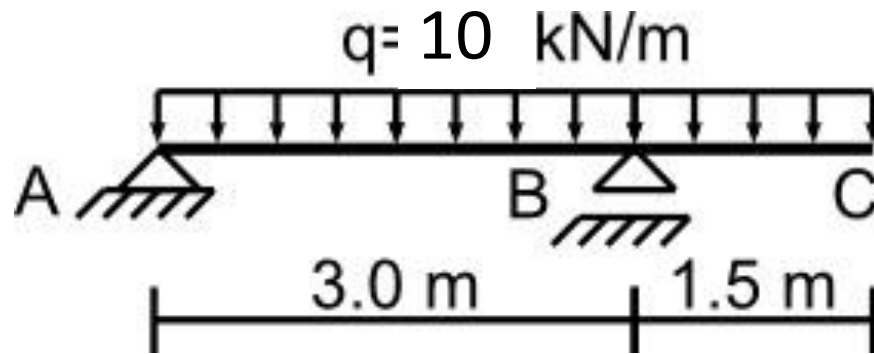


Ejemplos

Ejemplo

Ejemplo:



- Reacciones
- V y M en el punto B.
- b) Diagrama de V
- Bosquejar deformada.
- Hallar valores característicos.

La viga de la *figura 2* está formada por un *PNI 22*.
Hallar el valor de la carga admisible q , suponiendo que la viga
está construida con un metal de $\sigma^{\text{adm}} = 140 \text{ MPa}$.

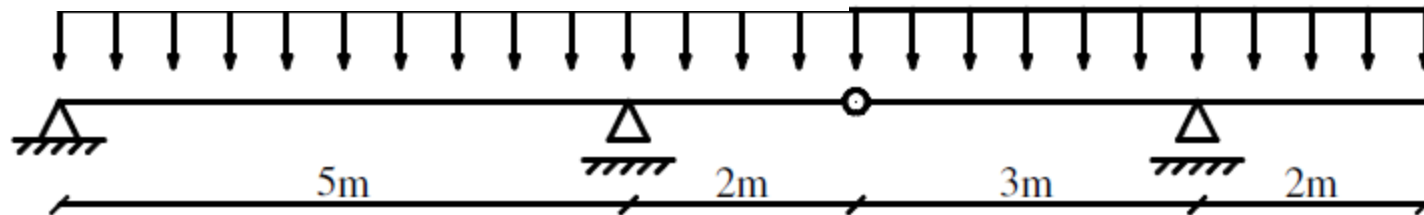
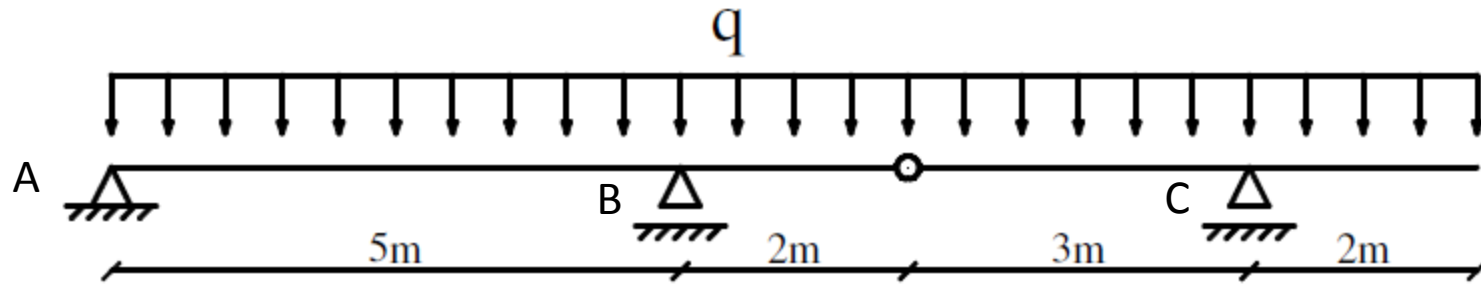


figura 2



Asumiendo $q=1\text{kN/m}$

$$R_A + R_B + R_C = 12$$

Suma $M_{\text{der_art}} = 0$

$$5 \cdot 2.5 - 3 \cdot R_C = 0$$

$$R_C = 12.5/3 \text{ kN}$$

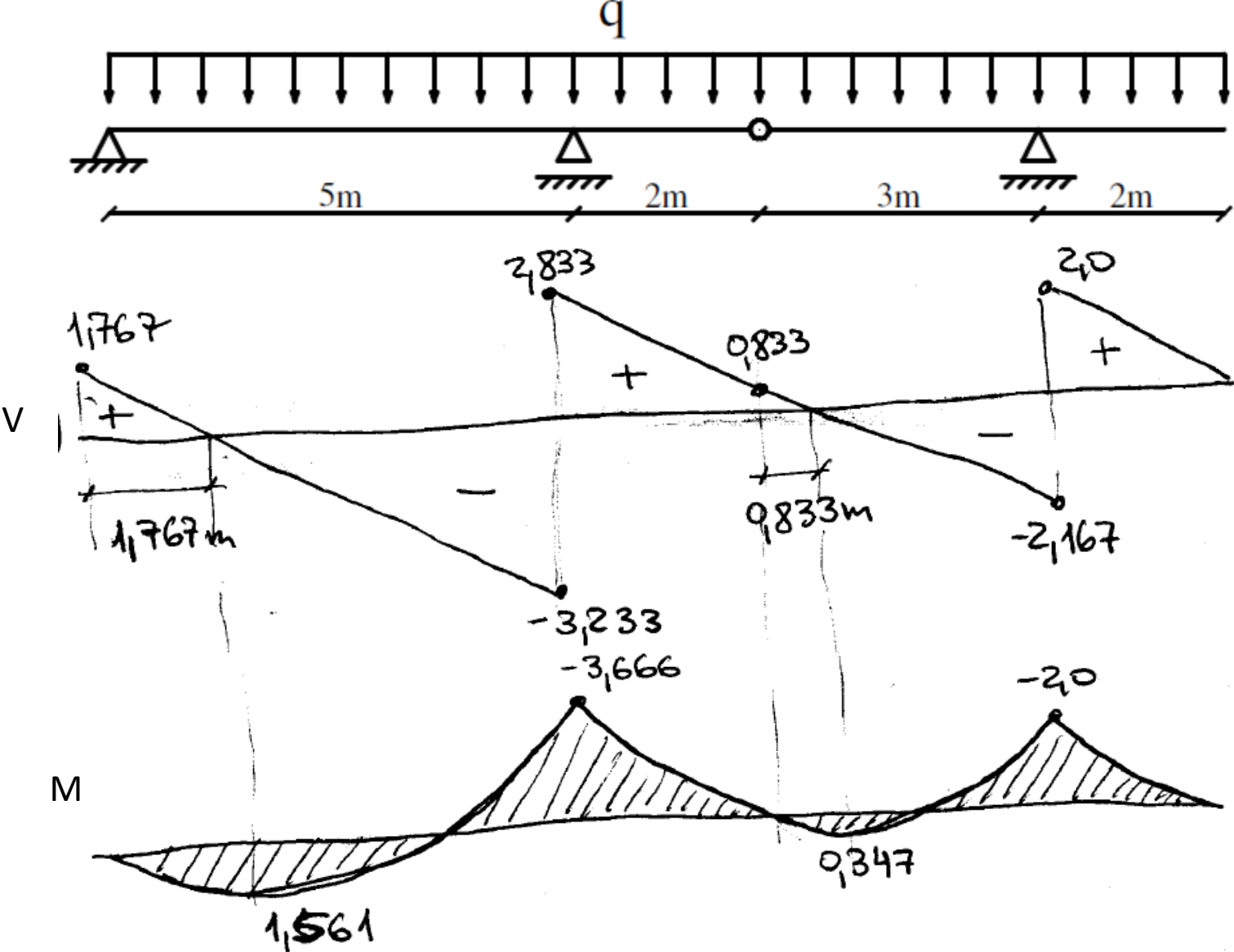
Suma $M_{\text{izq_art}} = 0$

$$2 \cdot R_B + 7 \cdot R_A - 7 \cdot 3.5 = 0$$

$$R_A = 1.767 \text{ kN}$$

$$R_B = 6.066 \text{ kN}$$

Diagramas



q admisible

$$W_x = 278 \text{ cm}^3 \text{ sale de Tablas}$$

$$M_{\max} = -3.666 \cdot q$$

$$\sigma > M_{\max} / W_x$$

$$140 \cdot 10^6 > 3.666 \cdot q / 278$$

$$q < 140 \cdot 10^6 \cdot 278 / 10^6 / 3.666$$

$$q < 10.6 \text{ kN/m}$$

A la misma viga se le piensa aumentar su carga de servicio a **1800 kg/m**. Para ello se la reforzará soldando dos **placas metálicas** del mismo material de espesor **1,5 cm** como se muestra en la *figura 1*.

Hallar el ancho d necesario de las **placas metálicas**.

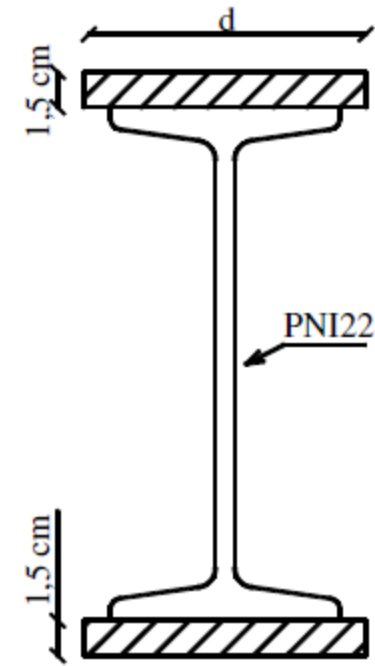


figura 1

Módulo Resistente

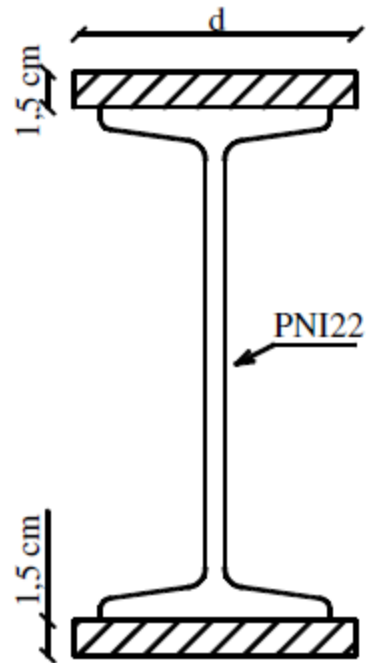


figura 1

PNI 22

$$I_{xPNI22} = 3060 \text{ cm}^4$$

$$I_x = 3060 + 2 * [(d * 1.5^3) / 12 + d * 1.5 * (11 + 1.5/2)^2]$$

$$I_x = 3060 + 2 * d * 207.375 \text{ cm}^4$$

$$W_x = I_x / y$$

$$W_x = (3060 + 2 * d * 207.4) / 12.5$$

Espesor d

$$q = 18 \text{ kN/m}$$

$$\sigma > M_{\max}/W_x$$

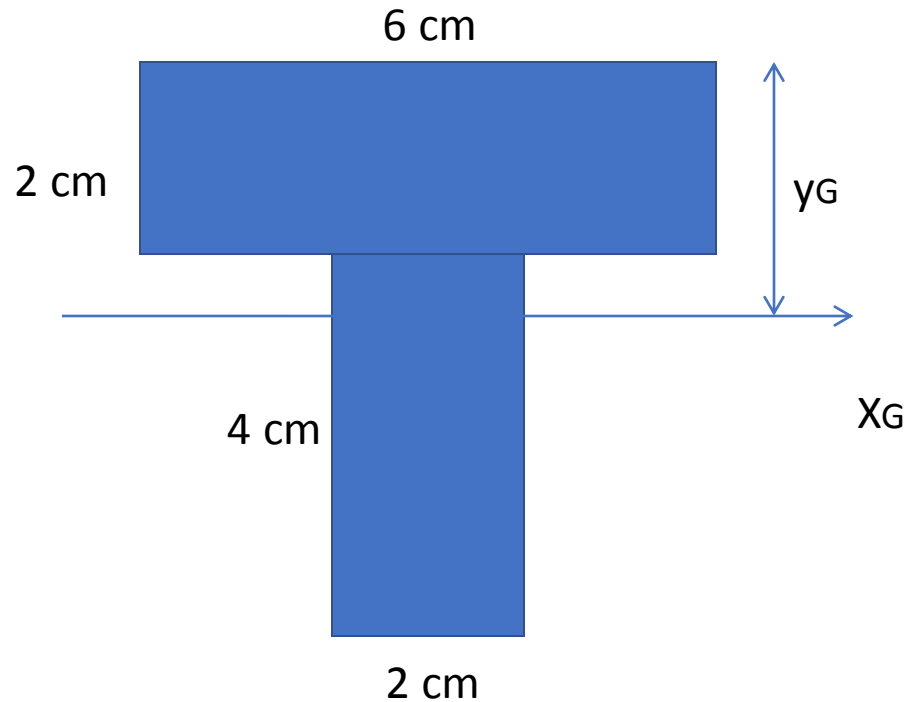
$$140 \text{ MPa} > M_{\max}/(3060 + 2 \cdot d \cdot 207.4)/12.5$$

$$140 \text{ MPa} > 3.7 \cdot 18 / (3060 + 2 \cdot d \cdot 207.4) / 12.5$$

$$140 > 3.7 \cdot 18 / (244.8 + 33.2d)$$

$$d > 6.8 \text{ cm}$$

Hallar q admisible

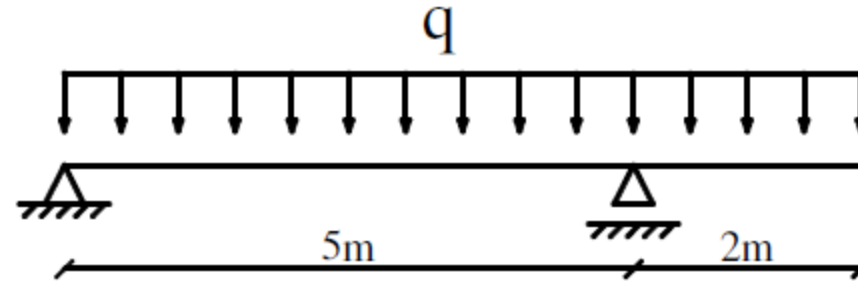


$$A \cdot y_G = y_1 A_1 + y_2 A_2$$

$$y_G \cdot (6 \cdot 2 + 2 \cdot 4) = 1 \cdot 6 \cdot 2 + 4 \cdot 2 \cdot 4$$

$$y_G = 44/20 \text{ cm} = 2.2 \text{ cm}$$

$$I_G = 6^4/12 + 0.8^2 \cdot 6 \cdot 6 - 2 \cdot (2 \cdot 4^3/12 + 1.8^2 \cdot 2 \cdot 4) = 57.9 \text{ cm}^4$$



Asumiendo $q = 1 \text{ kN/m}$

$$R_1 + R_2 = 7$$

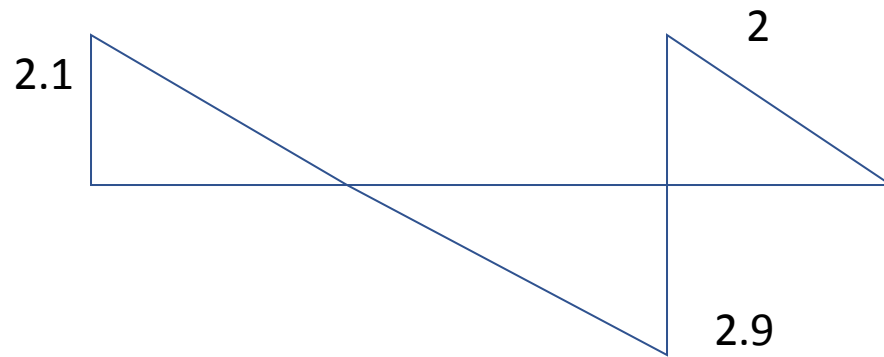
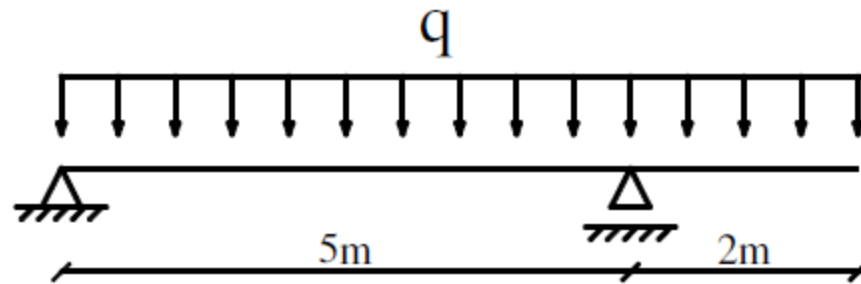
$$3.5 \cdot 7 - 5 \cdot R_2 = 0$$

$$R_2 = 4.9 \text{ kN}$$

$$R_1 = 2.1 \text{ kN}$$

$$W_{\text{sup}} = 57.9/2.2 = 26.3 \text{ cm}^3$$

$$W_{\text{inf}} = 57.9/3.8 = 15.2 \text{ cm}^3$$



$$M_{\max+} = 2.2 \text{ kN.m}$$

$$M_{\min-} = 2.0 \text{ kN.m}$$

$$\sigma = M_{\max+} / W_{\text{inf}} = 2.2 \text{ kN.m} / W_{\text{inf}}$$

$$q < 140 * 15.2 / 2.2 = 0.97 \text{ kN/m}$$

Dimensionar con un PNI

