

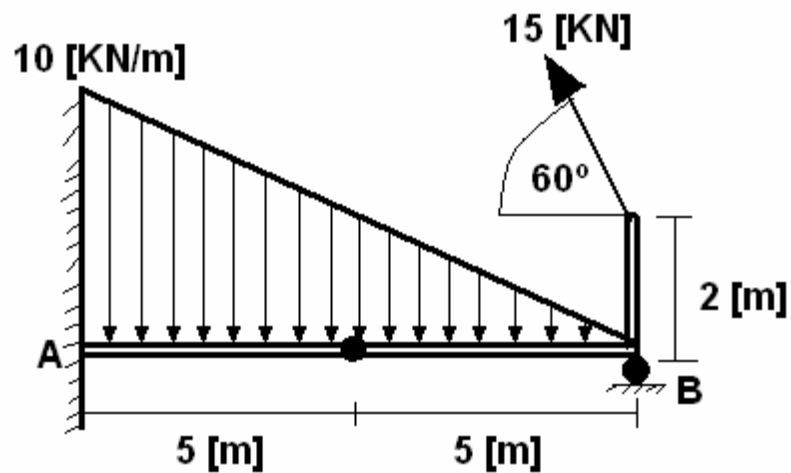
Ejercicio N°1

Primavera 2008

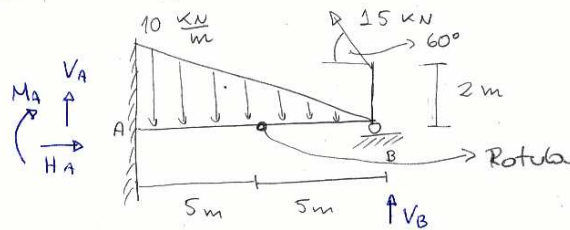
PREGUNTA 1

Para el esquema de la figura, calcular todas las reacciones. Luego de esto realizar los diagramas de las fuerzas internas (H, V, M) para la viga A-B.

HINT: La barra posee una rótula en su punto medio.



PAUTA



$$\sum x: H_A - 15 \cos 60^\circ = 0 \Rightarrow H_A = 7,5 \text{ [kN]}$$

$$\sum y: V_A - \frac{10 \cdot 10}{2} + 15 \sin 60^\circ + V_B = 0 \Rightarrow V_A + V_B = 50 - \frac{15\sqrt{3}}{2}$$

$$\sum M_B: -V_A \cdot 10 + \frac{10 \cdot 10}{2} \cdot \left(\frac{2}{3}\right) 10 + 15 \cdot \cos 60^\circ \cdot 2 - M_A = 0$$

Condición Rotula:

$$M + \frac{1}{3} \cdot 5 \cdot \frac{5 \cdot 5}{2} - V_B \cdot 5 - 15 (\cos 60^\circ \cdot 2 + \sin 60^\circ \cdot 5) = 0$$

$$\Rightarrow V_B = \frac{7 - 45\sqrt{3}}{6} = -11,8237 \text{ [kN]}$$

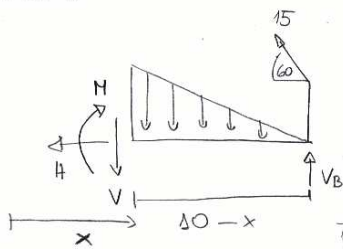
Reemplazo en $\sum y$:

$$\Rightarrow V_A = \frac{293}{6} = 48,833 \text{ [kN]}$$

Reemplazo en $\sum M_B$:

$$\Rightarrow M_A = -140 \text{ [kN}\cdot\text{m]}$$

Cortes:

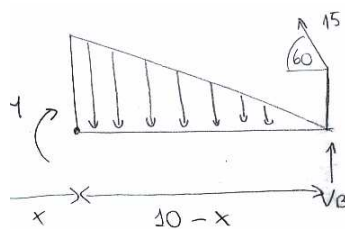


$$H + 15 \cos 60^\circ = 0$$

$$H = -7,5 \text{ [kN]}$$

$$V + \frac{(10-x)^2}{2} - V_B - 15 \sin 60^\circ = 0$$

$$V = \frac{7 - 45\sqrt{3}}{6} + \frac{15\sqrt{3}}{2} - \frac{(10-x)^2}{2}$$



$$M + \frac{(10-x)^2}{2} \cdot \frac{1}{3} (10-x) - V_B \cdot (10-x)$$

$$- 15 (\cos 60^\circ \cdot 2 + \sin 60^\circ \cdot (10-x)) = 0$$

$$M = \frac{7 - 45\sqrt{3}}{6} \cdot (10-x) + 15 \left(1 + \frac{(10-x)\sqrt{3}}{2} \right) - \frac{(10-x)^3}{6}$$

