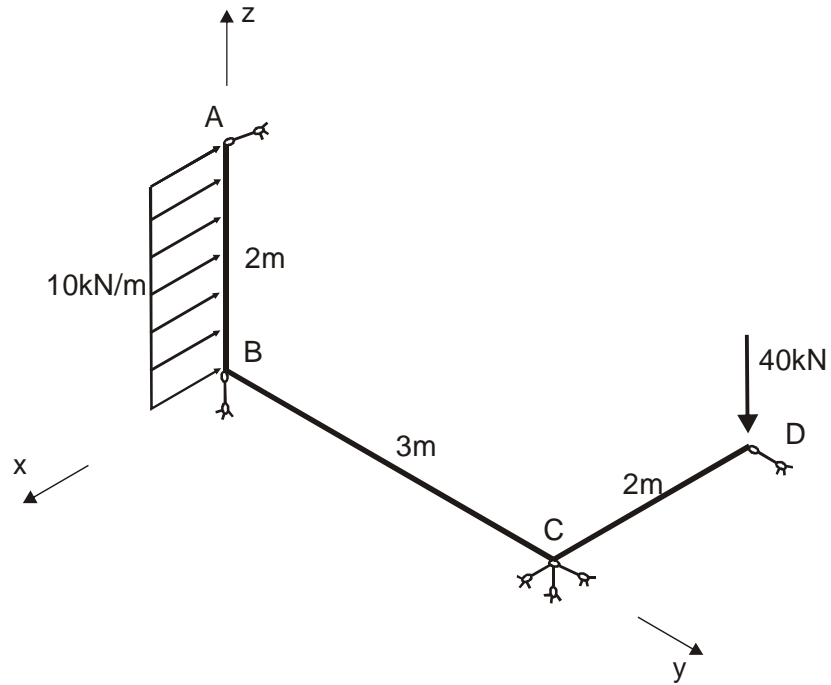


Nº USP: _____ Nome: _____

1ª Questão (3,0 pontos)

Calcule as reações de apoio da estrutura espacial ilustrada.



Resposta:

$$I) \sum X = 0 \rightarrow X_A - 20 + X_C = 0$$

$$II) \sum Y = 0 \rightarrow Y_C + Y_D = 0$$

$$III) \sum Z = 0 \rightarrow Z_B + Z_C - 40 = 0$$

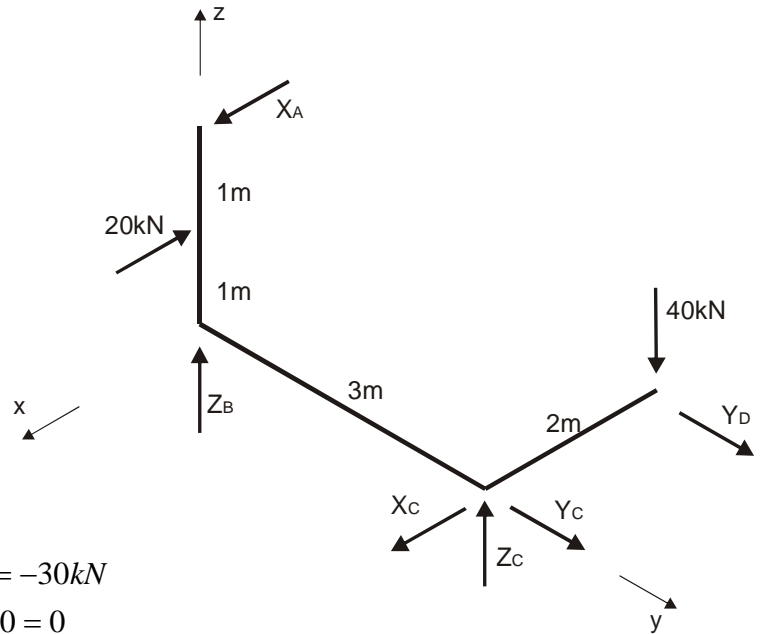
$$IV) \sum M_Z = 0 \rightarrow Z_C \cdot 3 - 40 \cdot 3 = 0$$

$$\therefore Z_C = 40 \text{ kN}$$

$$V) \sum M_Y = 0 \rightarrow X_A \cdot 2 - 20 \cdot 1 - 40 \cdot 2 = 0$$

$$\therefore X_A = 50 \text{ kN}$$

$$VI) \sum M_Z = 0 \rightarrow -X_C \cdot 3 - Y_D \cdot 2 = 0$$

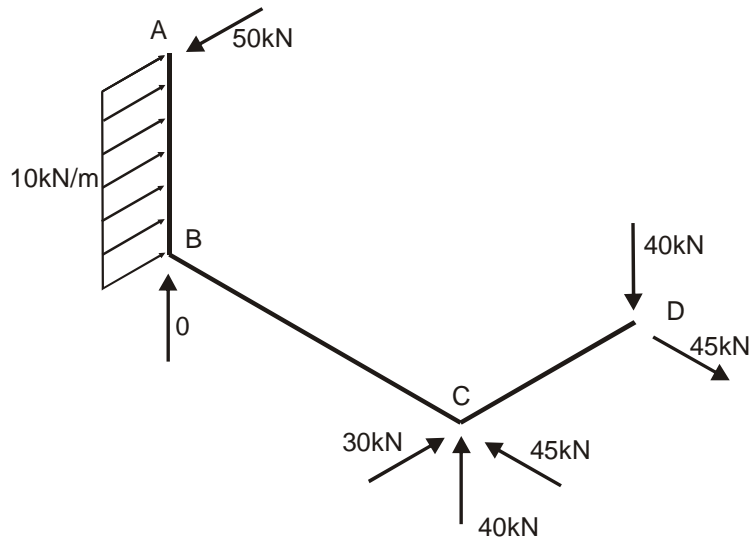


$$DE I, TEM - SE: X_C = 20 - X_A = 20 - 50 = -30 \text{ kN}$$

$$DE III, TEM - SE: Z_B = -Z_C + 40 = -40 + 40 = 0$$

$$DE VI, TEM - SE: Y_D = -\frac{X_C \cdot 3}{2} = \frac{30 \cdot 3}{2} = 45 \text{ kN}$$

$$DE II, TEM - SE: Y_C = -Y_D = -45 \text{ kN}$$



$$X_A = 50 \text{ kN}$$

$$Z_B = 0$$

$$X_C = -30 \text{ kN}$$

$$Y_C = -45 \text{ kN}$$

$$Z_C = 40 \text{ kN}$$

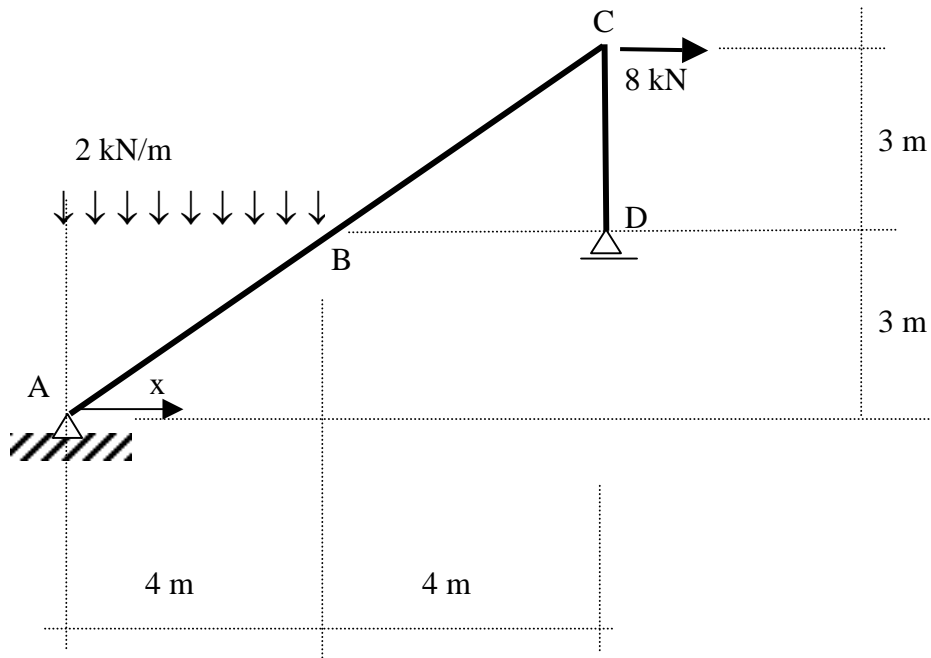
$$Y_D = 45 \text{ kN}$$

Nº USP: _____ Nome: _____

2ª Questão (3,0 pontos)

Na estrutura plana da figura determinar:

- a) as reações nos apoios A (articulação fixa) e D (articulação móvel).
- b) **as equações dos esforços solicitantes no trecho AB**, com A sendo origem de x

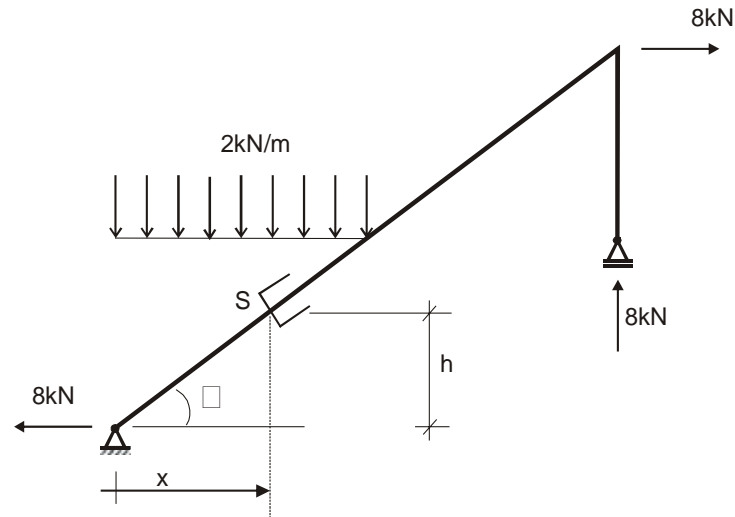


Resposta:

$$\sum X = 0 \rightarrow X_A + 8 = 0 \therefore X_A = -8$$

$$\sum Y = 0 \rightarrow Y_A - 8 + Y_D = 0 \therefore Y_A = 8 - Y_D = 0$$

$$\sum M_A = 0 \rightarrow -8.2 - 8.6 + Y_D = 0 \therefore Y_D = 8$$



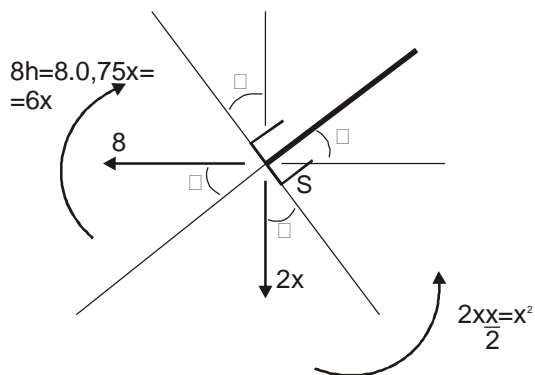
$$\text{sen } \alpha = 0,6$$

$$\text{cos } \alpha = 0,8$$

$$\text{tg } \alpha = 0,75$$

$$h = x \cdot \text{tg } \alpha = 0,75x$$

Tem-se na seção genérica S de abscissa x:



$$N(x) = 8 \cos \alpha + 2x \text{sen } \alpha = 6,4 + 1,2x$$

$$V(x) = 8 \text{sen } \alpha - 2x \text{cos } \alpha = 4,8 - 1,6x$$

$$M(x) = 6x - x^2$$