : -N_3 \cdot a + B_y \cdot \frac{a}{2} - Q \cdot 2a = 0$$

$$\Rightarrow N_3 = \frac{B_y}{2} - 2Q = \frac{3}{2} Q - 2Q = -\frac{5}{4} Q$$

$$= -\frac{5}{4} \cdot 30 = -37,5 \text{ kN}$$