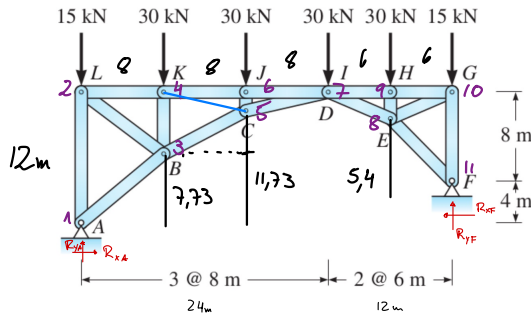


P6.31. For the arch rib to be funicular for the dead loads shown, establish the elevation of the lower chord joints B, C, and E.



$$\sum F_x = R_{xA} + R_{xF} = 0$$

$$\sum F_y = R_{yA} + R_{yF} = 150 \text{ kN}$$

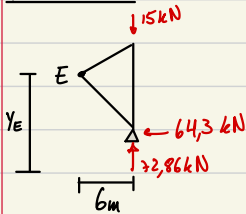
$$\sum M_A = R_{xF} \cdot 4 + R_{yF} \cdot 36 = 2880$$

$$\sum M_D = -R_{yF} \cdot 12 + R_{xF} \cdot 8 = -360$$

Resolviendo el sistema de ecuaciones:

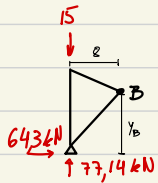
$R_{xA} = 64,3$	kN
$R_{yA} = 77,14$	kN
$R_{xF} = 64,3$	kN
$R_{yF} = 72,86$	kN

Node E



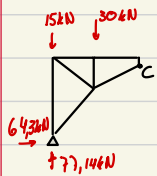
$$\sum M_D = 0 \rightarrow (72,86 - 15) \cdot 6 - 64,3 \cdot y_E = 0 \rightarrow y_E = 5,4 \text{ m}$$

Node B



$$M_B = (15 - 77,14) \cdot 8 + 64,3 \cdot y_B = 0 \rightarrow y_B = 7,73 \text{ m}$$

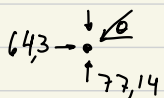
Node C



$$\sum M_c = (77,14 - 15) \cdot 16 - 64,3 \cdot y_C - 30 \cdot 8 = 0 \rightarrow y_C = 11,73 \text{ m}$$

Cálculo de esfuerzos axiales

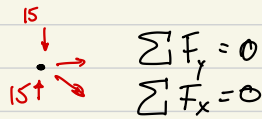
Node A $\alpha = 44,017^\circ$



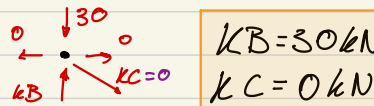
$$\sum F_x = 64,3 - AB \cdot \cos \alpha = 0 \rightarrow AB = 89,41 \text{ kN}$$

$$\sum F_y = 77,14 - AB \cdot \sin \alpha - AL = 0 \rightarrow AL = 15 \text{ kN}$$

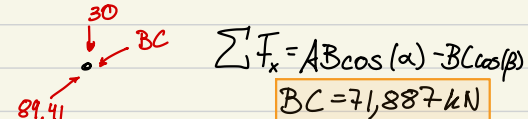
Nodo L



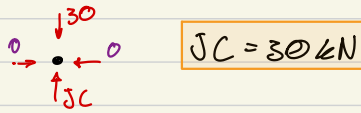
Nodo K



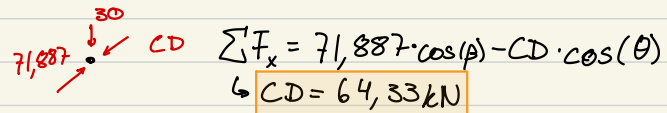
Nodo B $\beta = 26,565$



Nodo J

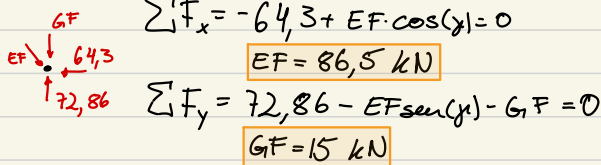


Nodo C $\theta = 1,933$



Nodo F

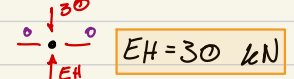
$\gamma = 41,987$



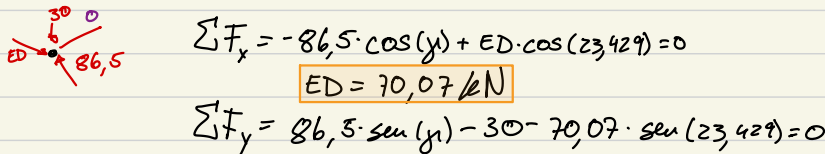
Nodo G



Nodo H



Nodo E $\omega = 23,429$



$AB = 89,41 \text{ kN}$

$AL = 15 \text{ kN}$

$BL = 0 \text{ kN}$

$LK = 0 \text{ kN}$

$BK = 30 \text{ kN}$

$BC = 71,887 \text{ kN}$

$KJ = 0 \text{ kN}$

$KC = 0 \text{ kN}$

$JC = 30 \text{ kN}$

$JD = 0 \text{ kN}$

$CD = 64,33 \text{ kN}$

$DE = 70,07 \text{ kN}$

$EF = 86,5 \text{ kN}$

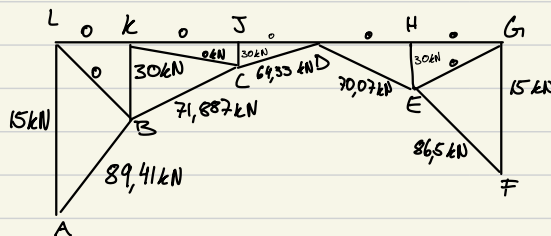
$GF = 15 \text{ kN}$

$HG = 0 \text{ kN}$

$HD = 0 \text{ kN}$

$EG = 0 \text{ kN}$

$HE = 30 \text{ kN}$



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