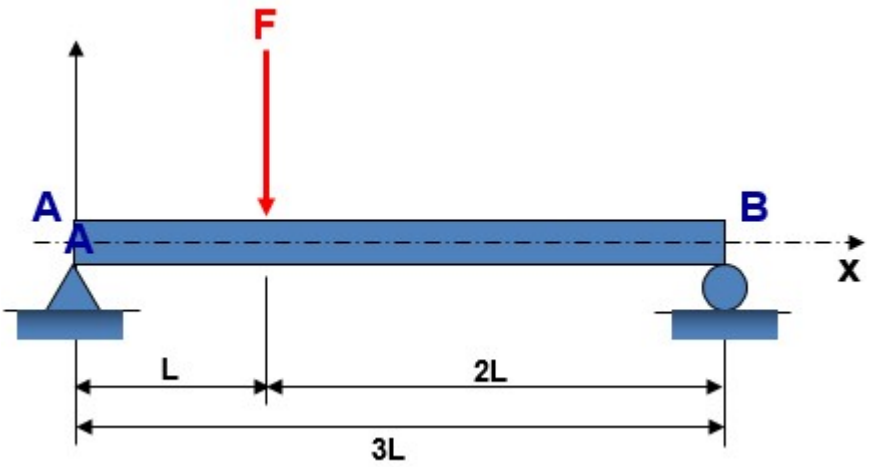
Exercice 1 :

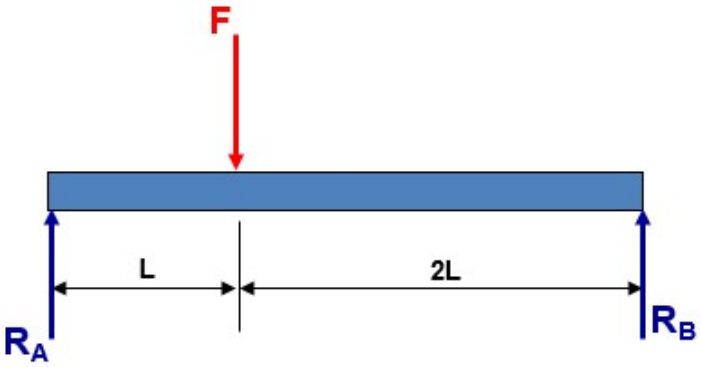


1/ Calculer les réactions aux appuis en A et B.

2/ Tracer les diagrammes des efforts tranchants et des moments fléchissant tout au long de la poutre.

Solution :

1/ Cherchons les réactions :



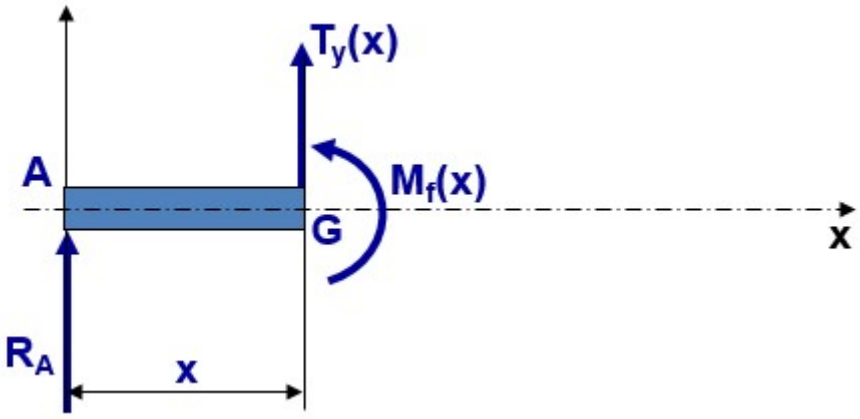
$$\sum M_A = 0 \quad \Rightarrow \quad R_B \times 3L - F \times L = 0$$

$$\Rightarrow R_B = \frac{F}{3}$$

$$\sum M_B = 0 \quad \Rightarrow \quad -R_A \times 3L + F \times 2L = 0$$

$$\Rightarrow R_A = \frac{2}{3}F$$

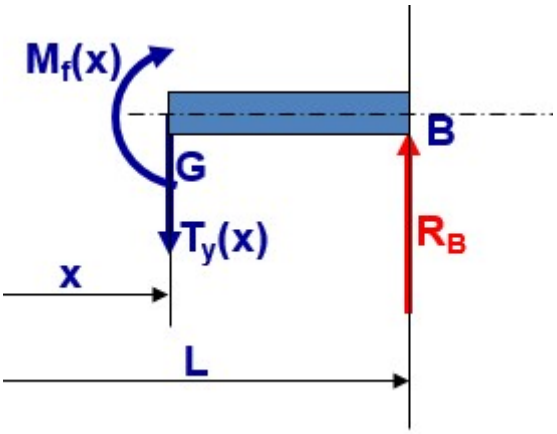
2/ *Pour* $0 \le x < L$



$$T_Y(x) = -R_A = -\frac{2}{3}F$$

$$M_{fz}(x) = -(-R_A \times x) = \frac{2}{3}F.x$$

Pour $L \le x < 3L$



$$T_Y(x) = R_B = \frac{F}{3}$$

$$M_{fz}(x) = (R_B \times (3L - x)) = \frac{F}{3}(3L - x)$$

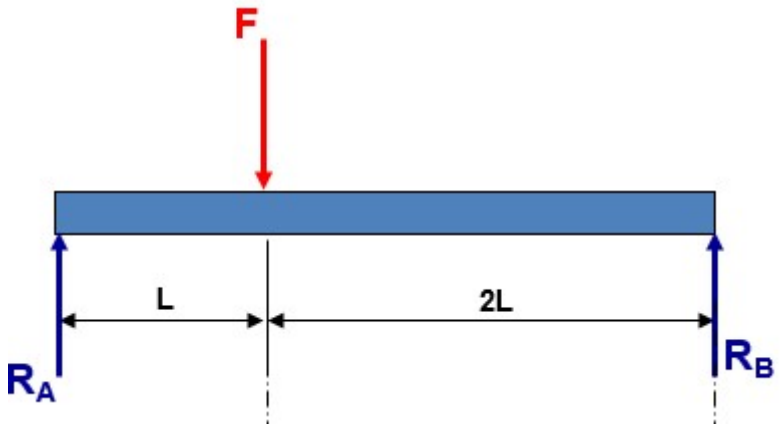


Diagramme des efforts tranchants :

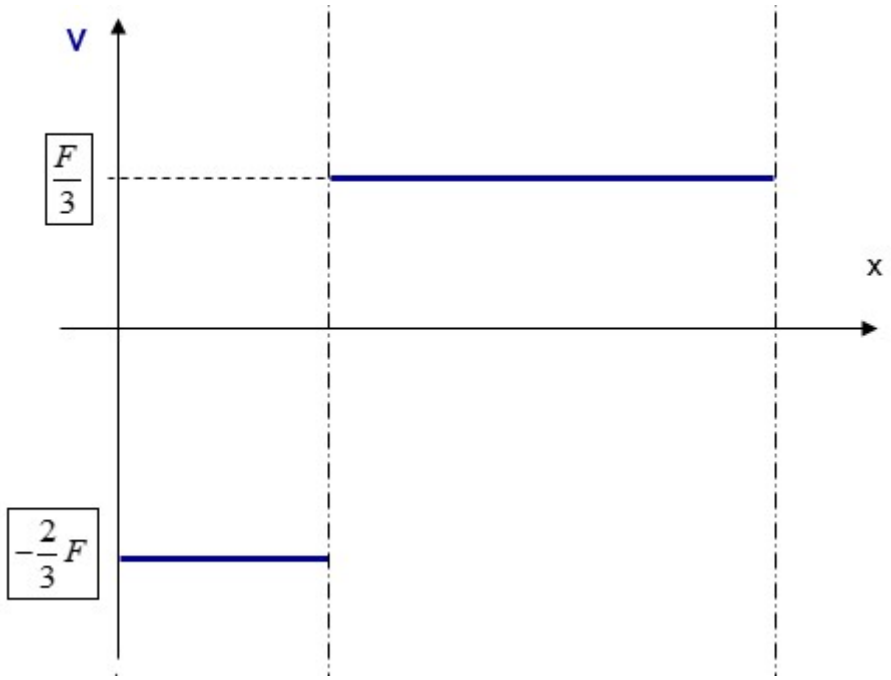
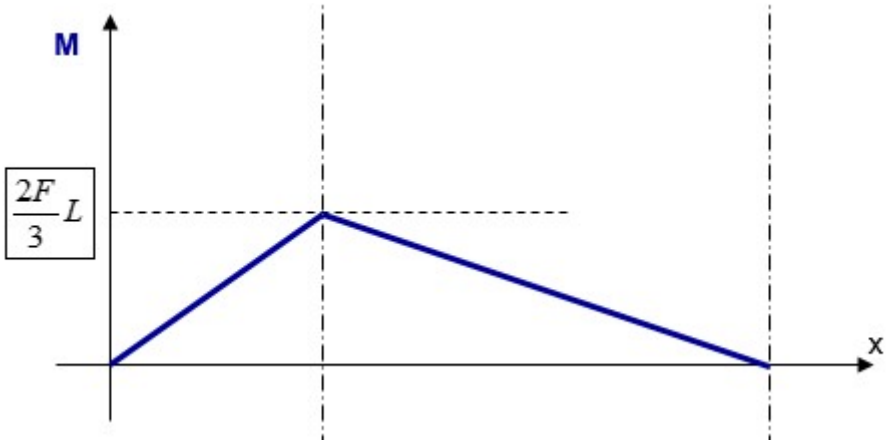
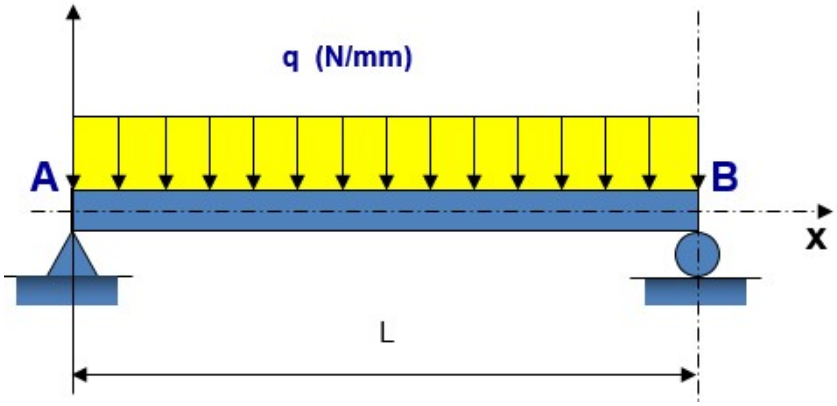


Diagramme des moments fléchissants :



Exercice 2 :

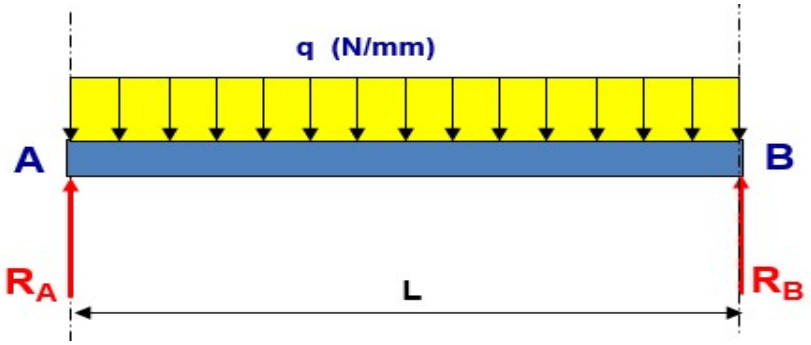


1/ Calculer les réactions aux appuis en A et B.

2/ Tracer les diagrammes des efforts tranchants et des moments fléchissant tout au long de la poutre.

Solution :

1/ Les réactions :



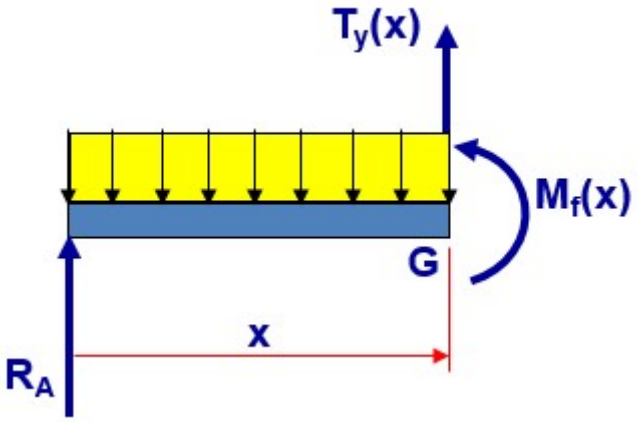
$$\sum M_B = 0 \quad \Rightarrow \quad -R_A \times L + q \times L \times \frac{L}{2} = 0$$

$$\Rightarrow R_A = q\frac{L}{2}$$

$$\sum M_A = 0 \quad \Rightarrow \quad R_B \times L - q \times L \times \frac{L}{2} = 0$$

$$\Rightarrow R_B = q\frac{L}{2}$$

2/ *Pour* $0 \le x < L$

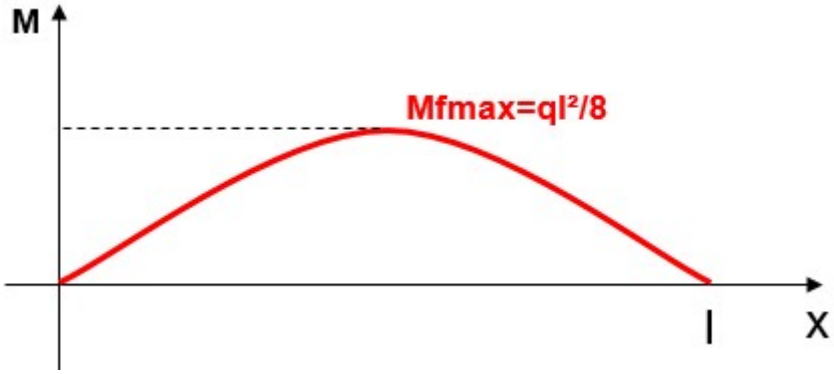


$$T_Y(x) = -q\frac{L}{2} + q \times x$$

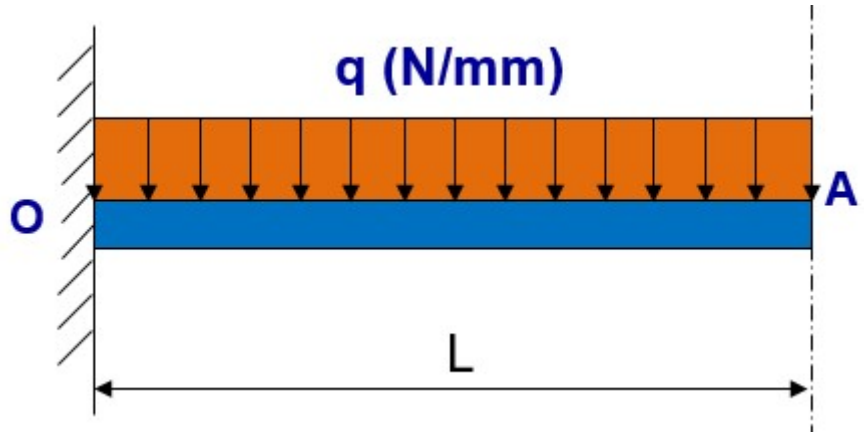
$$M_{fz}(x) = q\frac{L}{2}x - q\frac{x^2}{2}$$

Diagramme des efforts tranchants :

Diagramme des moments fléchissants :



Exercice 3 :

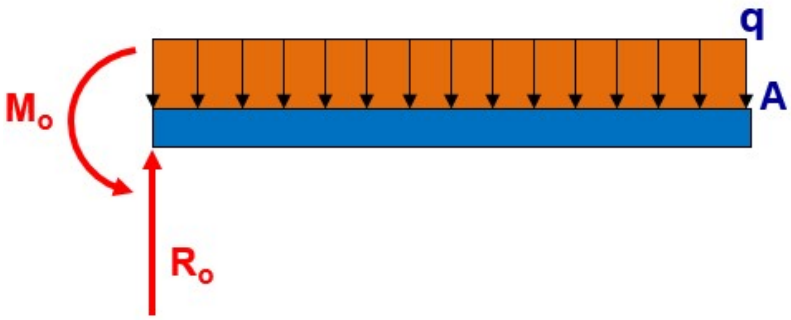


1/ Calculer les réactions aux appuis en A et B.

2/ Tracer les diagrammes des efforts tranchants et des moments fléchissant tout au long de la poutre.

Solution :

1/ Les réactions :



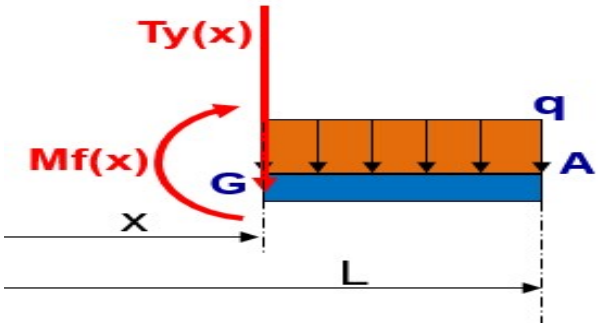
$$\sum F_x ext = 0 \quad \Rightarrow \quad R_O - q \times L = 0$$

$$\Rightarrow R_O = q \times L$$

$$\sum M_O = 0 \quad \Rightarrow \quad M_O - q \times L \times \frac{L}{2} = 0$$

$$\Rightarrow M_O = q \frac{L^2}{2}$$

2/ *Pour* $0 \le x < L$



$$T_Y(x) = -q(L-x)$$

$$\sum M_G = 0 \Rightarrow -M_{fz}(x) + q\frac{1}{2}(L-x)^2 = 0$$

$$\Rightarrow M_{fz}(x) = -q\frac{1}{2}(L-x)^2$$

Diagramme des efforts tranchants :

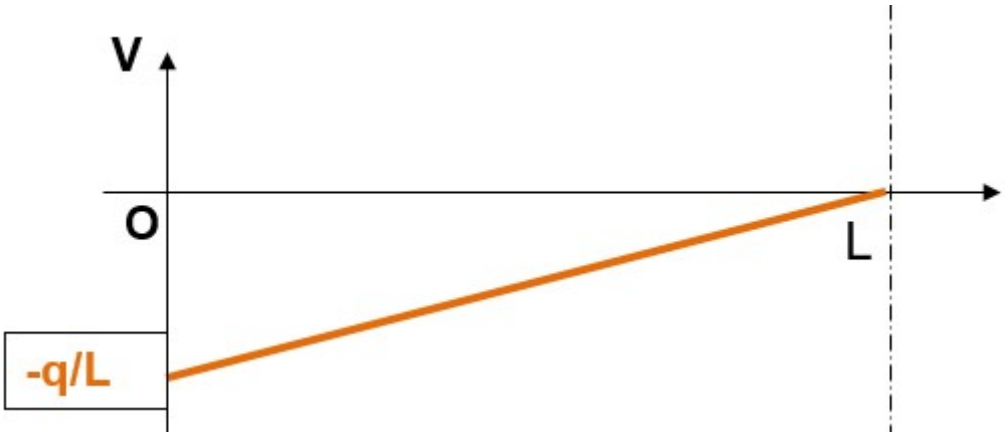


Diagramme des moments fléchissants :