

Utilizando el Método del Área del Diagrama de Momento flector, se calculará la curva elástica de la viga indicada arriba

#1: [CaseMode := Sensitive, InputMode := Word]

Cálculo de la reacciones:

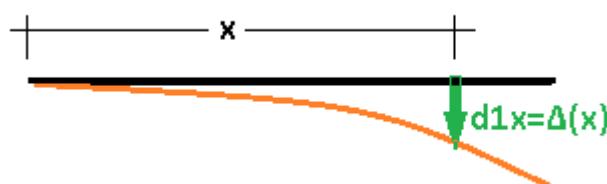
$$\begin{aligned} \text{#2: } & \left[\begin{array}{l} Y_1 = W \cdot L \\ M_1 + M - W \cdot L \cdot \frac{L}{2} = 0 \end{array} \right] \end{aligned}$$

$$\text{#3: } \left[M_1 := \frac{\frac{L^2 \cdot W}{2} - 2 \cdot M}{2}, Y_1 := L \cdot W \right]$$

Cálculo del momento flector, MF1(x)[0..a] y MF2(x)[a..L]:

$$\begin{aligned} \text{#4: } & \left[\begin{array}{l} MF1(x) := Y_1 \cdot x - M_1 - W \cdot x \cdot \frac{x}{2} \\ MF2(x) := Y_1 \cdot x - M_1 - W \cdot x \cdot \frac{x}{2} - M \end{array} \right] \\ \text{#5: } & \left[\begin{array}{l} MF1(x) := M - \frac{W \cdot (L^2 - 2 \cdot L \cdot x + x^2)}{2} \\ MF2(x) := -W \cdot \left(\frac{L^2}{2} - L \cdot x + \frac{x^2}{2} \right) \end{array} \right] \end{aligned}$$

Cálculo de la deflexión en cualquier punto x, Δ1(x)[0..a] y Δ2(x)[a..L]:



#6:

$$\left[\begin{array}{l} \Delta 1(x) := \frac{1}{E \cdot I} \cdot \int_0^x M F 1(x) \cdot (X - x) \, dx \\ \Delta 2(x) := \frac{1}{E \cdot I} \cdot \left(\int_0^a M F 1(x) \cdot (X - x) \, dx + \int_a^X M F 2(x) \cdot (X - x) \, dx \right) \end{array} \right]$$

#7:

$$\left[\begin{array}{l} \Delta 1(x) := \frac{M \cdot X^2}{2 \cdot E \cdot I} - \frac{W \cdot X^2 \cdot (6 \cdot L^2 - 4 \cdot L \cdot X + X^2)}{24 \cdot E \cdot I} \\ \Delta 2(x) := \frac{M \cdot a \cdot (2 \cdot X - a)}{2 \cdot E \cdot I} - \frac{W \cdot X^2 \cdot (6 \cdot L^2 - 4 \cdot L \cdot X + X^2)}{24 \cdot E \cdot I} \end{array} \right]$$

Usando datos para M,W,a,L,E,I:
 SUBST([#7],[W,M,a,L,E,I],[5,10,6,12,1,1])

#8:

$$\left[\begin{array}{l} \Delta 1(x) := - \frac{5 \cdot X^2 \cdot (X^2 - 48 \cdot X + 840)}{24} \\ \Delta 2(x) := - \frac{5 \cdot (X^4 - 48 \cdot X^3 + 864 \cdot X^2 - 288 \cdot X + 864)}{24} \end{array} \right]$$

