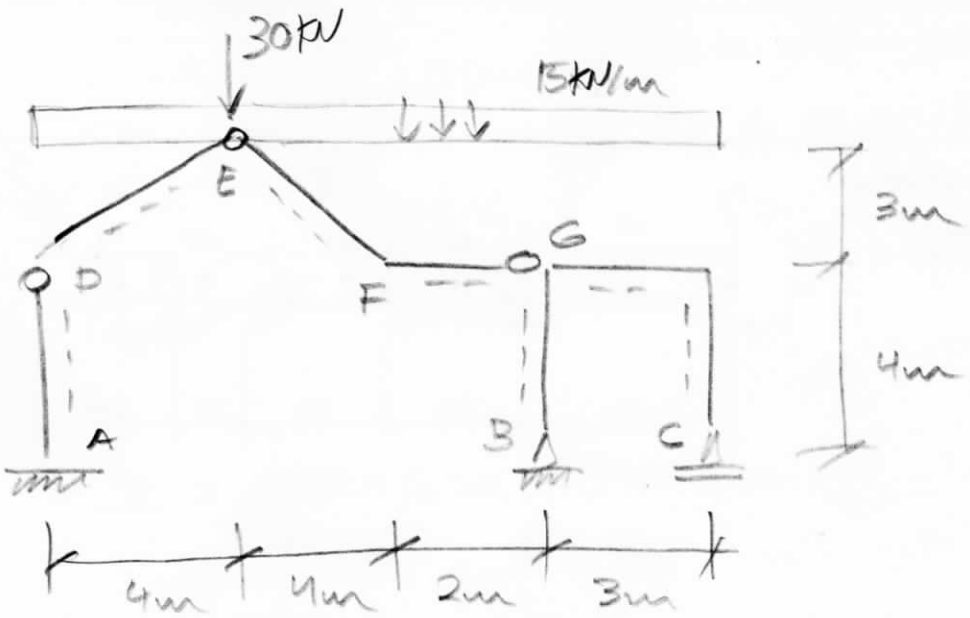
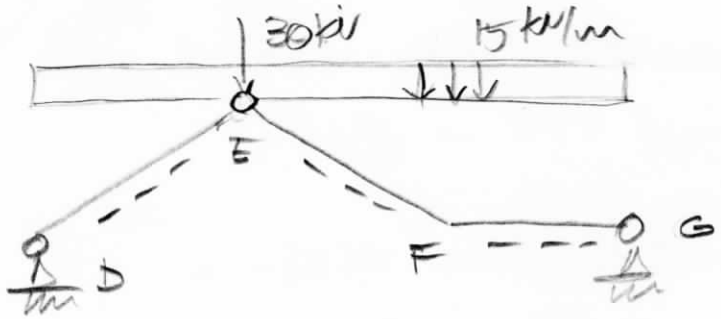
TE1-6a.1

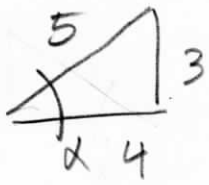


- Pórtico composto (HIPERESTÁTICO):



$\cos\alpha = 4/5$

$\operatorname{sen}\alpha = 3/5$



$\Sigma M_G = 0 \circlearrowleft^{\oplus} \quad -V_D \times 10m + 30kN \times 6m + 15\frac{kN}{m} \times \frac{(10m)^2}{2} = 0$

$V_D = \frac{1}{10}(30 \times 6 + 15 \times 100/2) = \underline{93kN} \uparrow$

$\Sigma M_D = 0 \circlearrowleft^{\oplus} \quad V_G \times 10m - 30tf \times 4m - 15\frac{tf}{m} \times \frac{(10m)^2}{2} = 0$

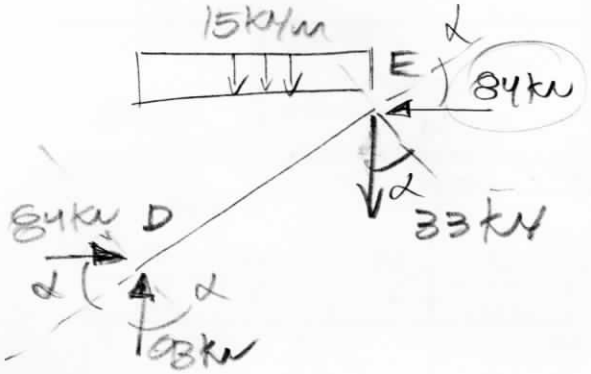
$V_G = \frac{1}{10}(30 \times 4 + 15 \times 100/2) = \underline{87kN} \uparrow$

$\Sigma M_E^{ESQ} = 0 \circlearrowleft^{\oplus} \quad -V_D \times 4m + 15\frac{kN}{m} \times \frac{(4m)^2}{2} + H_D \times 3m = 0$

$H_D = \frac{1}{3}(93 \times 4 - 15 \times 16/2) = \underline{84kN} \rightarrow$

$H_G = \underline{84kN} \leftarrow$

— DECOMPOSIÇÃO TRECHO DE:



$\Sigma F_V = 0 \curvearrowleft \oplus$

$93kN + V_E - 15kN/m \times 4m = 0$

$V_E = 15 \times 4 - 93 = -33$

$D_{\perp} = 93kN \times \cos\alpha - 84kN \operatorname{sen}\alpha$

$93 \cdot 4/5 - 84 \cdot 3/5 = \underline{+24kN}$

$D_{//} = -93kN \cdot \operatorname{sen}\alpha - 84 \cdot \cos\alpha$

$-93 \cdot 3/5 - 84 \cdot 4/5 = \underline{-123kN}$

$E^{esq}_{\perp} = 33kN \cdot \cos\alpha - 84 \operatorname{sen}\alpha$

$33 \times 4/5 - 84 \times 3/5 = \underline{-24kN}$

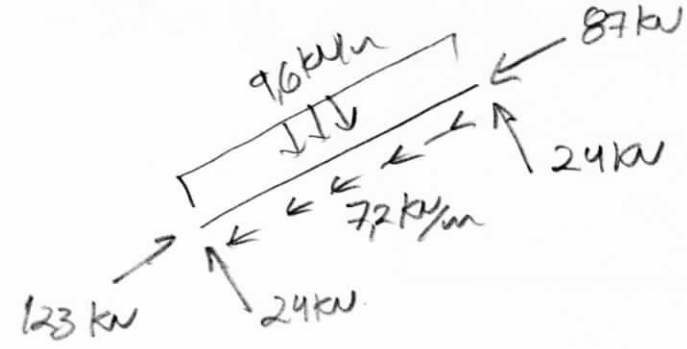
$E^{esq}_{//} = -33kN \cdot \operatorname{sen}\alpha - 84 \cos\alpha$

$-33 \cdot 3/5 - 84 \cdot 4/5 = \underline{-87kN}$

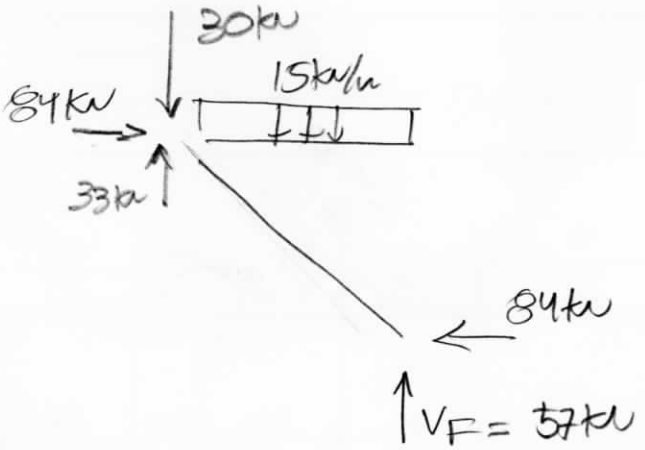
$q_{inc} = q \times \cos\alpha = 15kN/m \times 4/5 = 12kN/m$

$q_{\perp} = 12kN/m \times \cos\alpha = 12 \times 4/5 = \underline{9,6kN/m}$

$q_{//} = 12kN/m \times \operatorname{sen}\alpha = 12 \times 3/5 = \underline{7,2kN/m}$



— DECOMPOSIÇÃO TRECHO EF:

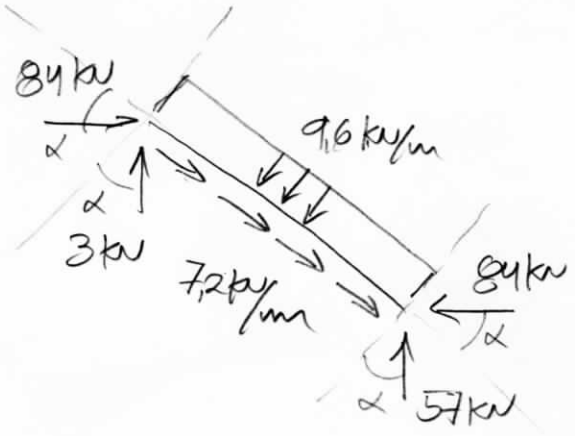


$\Sigma F_V = 0 \uparrow \oplus$

$33 - 30 - 15 \times 4 + V_F = 0$

$V_F = 30 + 15 \times 4 - 33$

$\underline{V_F = 57\,kN}$



$E^{DIR}_{\perp} = 3kN.\cos\alpha + 84kN.\operatorname{sen}\alpha =$

$3 \times 4/5 + 84 \times 3/5 = \underline{+52,8\,kN}$

$E^{DIR}_{//} = -84kN\cos\alpha + 3kN.\operatorname{sen}\alpha =$

$-84 \times 4/5 + 3 \times 3/5 = \underline{-65,4\,kN}$

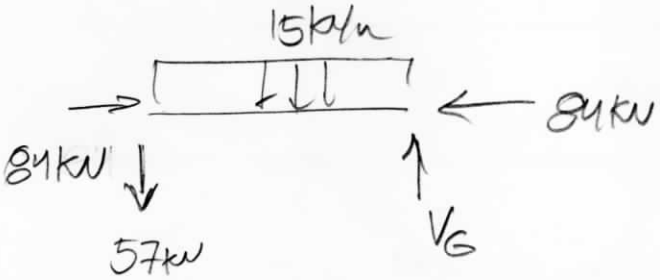
$F_{\perp} = -57kN\cos\alpha + 84kN.\operatorname{sen}\alpha$

$-57 \times 4/5 + 84 \times 3/5 = \underline{+4,8\,kN}$

$F_{//} = -57kN\operatorname{sen}\alpha - 84kN\cos\alpha$

$-57 \times 3/5 - 84 \times 4/5 = \underline{-101,4\,kN}$

- TRECHO FG:



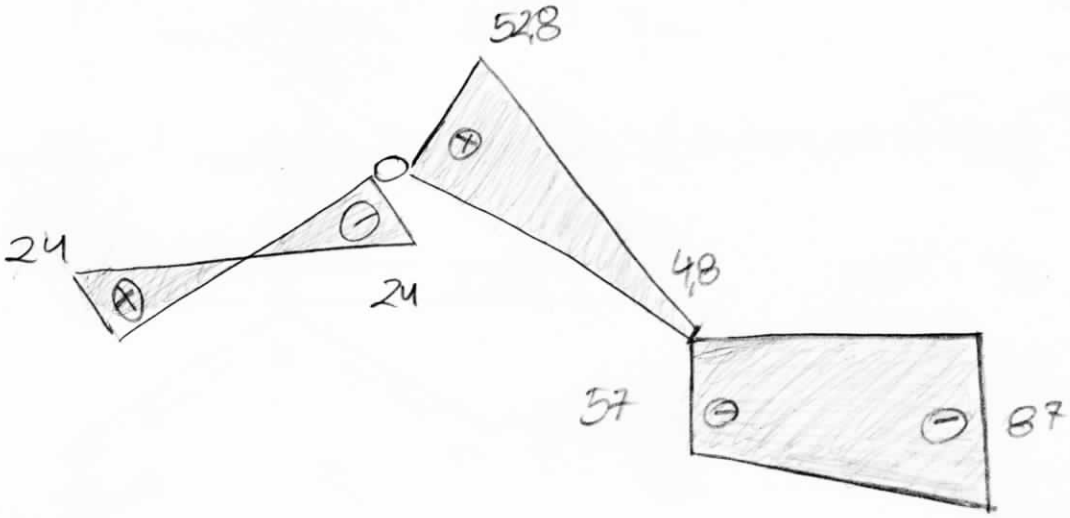
$\Sigma F_V = 0$ ↑⊕

$-57 - 15 \times 2 + V_G = 0$

$V_G = 57 + 30 = 87\ kN$

→ COMO ERA DE SE ESPERAR!!!

→ Diagrama de cortantes:



→ Diagrama de axiais:

