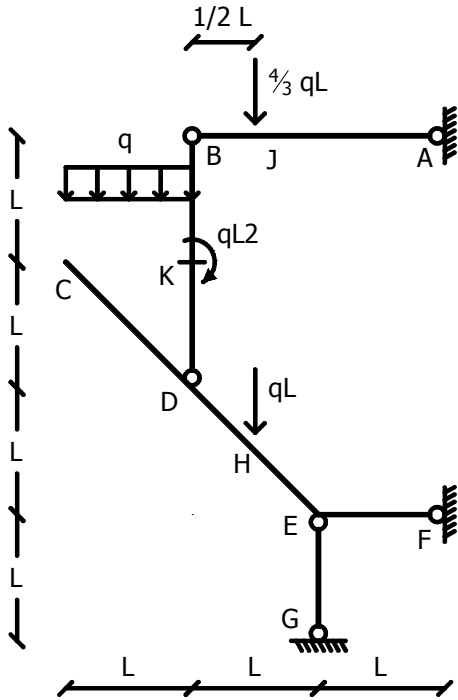


Ejercicio 1



a)

$$M_B^{der} = 0 \Rightarrow \frac{4}{3} qL \cdot \frac{L}{2} = V_A \cdot 2L$$

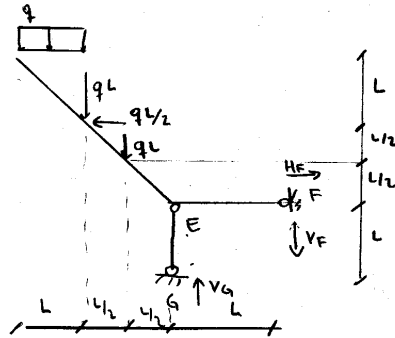
$$\rightarrow V_A = \frac{1}{3} qL$$

$$M_B^{izq} = 0 \Rightarrow qL^2 = 2L H_D$$

$$\rightarrow H_D = \frac{qL}{2}$$

$$\sum V = 0 \quad V_D = -V_A + \frac{4}{3} qL \Rightarrow \underline{V_D = qL}$$

$$\sum H = 0 \quad \underline{H_A = H_D = \frac{qL}{2}}$$

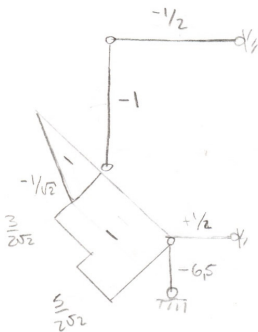


$$M_F = 0 \Rightarrow V_G L = qL^2 \left(\frac{3}{2} + 2 + \frac{5}{2} + 1 \right) \Rightarrow \underline{V_G = 6,5 qL}$$

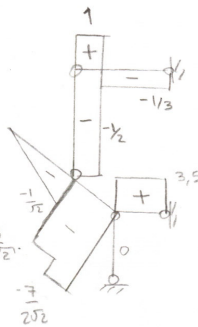
$$\sum V = 0 \Rightarrow V_G - V_F - qL \cdot 3 = 0 \Rightarrow \underline{V_F = 3,5 qL}$$

$$\sum H = 0 \Rightarrow \underline{H_F = \frac{qL}{2}}$$

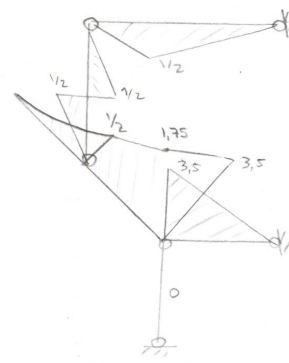
$\frac{11}{qL}$



$\frac{V}{qL}$



$\frac{11}{qL^2}$



$$A = 2 \times 22,8 \text{ cm}^2 = 45,6 \text{ cm}^2$$

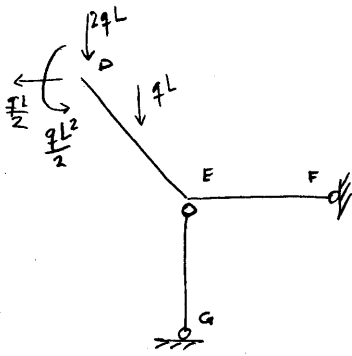
$$W_x = 161 \text{ cm}^3 \times 2 = 322 \text{ cm}^3$$

b) 2PNI 13 II \Rightarrow

El punto E izq. tiene $M = 3,5 qL^2$
 $N = \frac{-5}{2\sqrt{2}} qL$ } $\Rightarrow \sigma = q \left[\frac{35000}{322} + \frac{500}{2\sqrt{2}} \cdot \frac{1}{45,6} \right] \leq 1,4 \text{ t/cm}^2$

$$q_{adm} = 0,012 \text{ t/cm}$$

$$q_{adm} = 1,24 \text{ t/m}$$



$$2 \text{ PNI } 18 \rightarrow A = 2.27,9 \text{ cm}^2 = 55,8 \text{ cm}^2$$

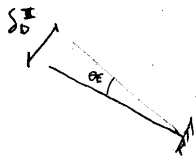
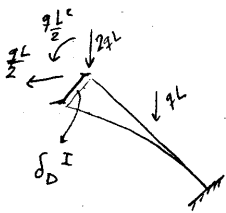
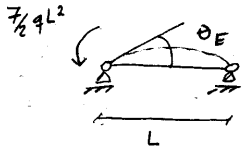
$$I = 2.1450 \text{ cm}^4 = 2900 \text{ cm}^4$$

$$E = 2,1 \cdot 10^3 \text{ t/cm}^2$$

$$q = 1,3 \text{ t/m} \rightarrow 1,3 \cdot 10^{-2} \text{ t/cm}$$

$$L = 1 \text{ m} \rightarrow 1 \cdot 10^2 \text{ cm}$$

$$\theta_E = \frac{7}{2} \frac{qL^2 L}{3EI} \quad (5)$$



$$\left\{ \begin{aligned} \delta_D^{I'} &= \frac{5qL^3}{2\sqrt{2}3EI} = \frac{5 \cdot 2\sqrt{2}}{2\sqrt{2} \cdot 3} \frac{qL^4}{EI} = \frac{5}{3} \frac{qL^4}{EI} \\ \delta_D^{I''} &= \frac{1}{\sqrt{2}} qL \frac{L^2}{4} \frac{(3L' - L'/2)}{6EI} = \frac{2 \cdot 5 \cdot \sqrt{2}}{\sqrt{2} \cdot 2 \cdot 4 \cdot 6} \frac{qL^4}{EI} = 0,21 \frac{qL^4}{EI} \\ \delta_D^{I'''} &= \frac{qL^2}{2} \frac{L'^2}{2EI} = \frac{2}{2 \cdot 2} \frac{qL^4}{EI} = \frac{1}{2} \frac{qL^4}{EI} \end{aligned} \right.$$

$$\rightarrow \delta_D^I = \delta_D^{I'} + \delta_D^{I''} + \delta_D^{I'''} = 2,38 \frac{qL^4}{EI} \quad (\checkmark)$$

$$\delta_D^{II} = \theta_E \cdot L\sqrt{2} = \frac{7\sqrt{2}}{6} \frac{qL^4}{EI} = 1,65 \frac{qL^4}{EI} \quad (\checkmark)$$

$$\delta_D = \delta_D^I + \delta_D^{II} = 4,03 \frac{qL^4}{EI} \quad (\checkmark)$$

$$\delta_D = 4,03 \cdot \frac{1,3 \cdot 10^{-2} \text{ t/cm} \cdot (1 \cdot 10^2 \text{ cm})^4}{2,1 \cdot 10^3 \text{ t/cm}^2 \cdot 2900 \text{ cm}^4} = 0,82 \text{ cm} \quad (\checkmark)$$

en dirección perpendicular a la barra

$$\boxed{\delta_D^H = 0,58 \text{ cm} \quad (\leftarrow) \quad \delta_D^V = 0,58 \text{ cm} \quad (\downarrow)}$$