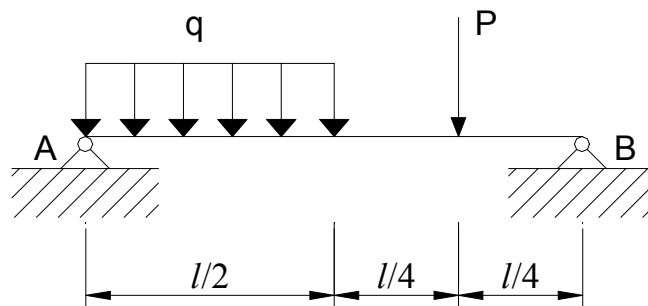


Determinar las ecuaciones y diagramas del esfuerzo cortante y del momento flector de la viga biapoyada de la figura, sometida a una carga uniforme q y una carga puntual P , tal y como se indica:



Obtención de las reacciones

$$\sum M_A = 0$$

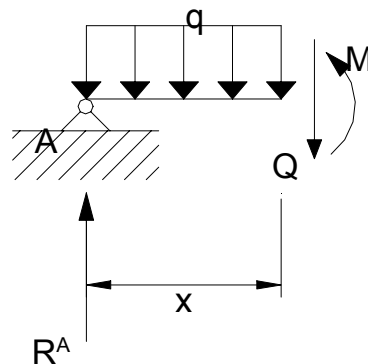
$$R_B \cdot l - P \cdot \frac{3 \cdot l}{4} - q \cdot \frac{l}{2} \cdot \frac{l}{4} = 0; \rightarrow R_B = \frac{3 \cdot P}{4} + \frac{q \cdot l}{8}$$

$$\sum M_B = 0$$

$$R_A \cdot l - q \cdot \frac{l}{2} \cdot \frac{3 \cdot l}{4} - P \cdot \frac{l}{4} = 0; \rightarrow R_A = \frac{P}{4} + \frac{3 \cdot q \cdot l}{8}$$

Determinación de las fuerzas de sección

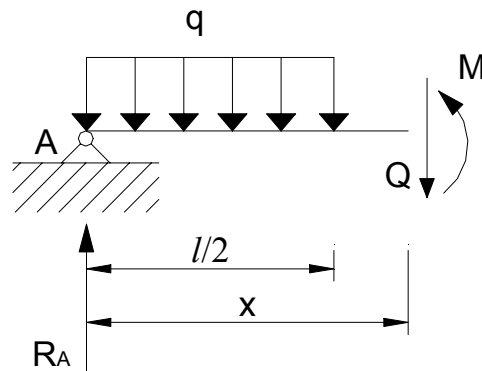
x



$$\begin{aligned}\sum F_y &= 0 \\ R_A - q \cdot x - Q &= 0 \\ Q &= R_A - q \cdot x; \rightarrow \text{Recta}\end{aligned}$$

$$\begin{aligned}\sum M &= 0 \\ R_A \cdot x - q \cdot x \cdot \frac{x}{2} - M &= 0 \\ M &= R_A \cdot x - \frac{q \cdot x^2}{2}; \rightarrow \text{Parábola}\end{aligned}$$

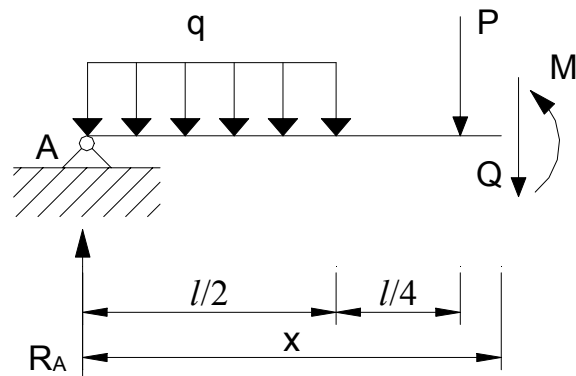
x



$$\begin{aligned}\sum F_y &= 0 \\ R_A - q \cdot \frac{l}{2} - Q &= 0 \\ Q &= R_A - \frac{q \cdot l}{2}; \rightarrow \text{Constante}\end{aligned}$$

$$\begin{aligned}\sum M &= 0 \\ R_A \cdot x - q \cdot \frac{l}{2} \cdot \left(x - \frac{l}{4}\right) - M &= 0 \\ M &= R_A \cdot x - q \cdot \frac{l}{2} \cdot \left(x - \frac{l}{4}\right) \rightarrow \text{Recta}\end{aligned}$$

x



$$\sum F_y = 0$$

$$R_A - q \cdot \frac{l}{2} - P - Q = 0$$

$$Q = R_A - \frac{q \cdot l}{2} - P = \frac{P}{4} + \frac{3 \cdot q \cdot l}{8} - \frac{q \cdot l}{2} - P = -\frac{3 \cdot P}{4} - \frac{q \cdot l}{8} = -R_B; \rightarrow \text{Constante}$$

$$\sum M = 0$$

$$R_A \cdot x - q \cdot \frac{l}{2} \cdot \left(x - \frac{l}{4}\right) - P \cdot \left(x - \frac{3 \cdot l}{4}\right) - M = 0$$

$$M = R_A \cdot x - q \cdot \frac{l}{2} \cdot \left(x - \frac{l}{4}\right) - P \cdot \left(x - \frac{3 \cdot l}{4}\right); \rightarrow \text{Recta}$$

Diagrama de esfuerzos cortantes

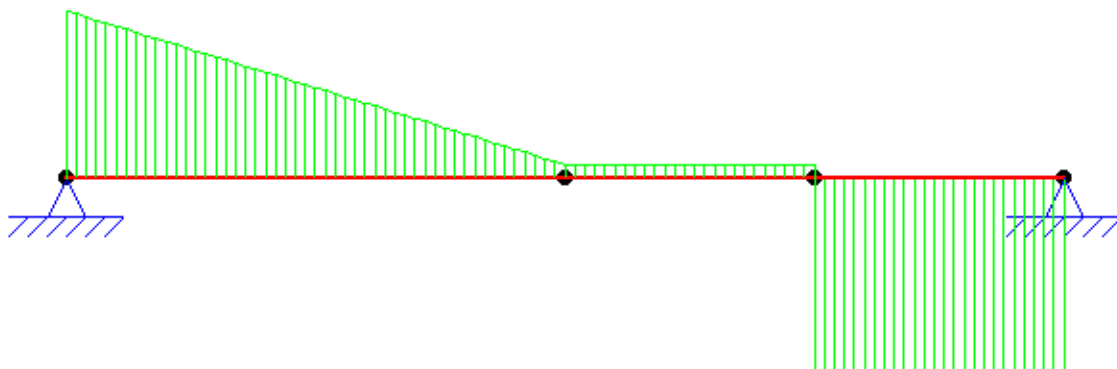
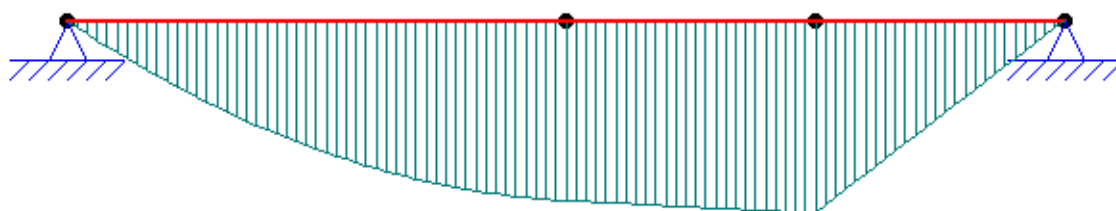


Diagrama de momentos flectores



Deformada de la viga

