

Armaduras

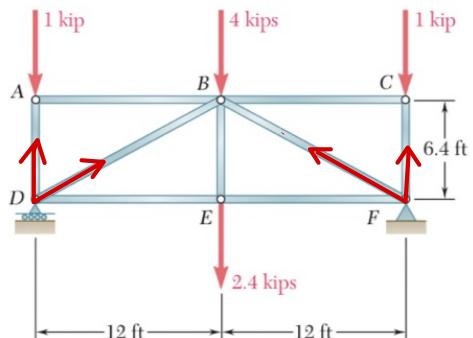
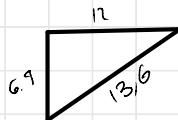


Figura P6.4



$$\sum F_y = -1 - 4 - 1 - 2.4 + Dg + Df = 0$$

$$-8.4 + Dg + Df = 0$$

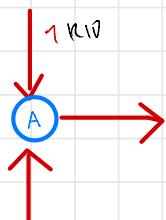
$$Dg + Df = 8.4$$

Nodo A

$$\sum F_x = 0$$

$$\sum F_y = -1 + F_{AD}$$

$$F_{AD} = 1 \text{ kip}$$



$$M = -1(24) - 4(12) - 2.4(12) + Dg(24)$$

$$Dg = 4.2 \text{ kip}$$

$$Df = 8.4 - 4.2$$

Nodo D

$$\sum F_y = \tan^{-1}\left(\frac{6.4}{12}\right) = 28.07^\circ$$

$$\sum F_y = -F_{AD} + Dg + \sin(28.07^\circ) F_{DB} = 0$$

$$-1 + 4.2 + \sin(28.07^\circ) F_{DB} = 0$$

$$F_{DB} = -6.8 \rightarrow 6.8 \text{ kip tension}$$

$$F_x = F_{DF} - 6.8 \cos(28.07^\circ) = 0$$

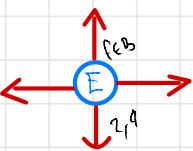
$$F_x = 6 \text{ kip}$$

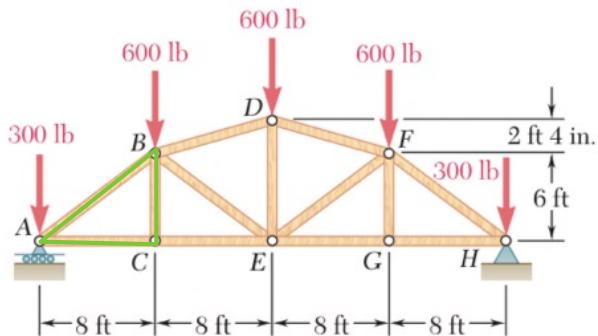
Nodo E

$$\sum F_x = F_{EF} = F_{DF} = 0$$

$$\sum F_y = F_{EB} - 2.4$$

$$F_{EB} = 2.4$$





2,33 ft

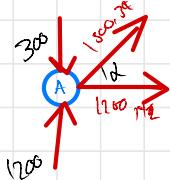
Figura P6.12

$$\sum F_y = A_y + H_y - 300 \text{ lb} - 600 \text{ lb} - 600 \text{ lb} - 600 \text{ lb} - 300 \text{ lb} = 0$$

$$\sum M_H = A_y (32) - 300 (32) - 600 (24) - 600 (16) - 600 (8) = 0$$

$$A_y = 1200.$$

Nodo A



$$\tan^{-1}\left(\frac{6}{8}\right) = 36,86^\circ = \alpha$$

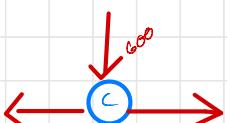
$$\sum F_y = 1200 - 300 - F_{AB} (\sin(36,86))$$

$$F_{AB} = 1500,34 \text{ lb}$$

$$\sum F_x = F_{AC} - 1500 \cos(36,86)$$

$$F_{AC} = 1200,82 \text{ lb}$$

Nodo C



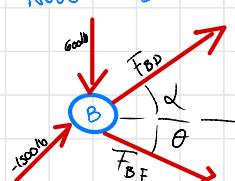
$$\sum F_x = 0$$

$$-1200 + F_{CE} = 0$$

$$F_{CE} = 1200$$

$$\begin{aligned} \alpha &= 16,72^\circ \\ \cos \theta &= \left(\frac{6}{10}\right) = 0,8 \\ \sin \theta &= \left(\frac{8}{10}\right) = 0,6 \end{aligned}$$

Nodo B

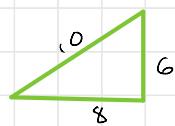


$$\sum F_x = 0$$

$$1500 \cos \theta + F_{BD} \cos \alpha + F_{BE} \cos \alpha = 0$$

$$\textcircled{1} \quad 0,96 F_{BD} + 0,8 F_{BE} = -1200$$

$$\sum F_y = -600 + 1500 \sin \theta - F_{BD} \sin \alpha + F_{BE} \sin \alpha = 0$$



$$(0,28 F_{BD} - 0,6 F_{BE} = -300) \quad ②) \quad 0,8$$

$$(0,96 F_{BD} + 0,8 F_{BE} = -1200) \quad 0,6$$

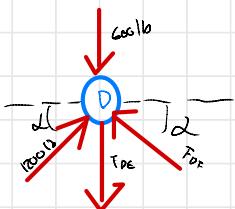
$$0,8 F_{BD} + 0 = -960$$

$$F_{BD} = -1200 \text{ lb}$$

Sustituyendo F_{BD} en ①

$$F_{BE} = \frac{-1200 - 0,96 (-1200)}{0,8} = -60 \text{ lb}$$

Nodo D



$$\sum F_x = 1200 \cos 16,26 - F_{DF} \cos 16,26 = 0$$

$$F_{DF} = 1200 \text{ lb}$$

$$\sum F_y = -600 - F_{DE} + 2(1200) \sin(16,26) = 0$$

$$F_{DE} = 72 \text{ lb}$$

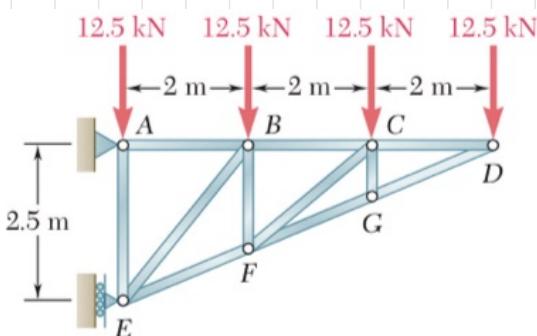
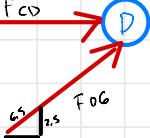
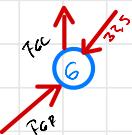


Figura P6.13

Nodo D



Nodo G



$$\frac{12.5 \text{ kN}}{2.5} = \frac{F_{CD}}{2.5} = \frac{F_{DG}}{1.25}$$

$$F_{CD} = 30 \text{ kN}$$

$$F_{DG} = 32.5 \text{ kN}$$

$$\sum M_A = 2.5 F_x - 2 \cdot 12.5 - 4 \cdot 12.5 - 6 \cdot 12.5$$

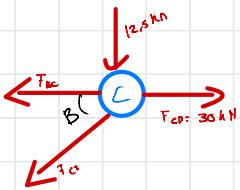
$$F_x = 60 \text{ kN}$$

$$\sum F_x = F_x + A_x \rightarrow A_x = -60 \text{ kN}$$

$$\sum F_y = A_y - 12.5 - 12.5 - 12.5 - 12.5$$

$$A_y = 60 \text{ kN}$$

Nodo C



$$F_{BF} = \frac{2}{3} (2,5 \text{ m}) = 1,6 \text{ m} \quad \beta = \angle BCF = \tan^{-1} \frac{F_{BF}}{2} = 39,81^\circ$$

$$\begin{aligned}\sum F_y &= -12,5 \text{ kN} - F_{cr} \sin \beta = 0 \\ &-12,5 \text{ kN} - 19,526 \text{ kN} \sin 39,81^\circ = 0\end{aligned}$$

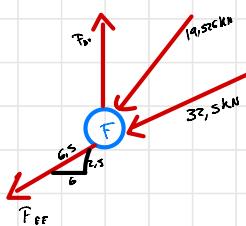
$$F_{cr} = -19,526 \text{ kN}$$

$$\sum F_x = 30 \text{ kN} - F_{bc} - F_{cr} \cos \beta = 0$$

$$30 \text{ kN} - F_{bc} - (-19,526 \text{ kN}) \cos 39,81^\circ = 0$$

$$F_{bc} = +45,0 \text{ kN}$$

Nodo F



$$\sum F_x = 0 \quad -\frac{6}{6,5} P_{cr} - \frac{6}{6,5} (32,5 \text{ kN}) - F_{cr} \cos \beta = 0$$

$$F_{cr} = -32,5 \text{ kN} - \left(\frac{6,5}{6}\right) (19,526 \text{ kN}) \cos (39,81)^\circ$$

$$F_{cr} = -18,75 \text{ kN}$$

$$F_{cf} = 18,8 \text{ kN}$$

$$\sum F_y = F_{bf} - \frac{2,5}{6,5} F_{cr} - \frac{2,5}{6,5} (32,5 \text{ kN}) - (19,526 \text{ kN}) \sin (39,81)^\circ = 0$$

$$F_{bf} = -\frac{2,5}{6,5} (32,5 \text{ kN}) - (19,526 \text{ kN}) \sin (39,81)^\circ = 0$$

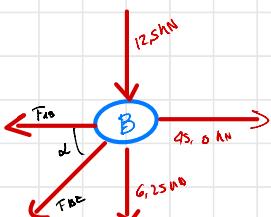
$$F_{bf} = -\frac{2,5}{6,5} (-48,75 \text{ kN}) - (2,5 \text{ kN} - 12,5 \text{ kN}) = 0$$

$$F_{bf} = 16,25 \text{ kN}$$

$$F_{bf} = 16,25 \text{ kN}$$

Nodo B

$$\tan \alpha = \frac{2,5 \text{ m}}{2 \text{ m}} \quad ; \quad \gamma = 51,34^\circ$$



$$\sum F_y = -12,5 \text{ kN} - 6,25 \text{ kN} - F_{bc} \sin 51,34^\circ = 0$$

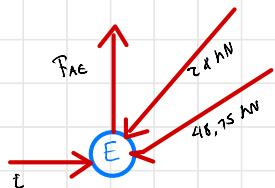
$$F_{bc} = -24,0 \text{ kN}$$

$$F_{be} = 24,0 \text{ kN}$$

$$\sum F_x = 45,0 \text{ kN} - F_{ab} + (24 \text{ kN}) \cos (51,34)^\circ = 0$$

$$F_{ab} = 60 \text{ kN}$$

Node E



$$\beta = 51,34^\circ$$

$$\sum F_y = -F_{AC} - (24 \text{ kN}) \sin 51,34^\circ - (48,75 \text{ kN}) \frac{25}{65} = 0$$

$$F_{AC} = 37,5 \text{ kN}$$