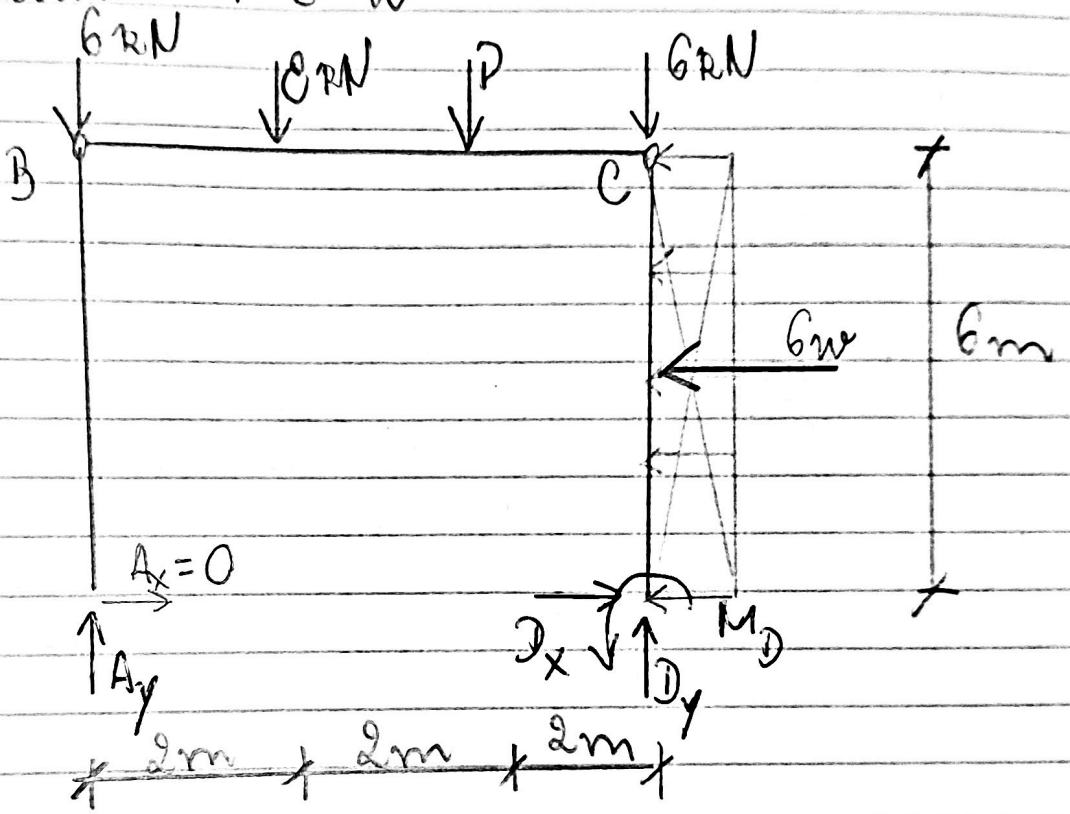
Resistência dos Materiais - MAC015

1º TVC

1ª Questão

Dados: P e w



$$M^{C}_{ABC} = 0 \Rightarrow 6A_y = 6\times 6 + 8\times 4 + 2P$$

$$\boxed{A_y = \frac{34 + P}{3}}$$

$$\Sigma F_V = 0 \Rightarrow A_y + D_y = 20 + P$$

$$D_y = 20 + P - A_y$$

$$\boxed{D_y = \frac{26 + 2P}{3}}$$

$$\Sigma F_H = 0 \Rightarrow \boxed{D_x = 6w}$$

$$M_{(D)}^{C} = 0 \Rightarrow M_D + 6D_x = 18w$$

$$\boxed{M_D = -18w}$$

$M_D = 18w$ (sentido horário)

Resumo:

$M_D = 18w$ ↷

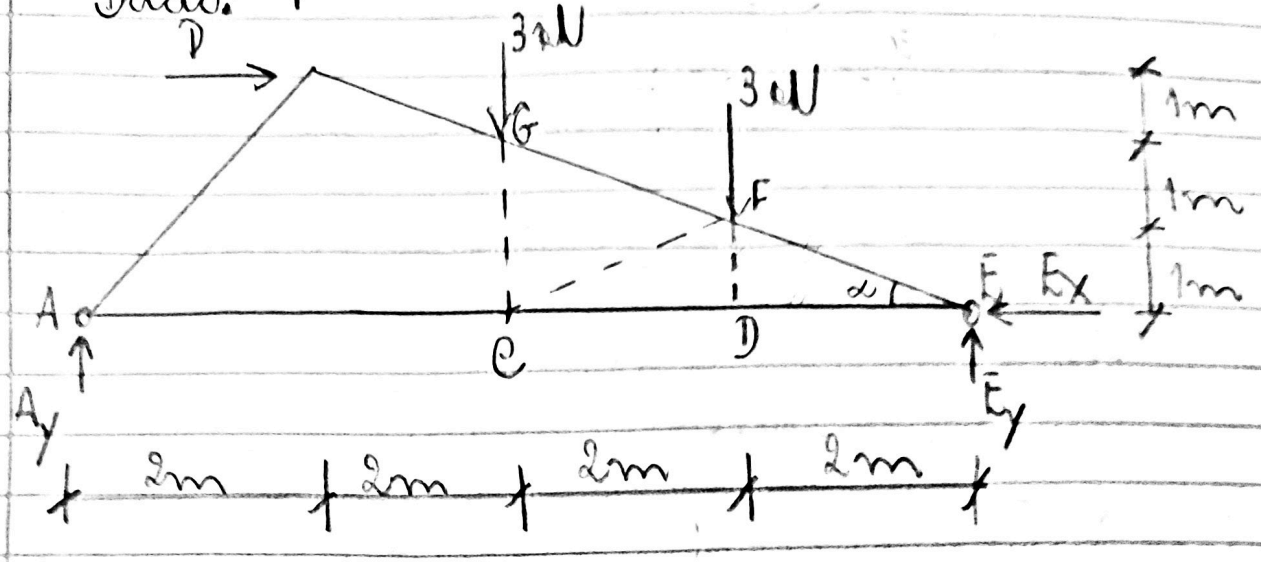
$D_x = 6w$ →

$D_y = \frac{26 + 2P}{3}$ ↑

$A_y = \frac{34 + P}{3}$ ↑

2ª Questão

Dado: P



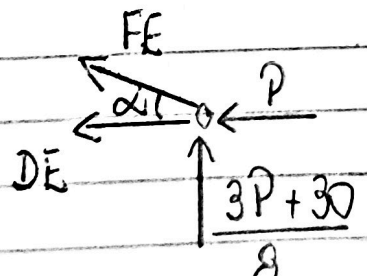
Reações de apoio:

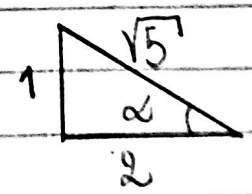
$$\Sigma M_A = 0 \Rightarrow 3P + 3\times 4 + 3\times 6 = 8E_y$$

$$E_y = \frac{3P + 30}{8}$$

$$\Sigma F_H = 0 \Rightarrow E_x = P$$

Nó E





$$\cos\alpha = \frac{2}{\sqrt{5}}$$

$$\operatorname{sen}\alpha = \frac{1}{\sqrt{5}}$$

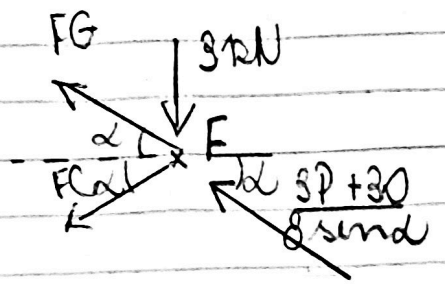
$$\Sigma F_V = 0 \Rightarrow FE \operatorname{sen}\alpha = -\frac{(3P+30)}{8}$$

$$\boxed{FE = -\frac{(3P+30)}{8\operatorname{sen}\alpha}}$$

$$\Sigma F_H = 0$$

$$\boxed{DE = FE\cos\alpha - P}$$

Nó F



$$\Sigma F_H = 0 \qquad FG\cos\alpha + FC\cos\alpha + \frac{(3P+30)}{8\sin\alpha}\cos\alpha = 0$$

$$FG + FC = -\frac{(3P+30)}{8\sin\alpha}$$

$$\Sigma F_V = 0 \Rightarrow FG\sin\alpha - FC\sin\alpha = 3 - \frac{(3P+30)}{8} = -\frac{3P}{8} - \frac{3}{4}$$

$$\boxed{FG = -\frac{(3P+18)}{8\sin\alpha}}$$

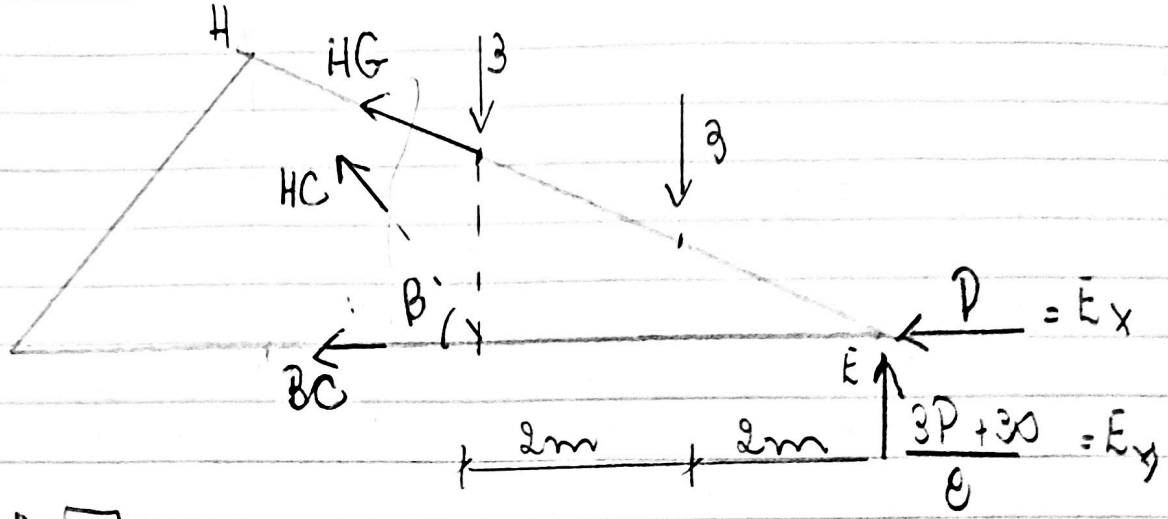
$$\boxed{FC = -\frac{3}{2\sin\alpha}}$$

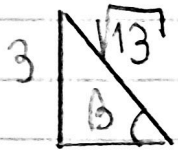
Resumo

$FE = \frac{3P + 30}{8 \operatorname{sen}\alpha}$	compressão
$DE = FE \cos\alpha - P$	tração
$FD = C$	
$GF = \frac{(3P + 18)}{8 \operatorname{sen}\alpha}$	compressão
$FC = \frac{3}{2 \operatorname{sen}\alpha}$	compressão

$\operatorname{sen}\alpha = \frac{1}{\sqrt{5}}$ $\quad \cos\alpha = \frac{2}{\sqrt{5}}$

3ª Questão





$\cos\beta = \frac{2}{\sqrt{13}}$

$\sin\beta = \frac{3}{\sqrt{13}}$

$\Sigma M_H = 0 \Rightarrow 3BC + 3E_x = 6E_y - 3\times2 - 3\times4 = 6E_y - 18$

$BC + E_x = 2E_y - 6 \quad \therefore \quad \boxed{BC = \frac{6 - P}{4}}$

$\Sigma M_E = 0 \Rightarrow HC\sin\beta \times 4 = 3\times4 + 3\times2$

$$\boxed{HC = \frac{9}{2\sin\beta}}$$

$\Sigma F_V = 0 \quad HG\sin\alpha + HC\sin\beta = 6 - \frac{(3P+30)}{8} = \frac{18 - 3P}{8}$

$$\boxed{HG = -\frac{(3P+18)}{8\sin\alpha}}$$