Esfuerzos internos en pórtico

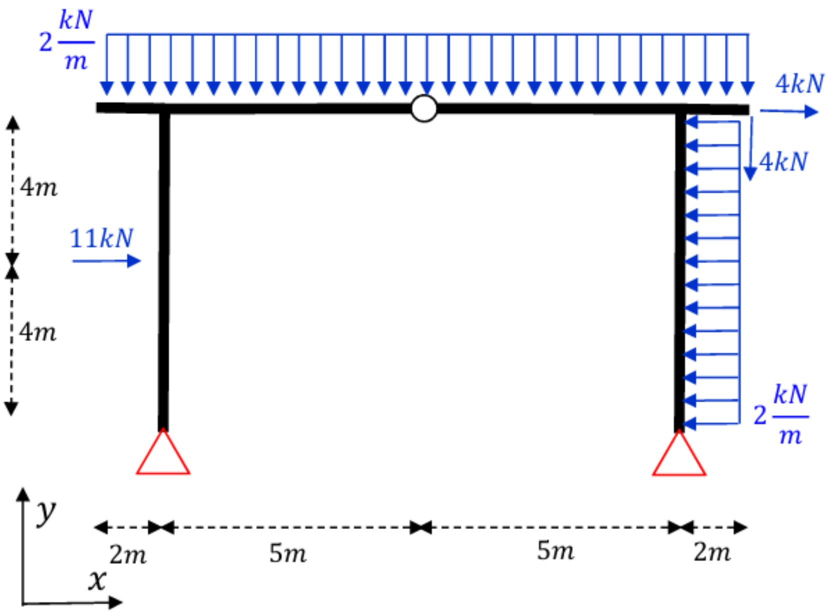
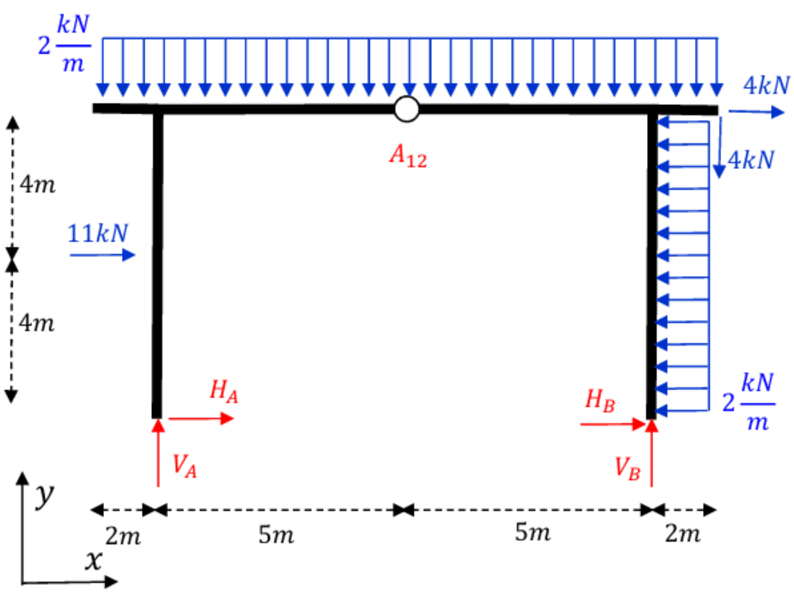


Diagrama de Cuerpo libre



Reacciones de vínculos

$$\sum M_B = 0 = V_A x10 + 11x4 - 2x14x5 + 4x8 + 4x2 - 2x\frac{8^2}{2}$$

$$\boxed{V_A = 12kN}$$

$$\sum M_A = 0 = 11x4 + 2x14x5 + 4x8 + 4x12 - 2x8x4 - V_B x10$$

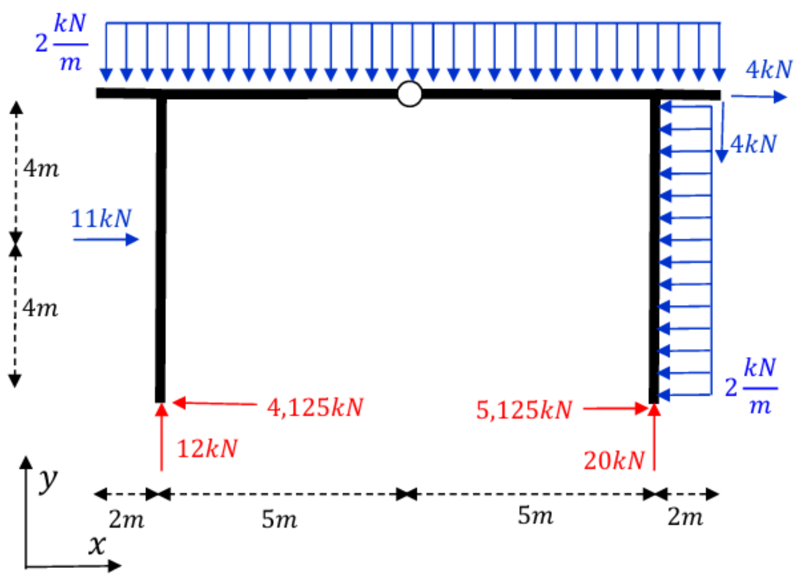
$$\boxed{V_B = 20kN}$$

$$\sum M_{A12(S1)} = 0 = 12x5 - 11x4 - 2x7x3.5 + H_A x8$$

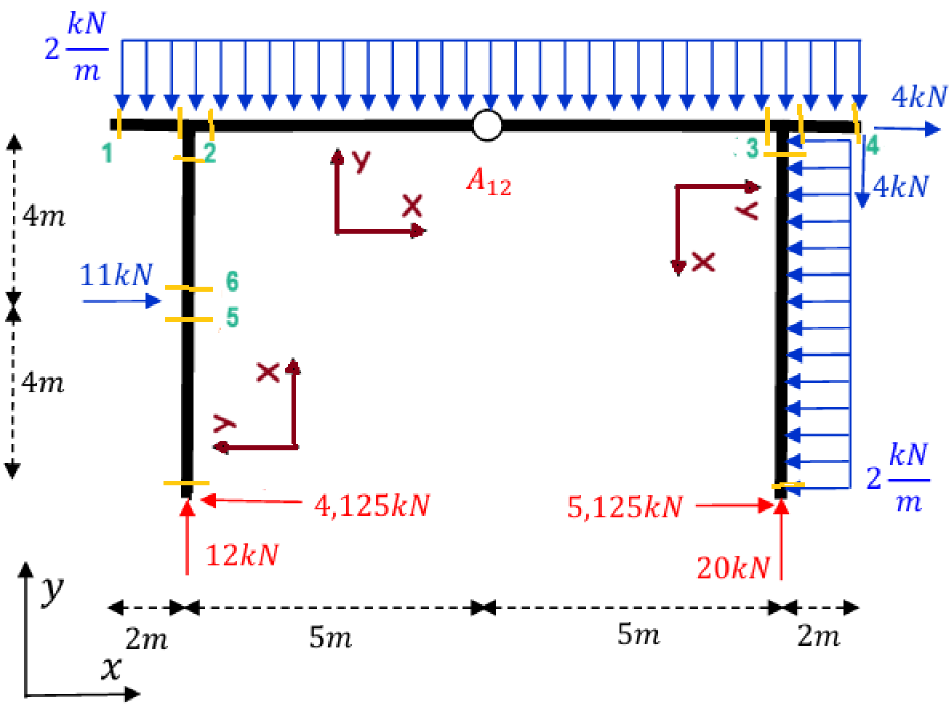
$$\boxed{H_A = 4.125kN}$$

$$\sum M_{A12(S2)} = 0 = -20x5 + 2x8x4 + 2x7x3.5 + 4x7 - H_B x8$$

$$\boxed{H_B = 5.125kN}$$



Se identifican los puntos de discontinuidad para los diagramas de esfuerzos



Ley de variación de esfuerzos columna izquierda

$0 \leq x < 4m$

$$N(A-5) = -12kN$$

$$Q(A-5) = 4{,}125kN$$

$$M(A-5) = 4{,}125kN.x$$

$4 \leq x < 8m$

$$N(6-2) = -12kN$$

$$Q(6-2) = 4{,}125kN - 11kN = -6{,}875kN$$

$$M(6-2) = 4{,}125kN.x - 11.(x-4)$$

Ley de variación de esfuerzos voladizo izquierdo

$0 \leq x < 2m$

$$N(1-2)=0$$

$$Q(1-2)=-2.x$$

$$M(1-2)=-2.\frac{x^2}{2}$$

Ley de variación de esfuerzos tramo 2-3

$0 \leq x < 10m$

$$N(2-3)=-6{,}875kN$$

$$Q(2-3)=-2.2+12-2.x$$

$$M(2-3)=-11-4(x+1)+12.x-2.\frac{x^2}{2}$$

Ley de variación de esfuerzos columna derecha

$0 \leq x < 8m$

$$N(3-B)=(12-2.14-4)=-20kN$$

$$Q(3-B)=-4{,}125+11+4-2.x$$

$$M(3-B)=-12-11.(4-x)+4{,}125.(8-x)+4.x-2.\frac{x^2}{2}$$

Ley de variación de esfuerzos voladizo derecho

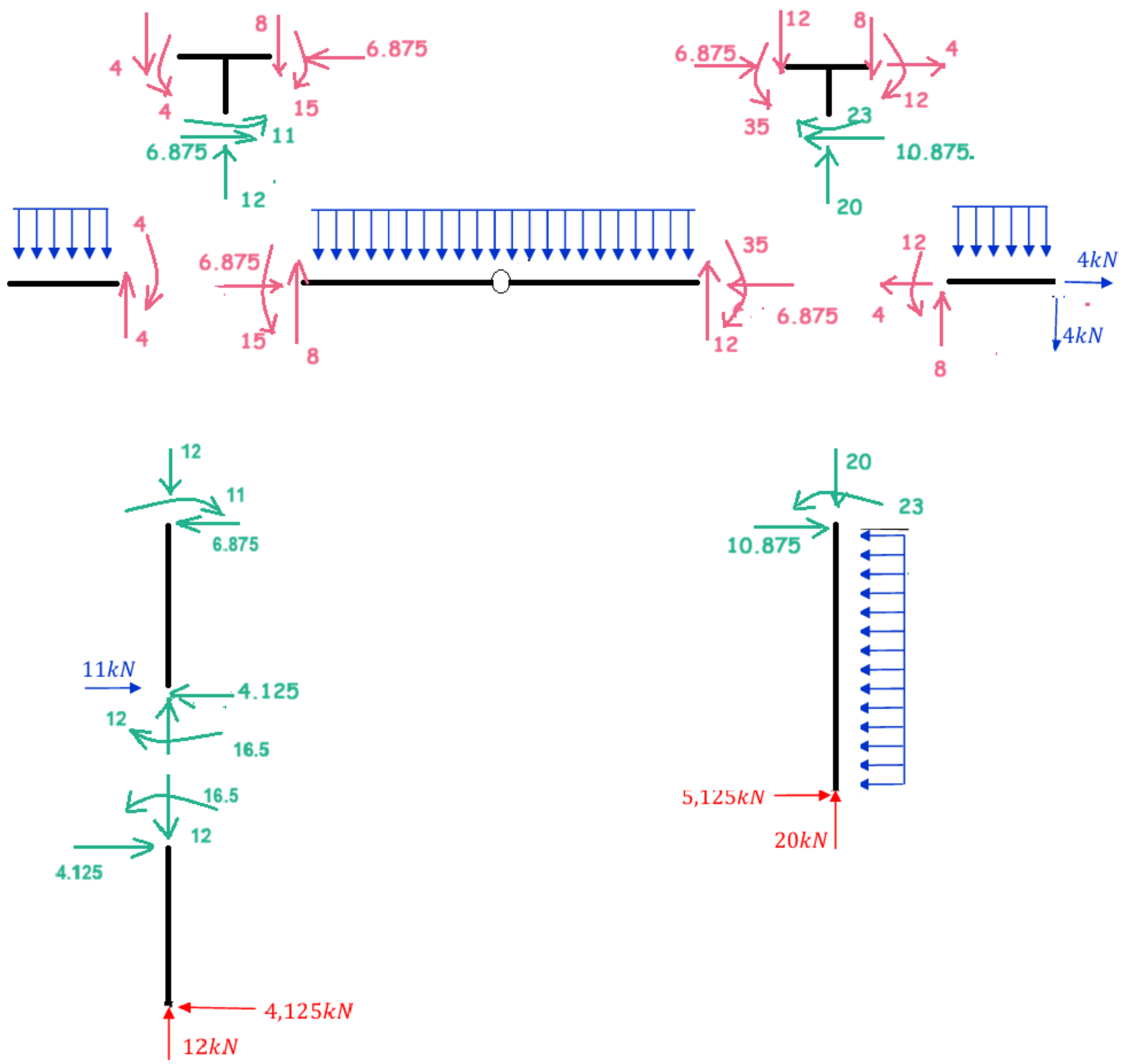
$0 \leq x < 2m$

$$N(3-4)=(4{,}125-11+2.8-5{,}125)=4kN$$

$$Q(3-4)=12-2.12+20-2.x$$

$$M(3-4)=12+12.(10+x)-2.12.(6+x)+20.x-2.\frac{x^2}{2}$$

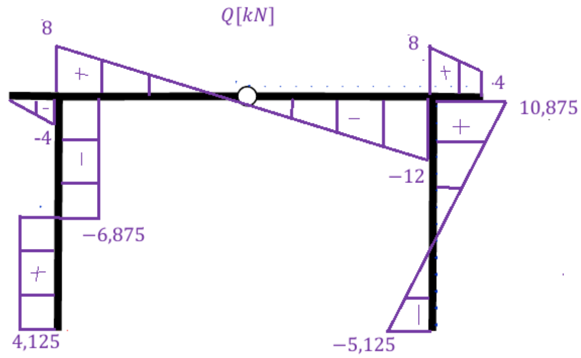
Planteo de equilibrio en barras

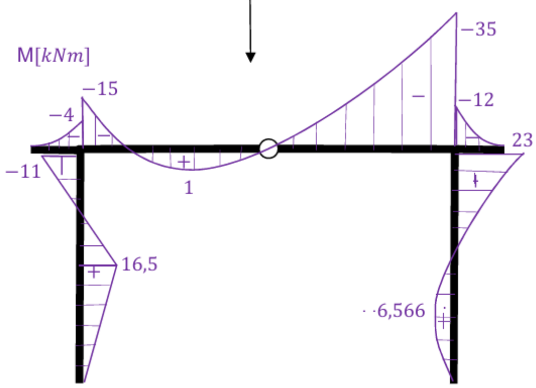


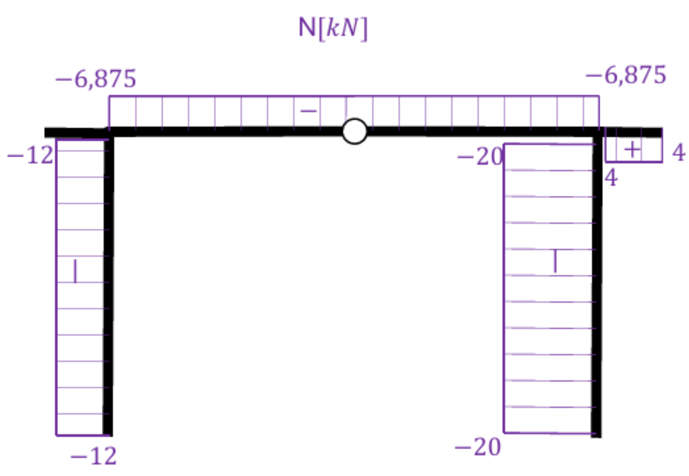
Diagramas

$$Corte: \quad \frac{dQ_z(x)}{dx} = -q_z(x)$$

$$Momento: \quad \frac{dM(x)}{dx} = Q_z(x)$$

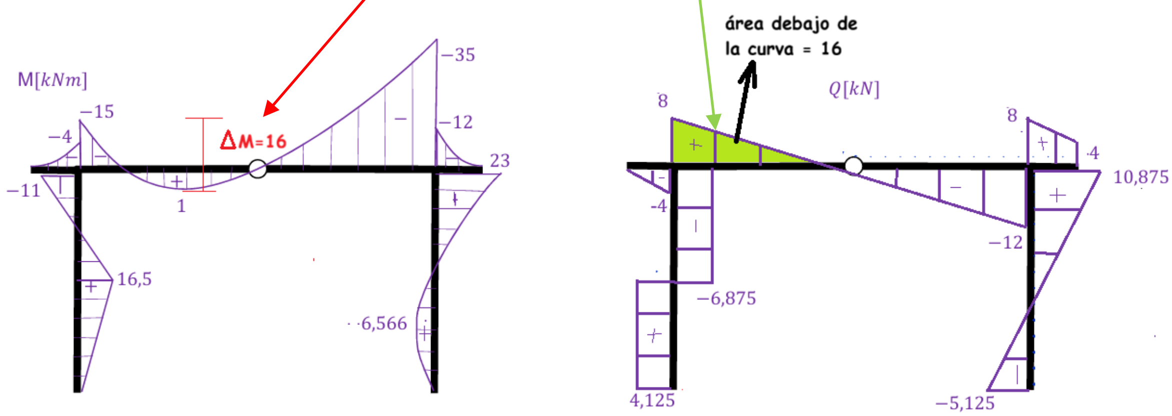






$$Normal: \quad \frac{dN(x)}{dx} = -q_x(x)$$

$$M_2 - M_1 = \int_{x_1}^{x_2} Q(x)dx$$



$$Q_2 - Q_1 = -\int_{x_1}^{x_2} q(x)dx$$