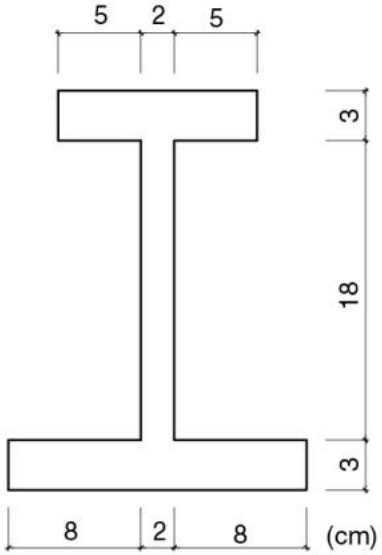
Figuras Planas

Determinar a posição do centro de gravidade
e os valores dos momentos centrais de inércia das seções transversais abaixo:

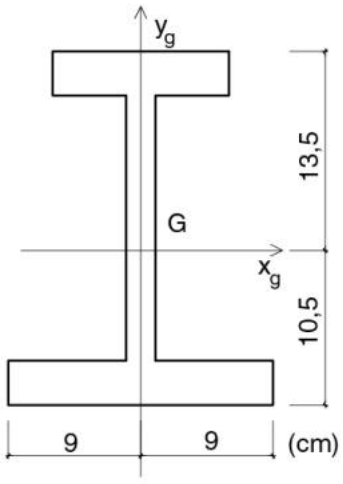
4_



$$y_g = \frac{S_x}{A} = \frac{12 \cdot 3 \cdot 22{,}5 + 2 \cdot 18 \cdot 12 + 18 \cdot 3 \cdot 1{,}5}{12 \cdot 3 + 2 \cdot 18 + 18 \cdot 3} = \frac{1323}{126} = 10{,}5\text{cm}$$

$$I_x = \left(\frac{12 \cdot 3^3}{12} + 22{,}5^2 \cdot 12 \cdot 3\right) + \left(\frac{2 \cdot 18^3}{12} + 12^2 \cdot 2 \cdot 18\right) + \frac{18 \cdot 3^3}{3} = 24570\text{cm}^4$$

$$I_{x_g} = I_x - (y_g)^2 \cdot A = 24570 - (10{,}5)^2 \cdot 126 = 10678{,}5\text{cm}^4$$



$$I_{y_g} = \frac{3 \cdot 12^3}{12} + \frac{18 \cdot 2^3}{12} + \frac{3 \cdot 18^3}{12} = 1902{,}0\text{cm}^4$$

$I_{x_g} = 10678{,}5\ \text{cm}^4$

$I_{y_g} = 1902{,}0\ \text{cm}^4$