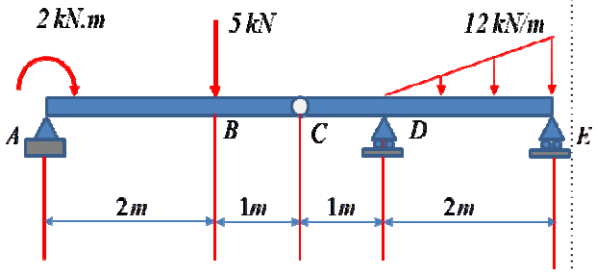
Determinar las leyes de esfuerzo cortante y momento flector de la siguiente estructura así como sus diagramas indicando los puntos más representativos.



1) Cálculo de las reacciones

$$\sum M_c = 0 \rightarrow 2 + 3V_A - 5 = 0$$

$$\mathbf{V_A = 1\ kN}$$

$$\sum M_E = 0 \rightarrow 6.1 + 2 - 5.4 + 2V_D - 12.2/3 = 0$$

$$\mathbf{V_D = 10\ kN}$$

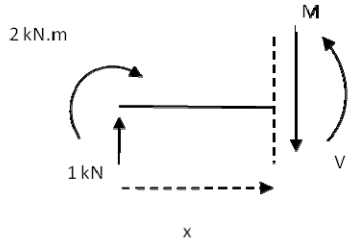
$$\sum F_y = 0 \rightarrow 10 + 1 + V_E = 12 + 5$$

$$\mathbf{V_E = 6\ kN}$$

$$\sum F_x = 0 \rightarrow \mathbf{H_A = 1\ kN}$$

2) Leyes de esfuerzo

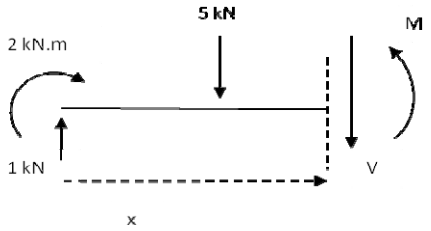
$0 \leq x \leq 2$



$$V_1 = 1\ \text{kN}$$

$$M_1 = x + 2\ \text{kN.m}$$

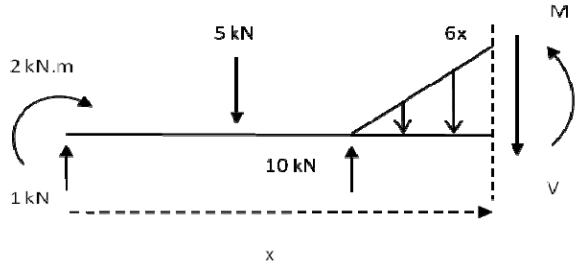
$2 \leq x \leq 4$



$$V_2 = 1 - 5 = -4\ \text{kN}$$

$$M_2 = x + 2 - 5(x - 2) = -4x + 12\ \text{kN.m}$$

$4 \leq x \leq 6$



$$V_3 = -4 + 10 - V_T$$

$$M_3 = -4x + 12 + 10(x - 4) - M_T$$

$$V_T(x) = \int_a^b q(\xi).d\xi = \int_a^b \frac{q\xi}{L}.d\xi = \int_a^b 6\xi.d\xi$$

$$V_T(x) = \int_0^{x-4} 6\xi\, d\xi = 3(x-4)^2$$

$$M_T(x) = \int_a^b V(\xi).d\xi$$

$$M_T(x) = \int_0^{x-4} 3\xi^2\, d\xi = [\xi^3]_0^{x-4} = (x-4)^3$$

$$V_3 = -3x^2 + 24x - 42\ \text{kN}$$

$$M_3 = -x^3 + 12x^2 - 42x + 36\ \text{kN.m}$$

$$M_{max} \rightarrow \frac{dM_3(x)}{dx} = V(x) = 0 \rightarrow x = 5{,}41\ \text{m}$$

$$M_{max} = M_3(x = 5{,}41) = 1{,}66\ \text{kN.m}$$

3) Diagramas