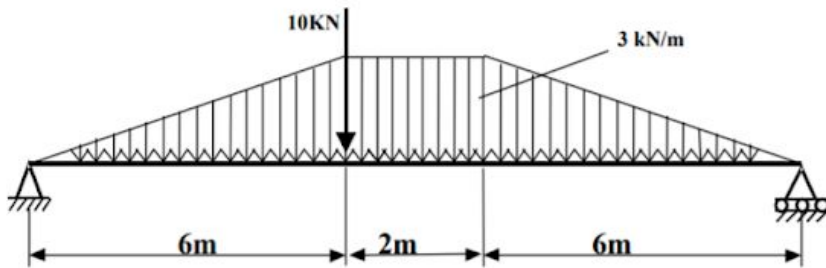


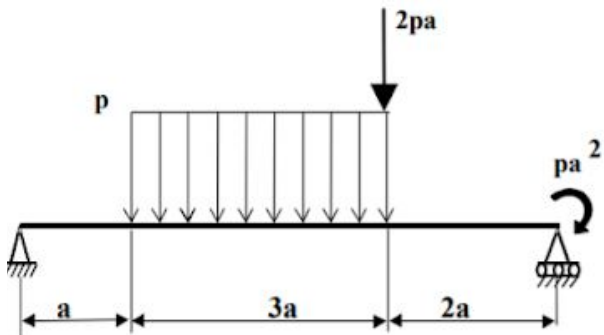
LISTA DE EXERCÍCIOS PARA P1

1. Calcular reações de apoio

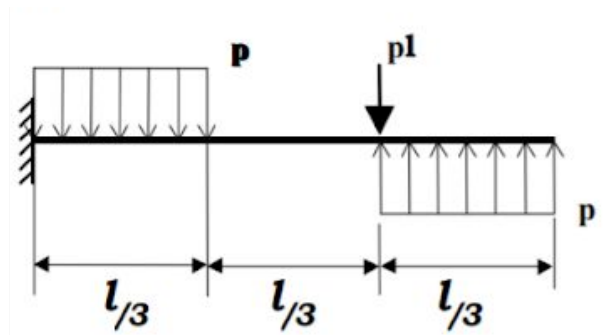
a)



b)

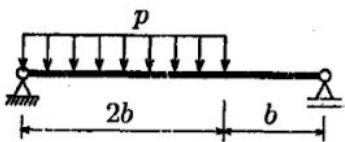


c)

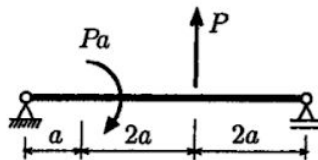


2. Desenhar diagramas de momento fletor e força cortante

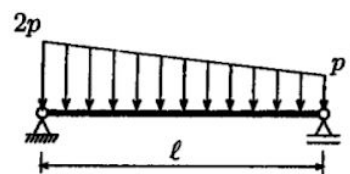
a)



b)

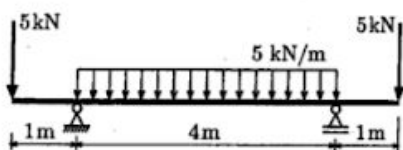


c)

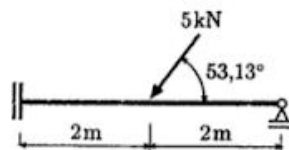


3. Traçar os diagramas de esforços solicitantes

a)

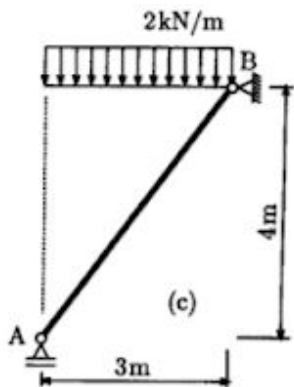


b)



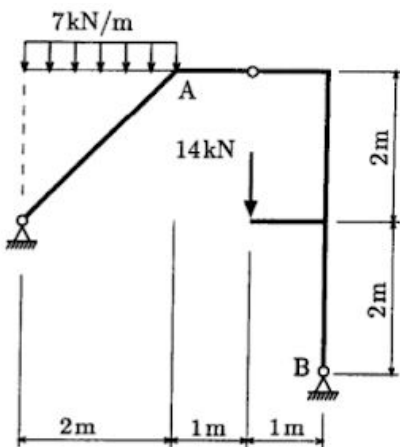
LISTA DE EXERCÍCIOS PARA P1

c)

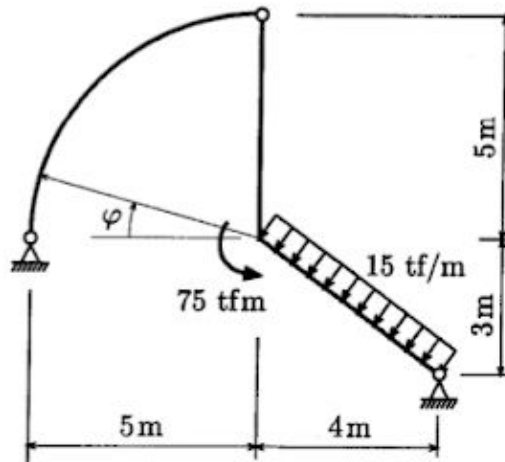


4. Traçar diagrama dos esforços solicitantes

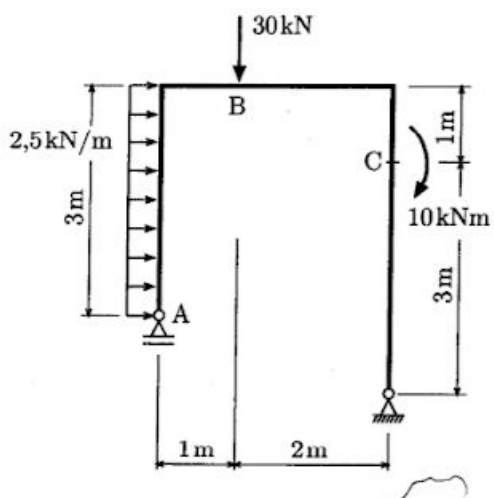
a)



b)



c)



LISTA DE EXERCÍCIOS PARA P1

RESPOSTAS:

1. a) $R_1 = 124/7 \text{ kN}$; $R_2 = 114/7 \text{ kN}$
 b) $R_1 = 27/12 \text{ pa}$; $R_2 = 33/12 \text{ pa}$
 c) $R_1 = pl$; $M = 4 pl^2 / 9$

2. a)

$$M\left(\frac{4}{3}b\right) = \frac{8}{9}pb^2 = \frac{8}{81}p\ell^2$$

$$V(0) = \frac{4}{3}pb$$

b)

$$M(a^-) = -\frac{3}{5}Pa$$

$$M(3a) = -\frac{4}{5}Pa$$

c)

$$V_{\text{extr}} = \frac{5}{6}p\ell$$

$$M_{\text{extr}} = 0,1881p\ell^2 \quad (x = 0,4725\ell)$$

3. a)

$$V(5^-) = -10 \text{ kN}$$

$$V(5^+) = 5 \text{ kN}$$

$$M(5) = -5 \text{ kN m}$$

b)

$$N(2^-) = -3 \text{ kN}$$

$$V(2^-) = 0$$

$$V(2^+) = 4 \text{ kN}$$

$$M(2) = 8 \text{ kN m}$$

c)

$$M_{\text{extr}} = 2,25 \text{ kN m}$$

$$N_{\text{extr}} = 2,40 \text{ kN}$$

$$V_{\text{extr}} = 1,80 \text{ kN}$$

4 a)

$$M_A = 2 \text{ kN m (i)}$$

$$R_B = 16 \text{ kN (}\uparrow\text{)}$$

$$M_{\text{extr}} = 14 \text{ kN m (s)}$$

b)

$$N_a = 21,875 \text{ tf}$$

$$V_a = 21,875 \text{ tf}$$

$$M_a = 0 \dots 109,375 \text{ tf m (e)}$$

$$N_b = -4,375 \text{ tf}$$

$$V_b = 30,625 \dots -44,375 \text{ tf}$$

$$M_b = 34,375 \dots 65,638 \dots 0 \text{ tf m (i)}$$

Barra curva

$$M(\varphi) = 109,38(1 - \sin \varphi - \cos \varphi)$$

c)

$$R_A = 10,42 \text{ kN (}\uparrow\text{)}$$

$$M_B = 0,83 \text{ kN m (s)}$$

$$M_C^s = 32,5 \text{ kN m (d)}$$

$$M_C^i = 22,5 \text{ kN m (d)}$$

$$M_{\text{extr}} = 40 \text{ kN m (s,d)}$$

LISTA DE EXERCÍCIOS PARA P1

Observação: todos os exercícios e respostas de exercícios foram retirados da primeira e segunda listas que estão no moodle.

Exemplo de diagrama traçado:

4.a)

