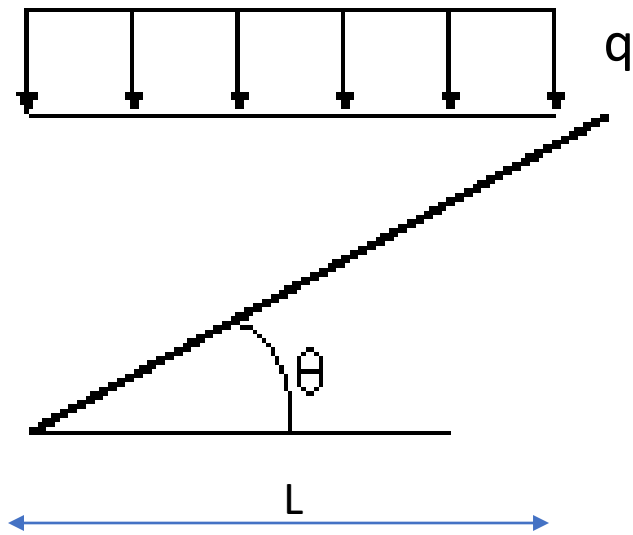
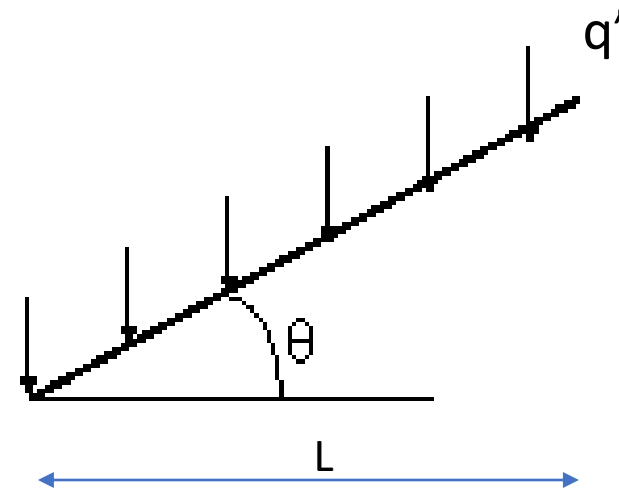


Continuación Pórticos

Carga distribuida

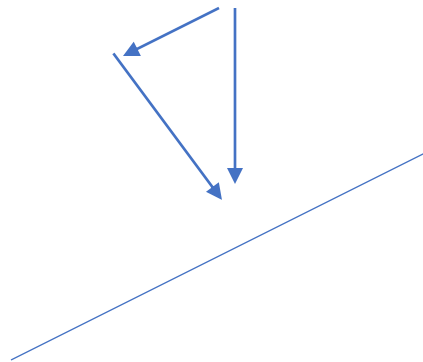
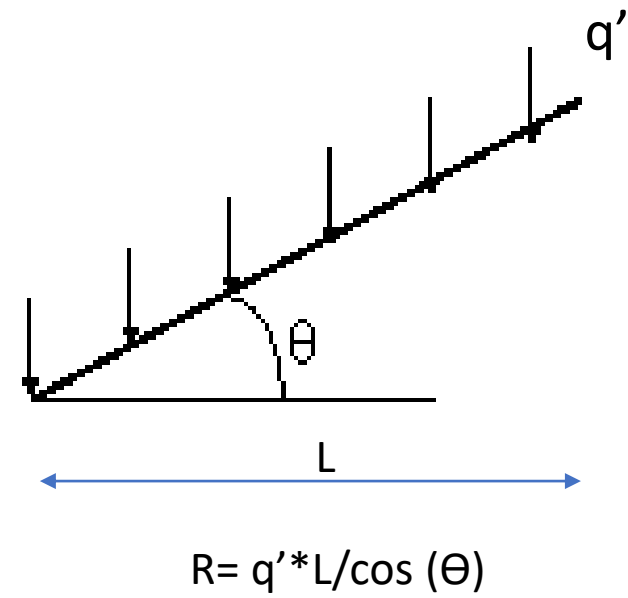
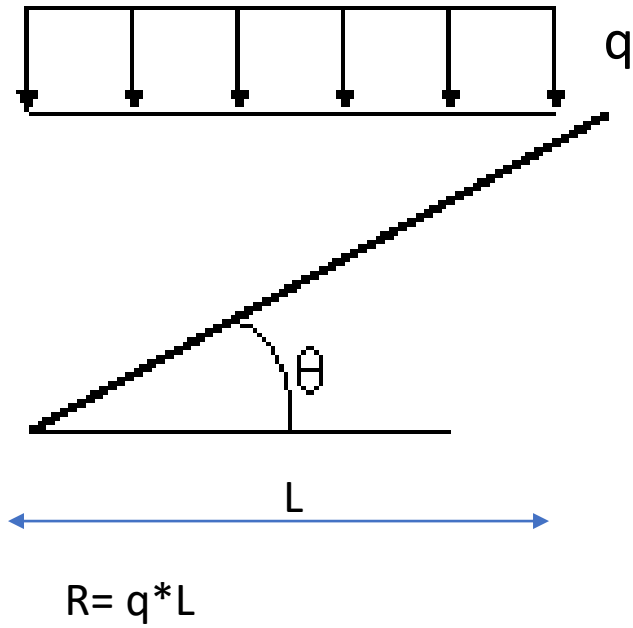


$$R = q * L$$



$$R = q' * L / \cos (\theta)$$

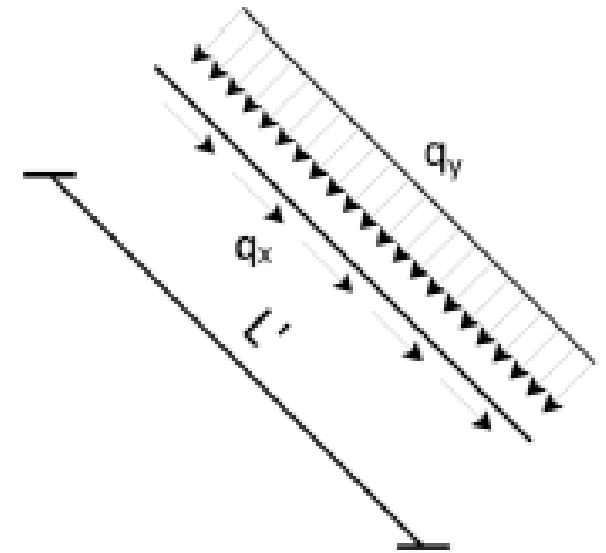
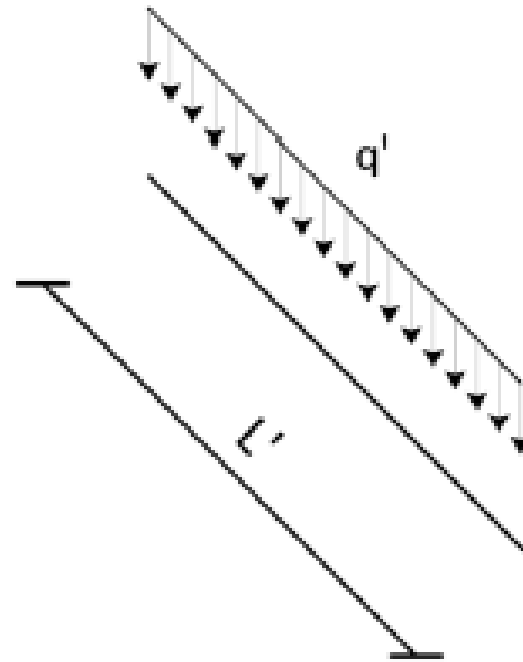
Carga distribuida

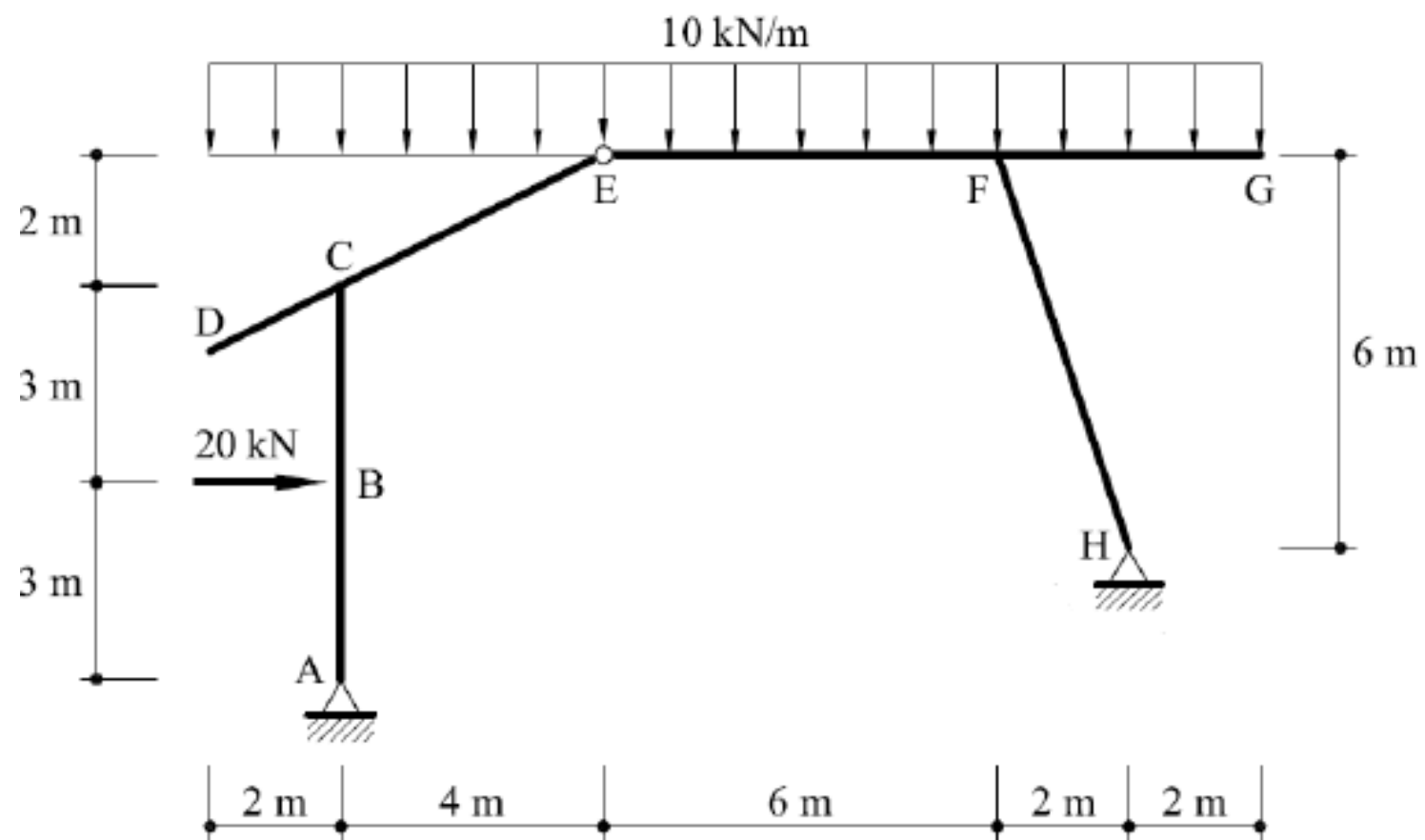


Puede resultar útil trabajar con la carga en los ejes locales de la barra, por lo que descomponemos en cargas q_x y q_y

$$q_y = q' \cos \alpha$$

$$q_x = q' \sin \alpha$$





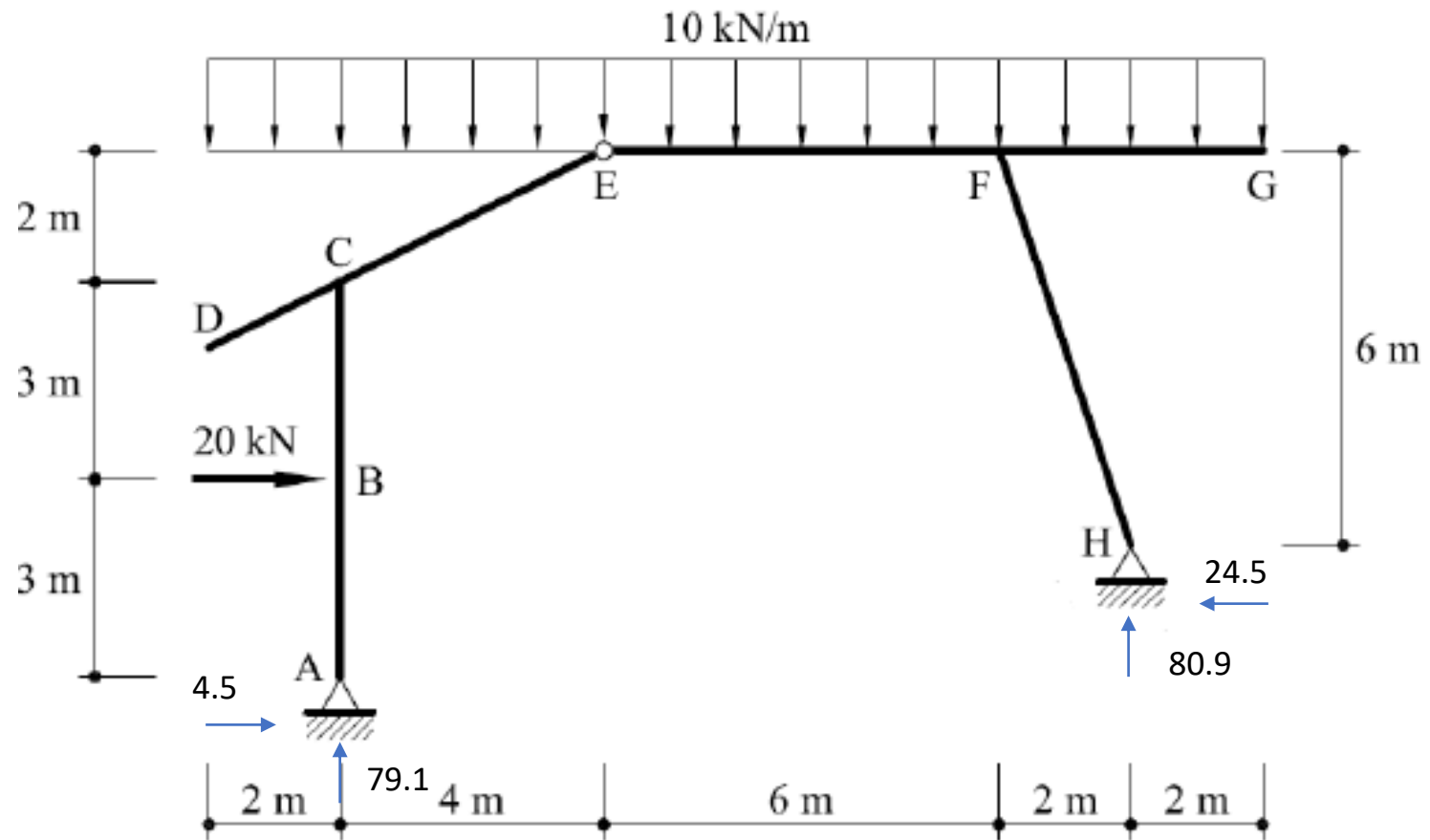
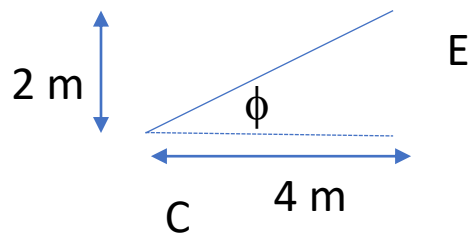
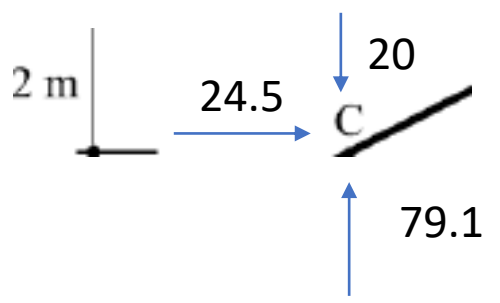


Diagrama de Directa

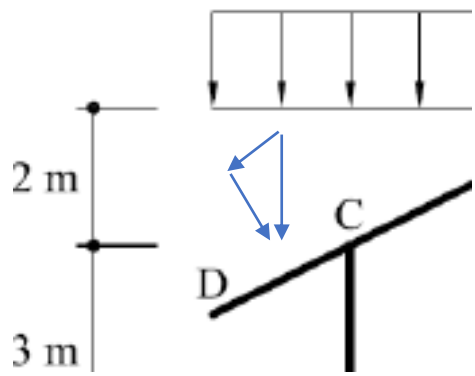


$\tan \phi = 2/4$
 $\cos \phi = 0.8944$
 $\sin \phi = 0.4472$



$59.1 * 0.4475 + 24.5 * 0.8944 = 48.4 \text{ kN}$

$19.1 * 0.4475 + 24.5 * 0.8944 = 30.5 \text{ kN}$

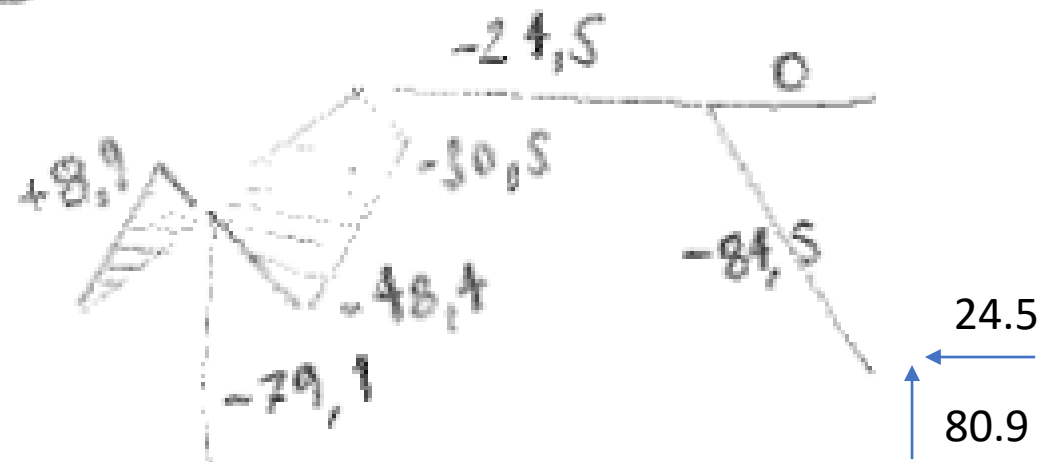


$qN = 10 * 0.4472$
 $qV = 10 * 0.8944$

Directa DC en C

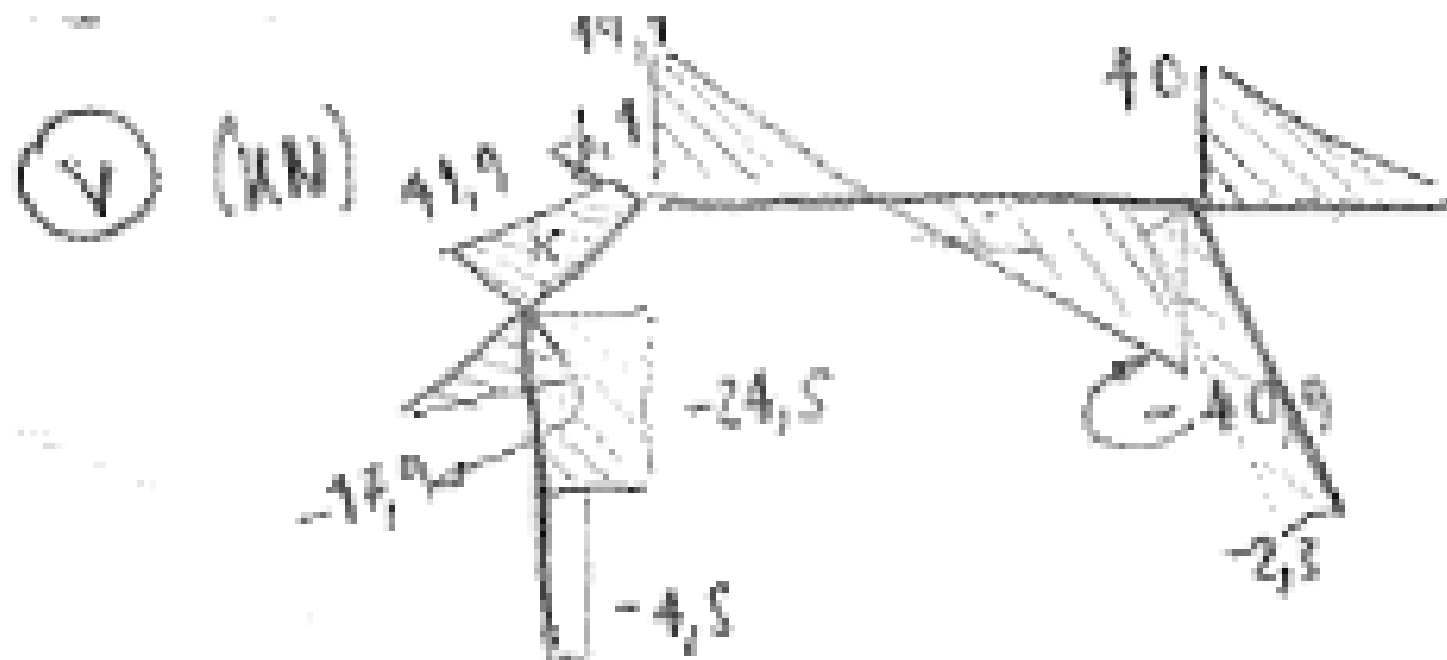
$N_{DC} = 2 * 10 * 0.4472 = 8.9 \text{ kN}$

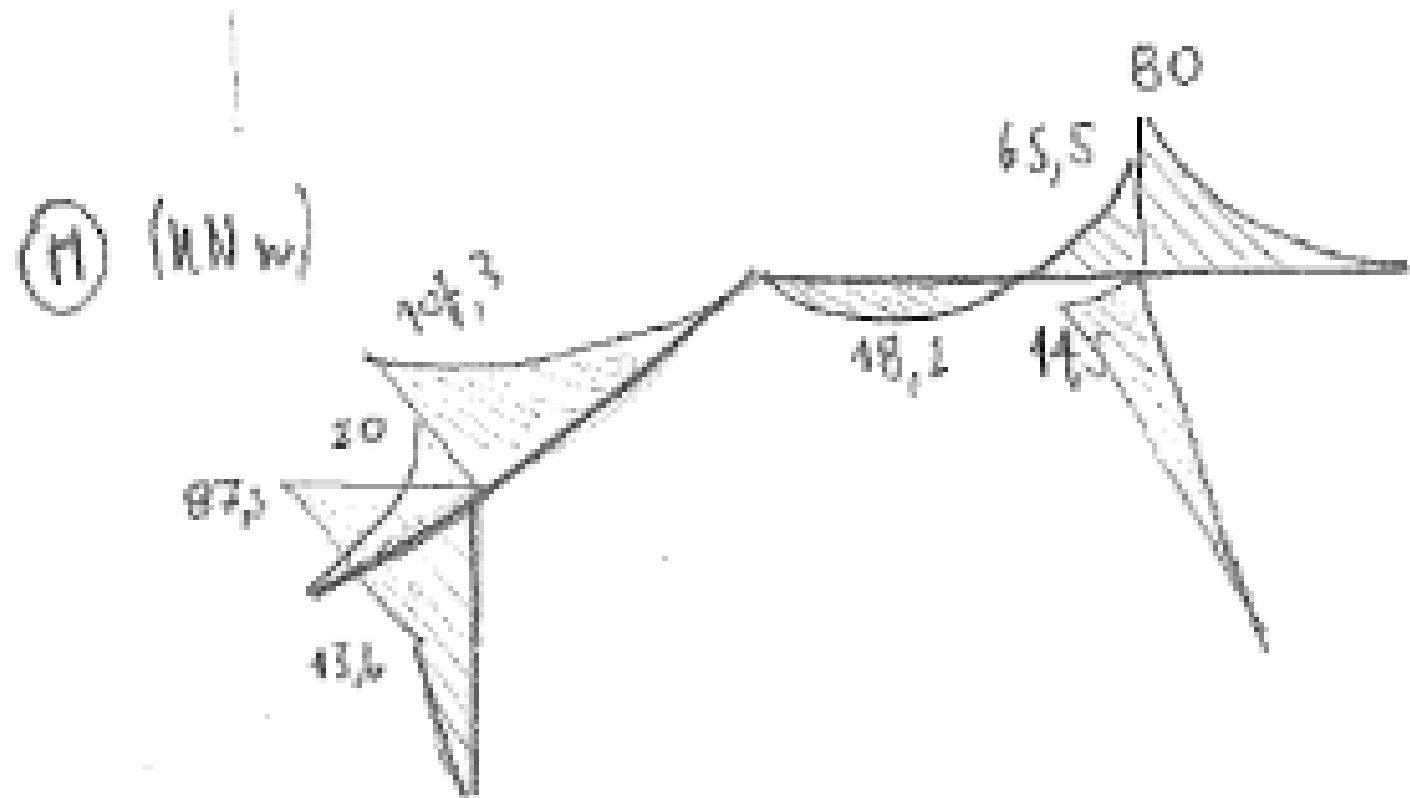
(N) (xN)



$24.5 * \sin a + 80.9 * \cos a = 84.5 \text{ kN}$

Diagrama de Cortante



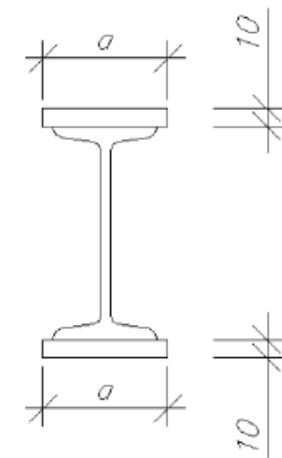
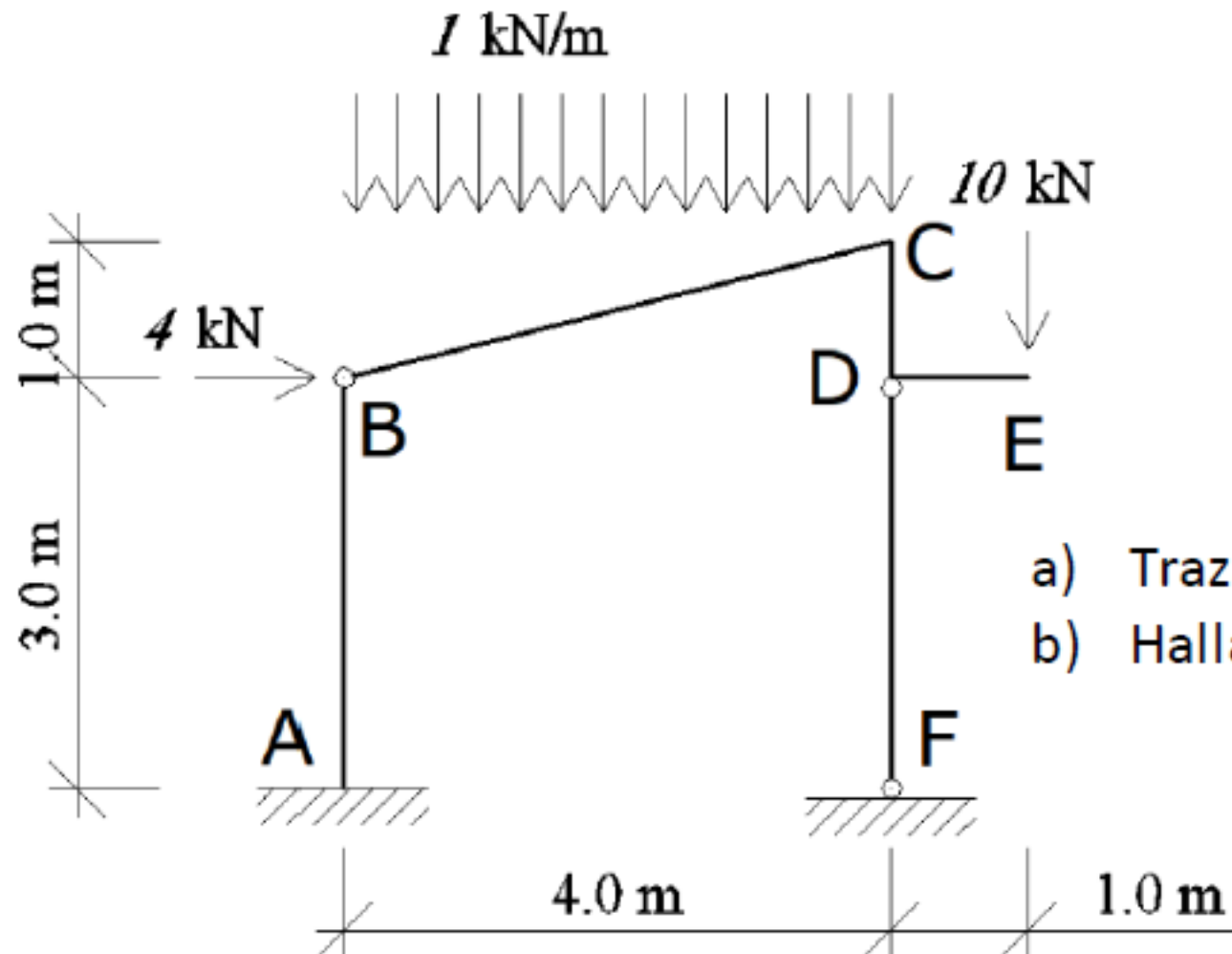


Gere, 5^a Ed. (2002): 5.12

Ortiz Berrocal, 3^a Ed. (2007): 6.5

Beer, 3^a Ed. (2004): 4.12

La estructura de la figura 4, ABCDEF, se encuentra sometida a una carga uniformemente distribuida hacia abajo de 1 kN/m en el tramo BC, a una carga puntal de 10 kN hacia abajo aplicada en el punto E y a una carga puntal de 4 kN horizontal y hacia la derecha aplicada en el punto B. La estructura se materializa mediante una sección formada por un perfil PNI 120 y dos planchuelas metálicas de 10 mm de espesor cada una; siendo éstas del mismo material que el perfil. Se pide:

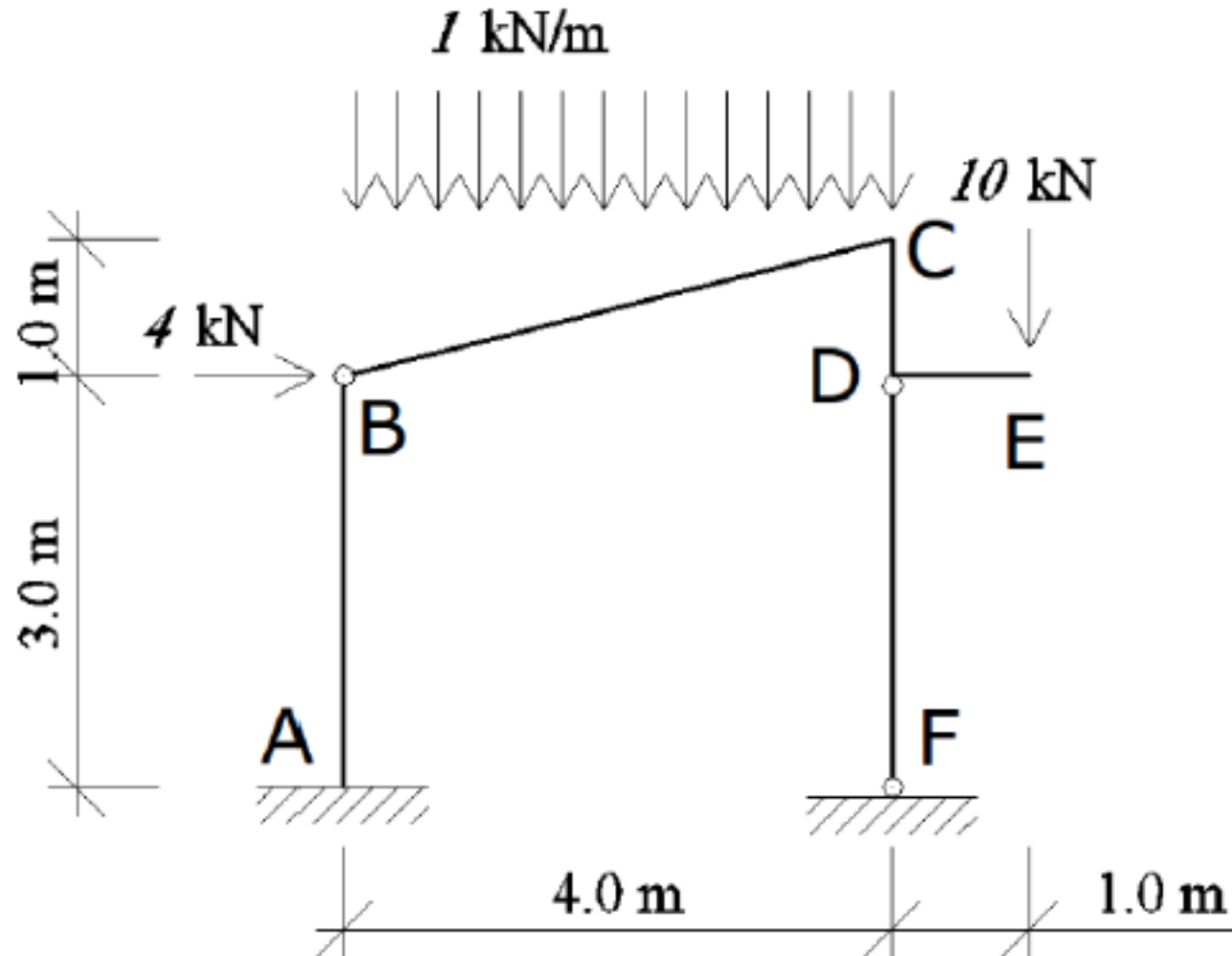


UNIDADES EN mm .

- Trazar los diagramas de solicitaciones.
- Hallar el valor del ancho a de las planchuelas,

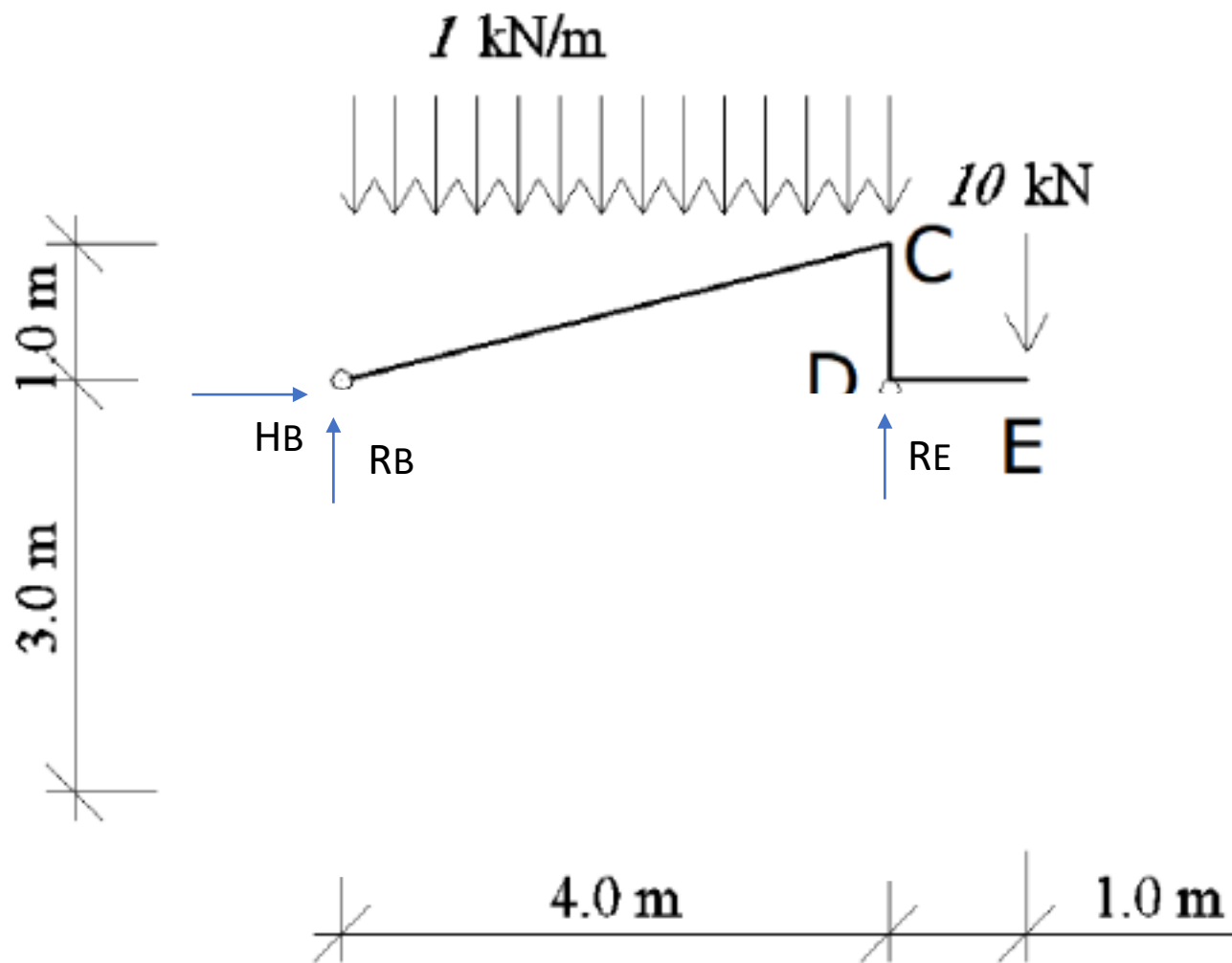
tensión normal admisible de 140 MPa
 tensión rasante admisible de 90 MPa

Hallar reacciones



$$\cos(\alpha) = 4/\sqrt{17}$$
$$\cos(\alpha) = 0.97$$

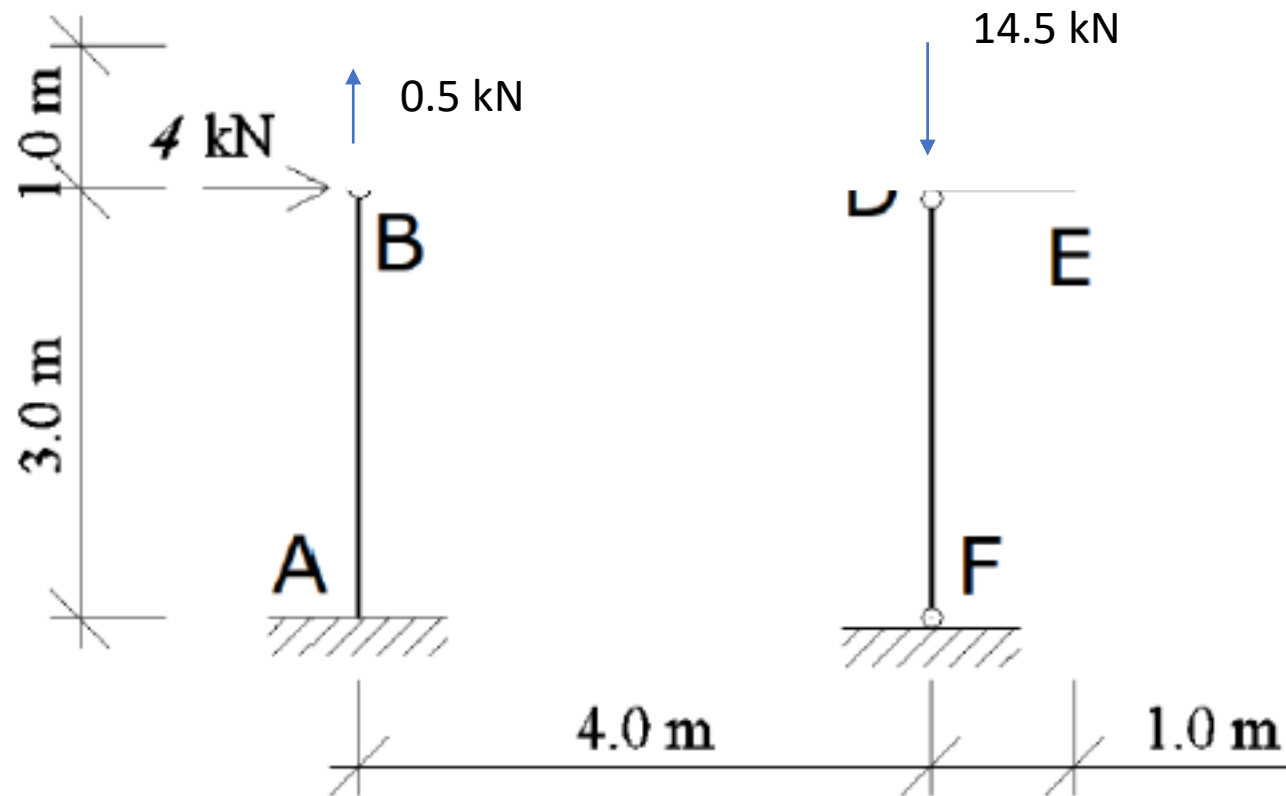
$$\sin(\alpha) = 1/\sqrt{17}$$
$$\sin(\alpha) = 0.24$$

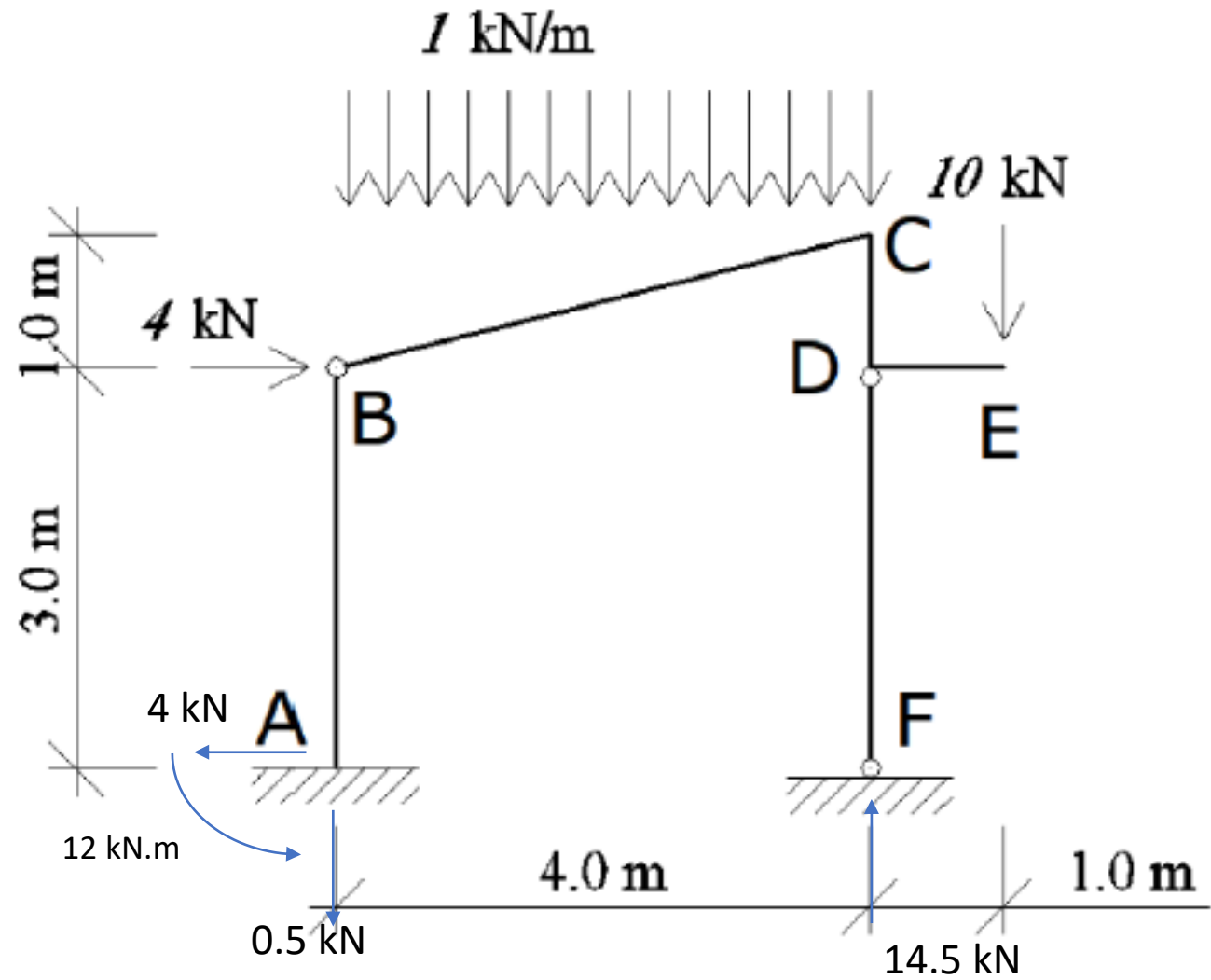


$$\begin{aligned} \text{Suma}(M_B) &= 0 \\ 4 \cdot 2 + 50 - 4 \cdot R_E &= 0 \\ R_E &= 14,5 \text{ kN} \end{aligned}$$

$$R_B = -0,5 \text{ kN}$$

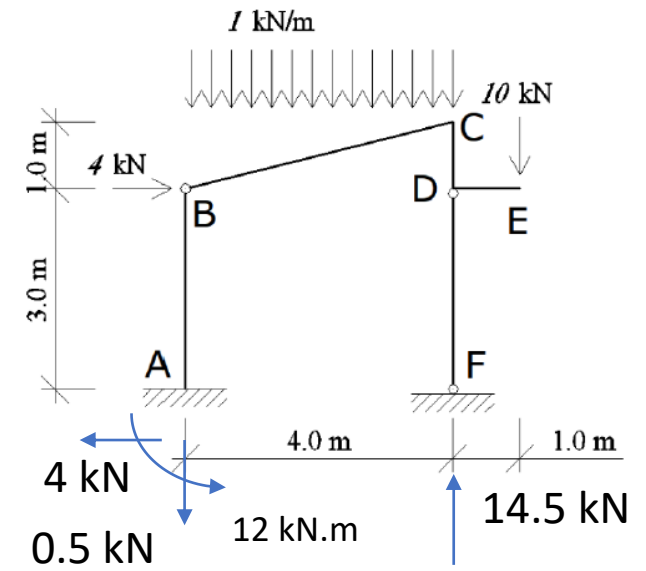
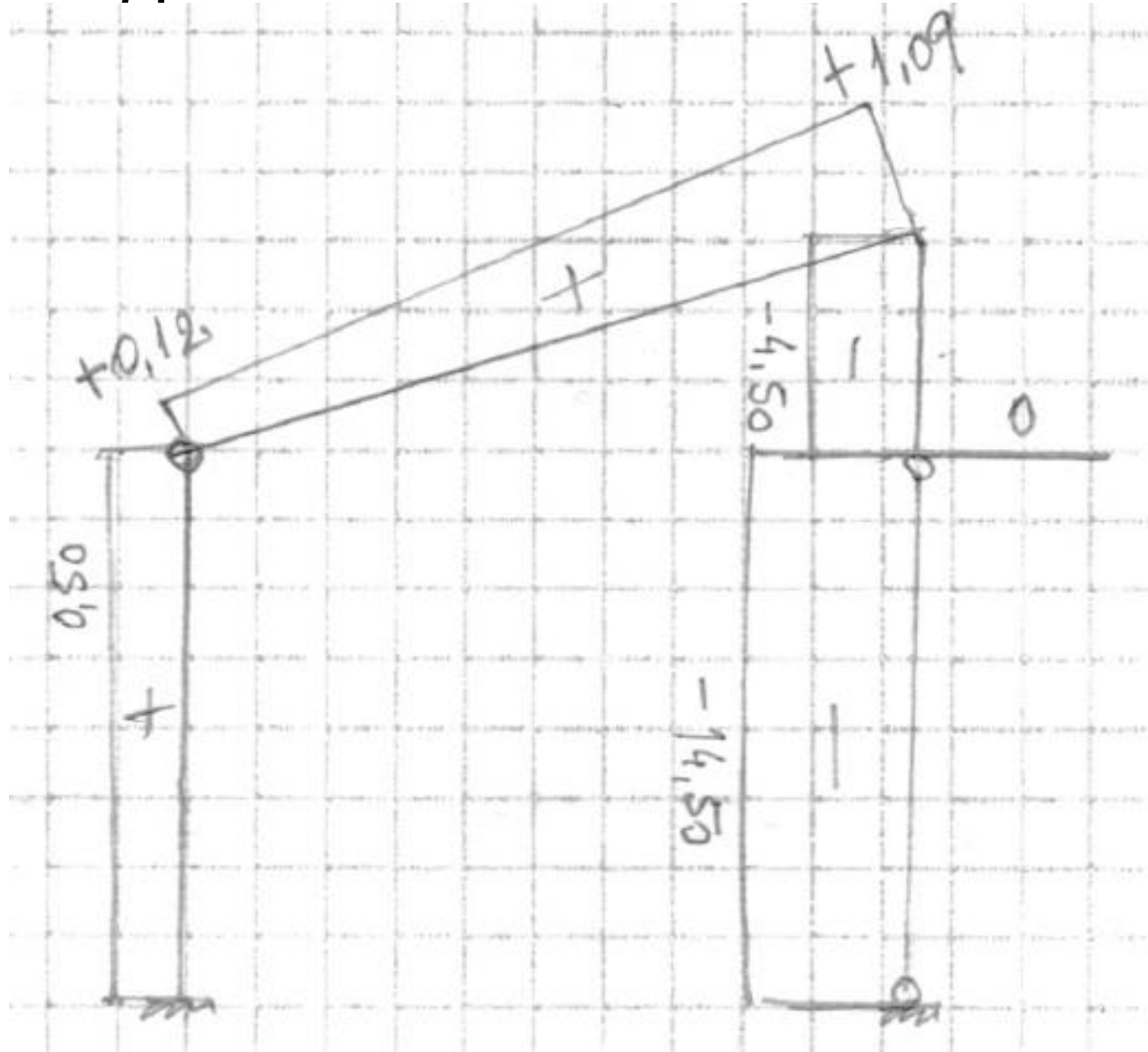
Hallar reacciones



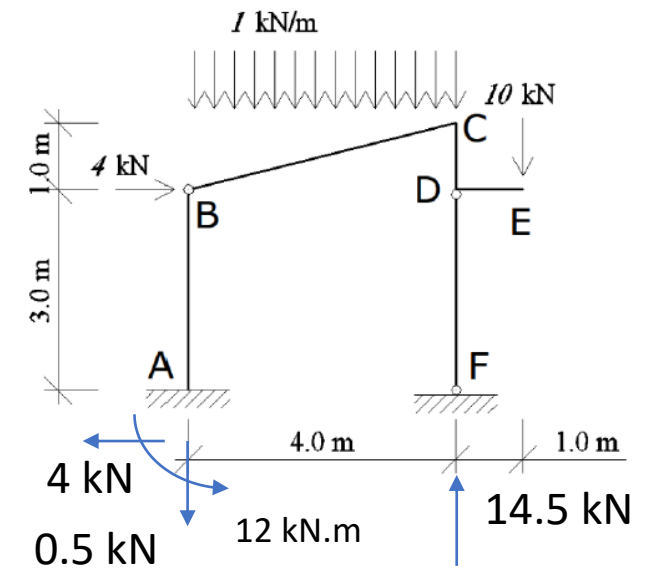
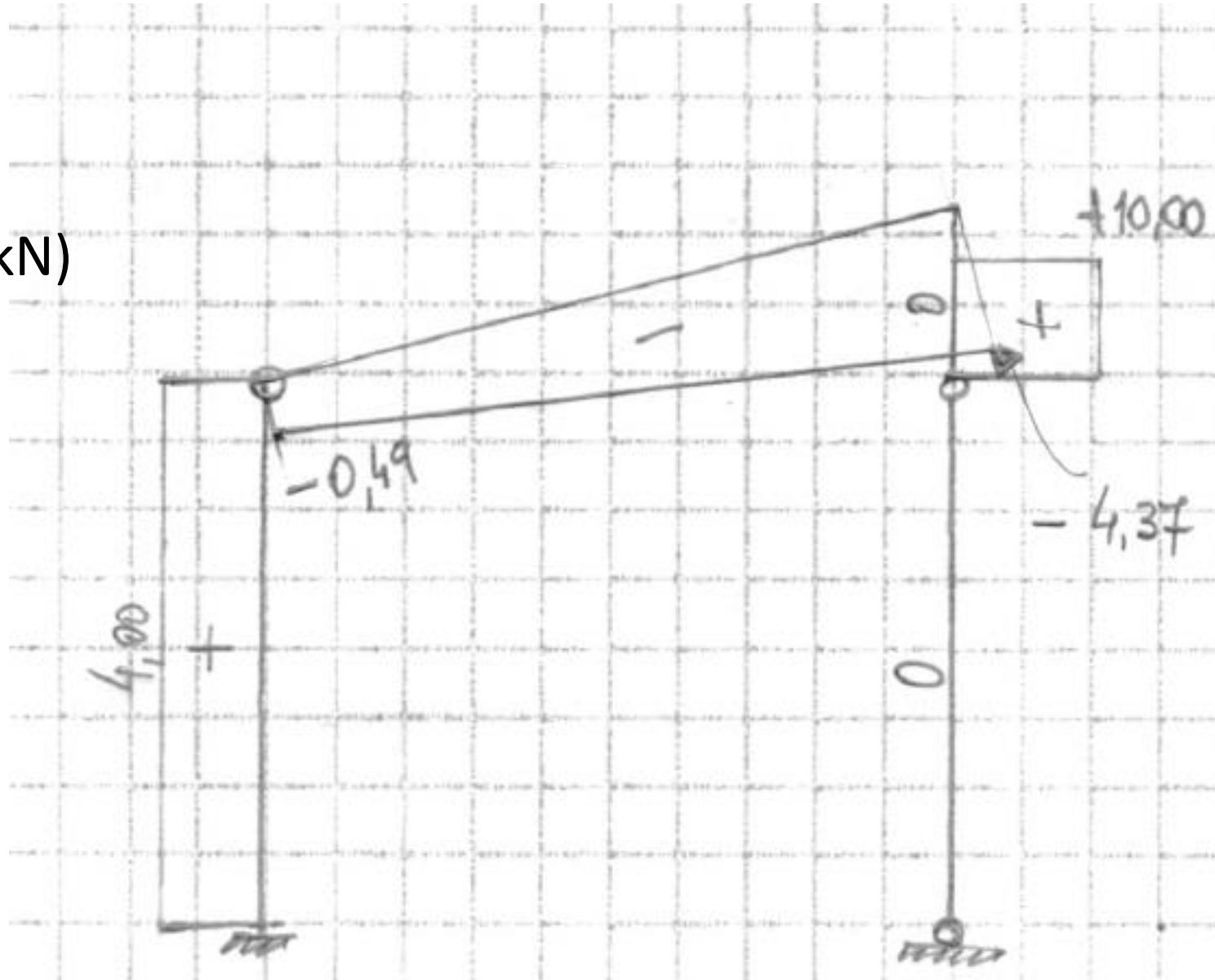


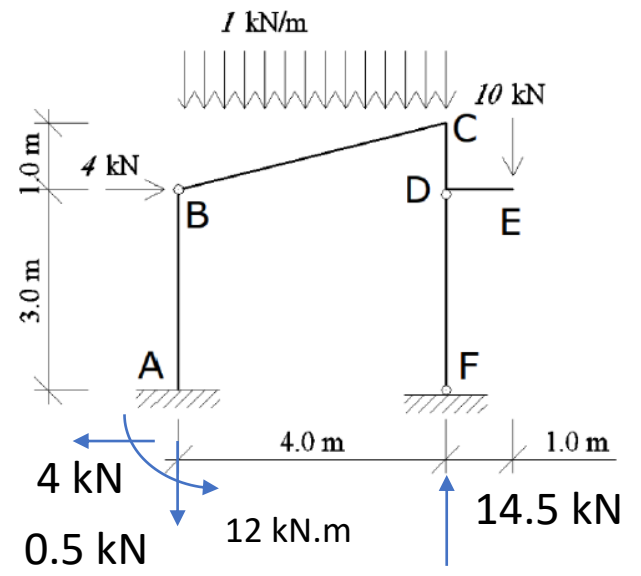
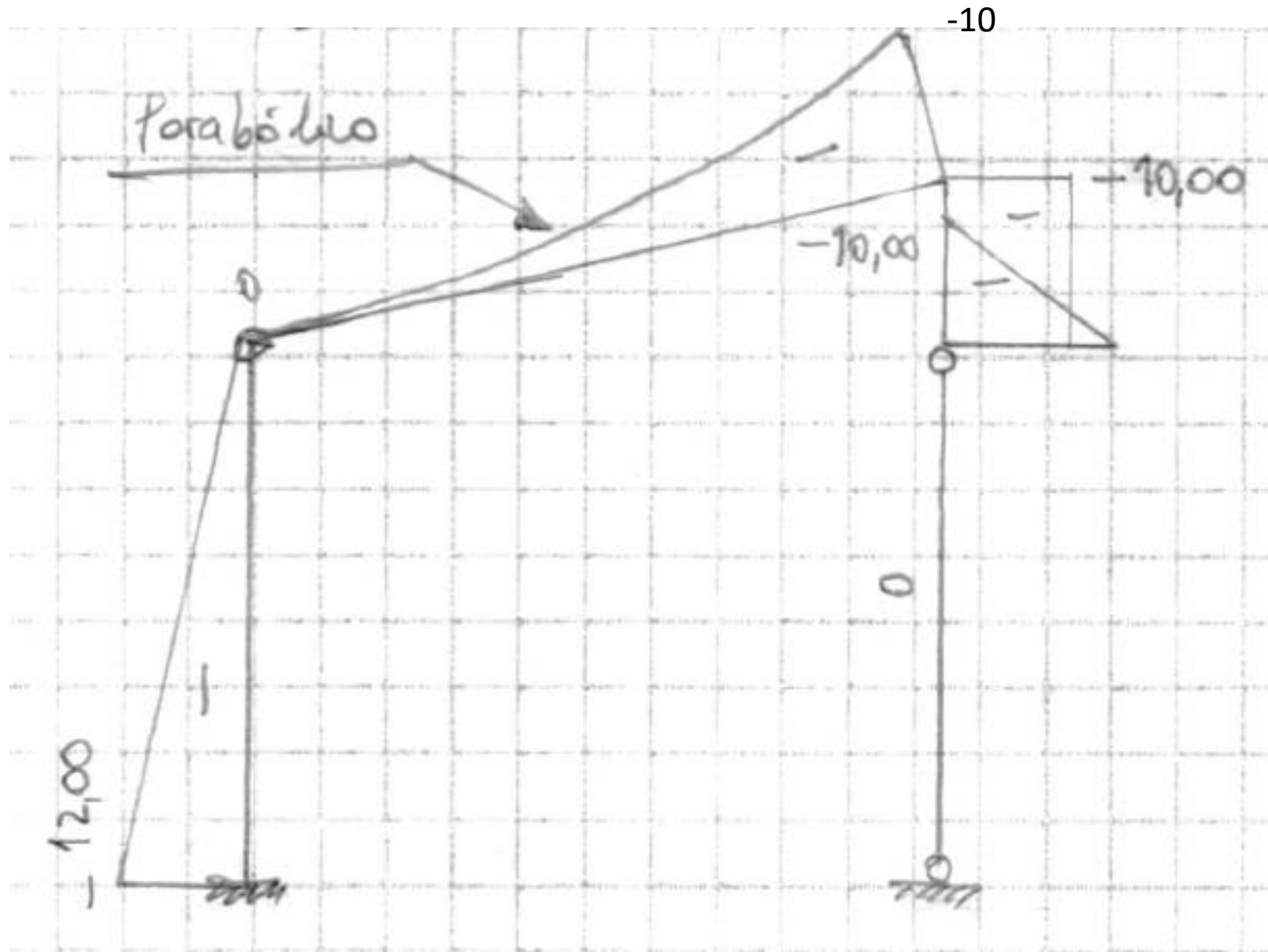
Trazar Diagramas

- N (kN)



• V(kN)





Dimensionado

- En barra AB: $M_{\max} = 12 \text{ kNm}$ y $N = +0.5 \text{ kN}$
- En CD: $M = 10 \text{ kNm}$ y $N = -4.5 \text{ kN}$
- $N = -14.5 \text{ kN}$
- $V = -10 \text{ kN}$

PNI 12

$$I_x = 328 \times 10^4$$

$$I_x = 2 \cdot \left(\frac{a \cdot 10^3}{12} + 10 \cdot a \cdot 65^2 \right)$$

Placas

$$I_x = 328 \times 10^4 + 84,67 \times 10^3 \cdot a \quad [\text{mm}^4]$$

PNI 12

EN A: $M_{\max} = 12 \text{ kNm}$ y $N = +0.5 \text{ kN}$

$$\sigma = \frac{500}{14,20 \times 10^2 + 20 \cdot a} + \frac{12 \times 10^6 \cdot 70}{328 \times 10^4 + 84,67 \times 10^3 a} \leq 140$$

$$237,086 \times 10^6 \cdot a^2 + 9,174 \times 10^9 a - 542,376 \times 10^9 \geq 0$$

$$a \geq 32,25 \text{ mm}, \text{ luego } \underline{\underline{a = 33 \text{ mm}}}$$

VERIFICACION EN CD: $M = 10 \text{ kNm}$ y $N = -4.5 \text{ kN}$

$$A = 2,080 \times 10^3 \text{ mm}^2$$

$$I_x = 6,074 \times 10^6 \text{ mm}^4$$

$$|\sigma| = 117,4 \leq 140 \text{ MPa} \quad (\text{OK})$$

VERIFICACION DE CONTANTES:

$$M_x = 31,8 \times 10^3 + 10,33 \cdot 65 = 53,25 \times 10^3 \text{ mm}^3$$

$$\tau = \frac{53,25 \times 10^3 \cdot 10000}{6,074 \times 10^6 \cdot 5,1} = 17,2 \text{ MPa} \leq 90 \text{ MPa} \rightarrow \underline{\underline{\text{OK}}} \checkmark$$