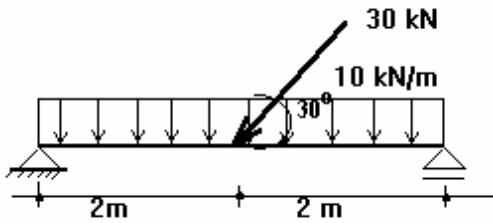


ESTRUTURAS ISOSTÁTICAS – DECivil – Faculdade de Engenharia - PUCRS

LISTA DE EXERCÍCIOS - CÁLCULO DE REAÇÕES EXTERNAS

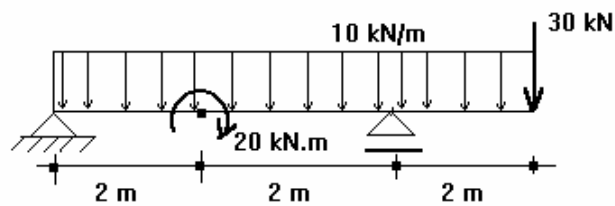
1.



$$R: V_A = V_B = 27,5 \text{ kN}$$

$$H_A = 25,98 \text{ kN}$$

2.

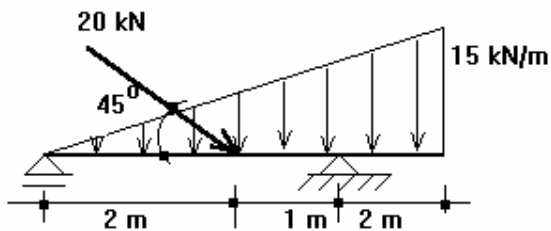


$$R: V_A = -5 \text{ kN}$$

$$V_B = 95 \text{ kN}$$

$$H_A = 0$$

3.

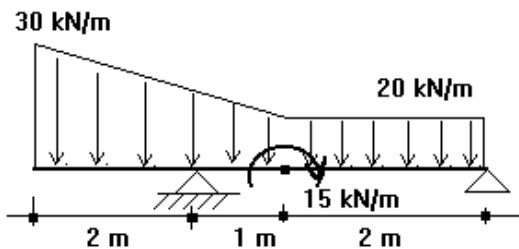


$$R: V_A = 0,59 \text{ kN}$$

$$V_B = 51,05 \text{ kN}$$

$$H_B = 14 \text{ kN} (\leftarrow)$$

4.

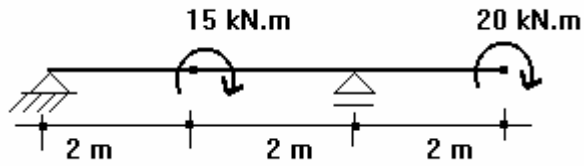


$$R: V_A = 98,4 \text{ kN}$$

$$V_B = 16,6 \text{ kN}$$

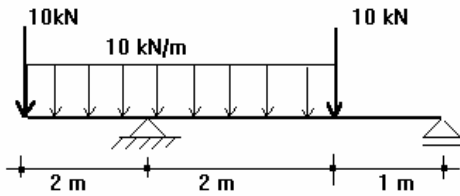
$$H_A = 0$$

5.



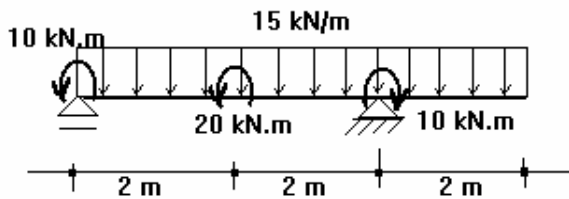
$$\begin{aligned} R: V_A &= -8,75 \text{ kN} \\ V_B &= 8,75 \text{ kN} \\ H_A &= 0 \end{aligned}$$

6.



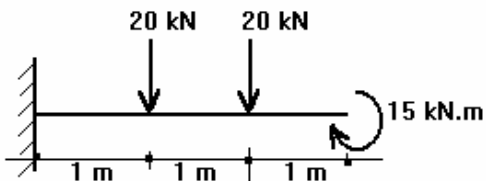
$$\begin{aligned} R: V_A &= 60 \text{ kN} \\ V_B &= 0 \\ H_A &= 0 \end{aligned}$$

7.



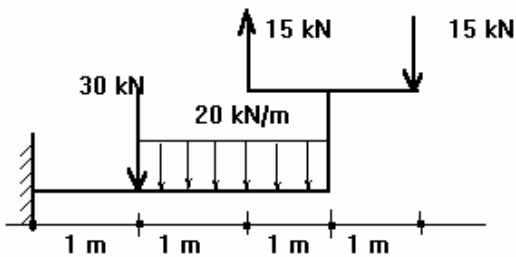
$$\begin{aligned} R: V_A &= 27,5 \text{ kN} \\ V_B &= 62,5 \text{ kN} \\ H_B &= 0 \end{aligned}$$

8.



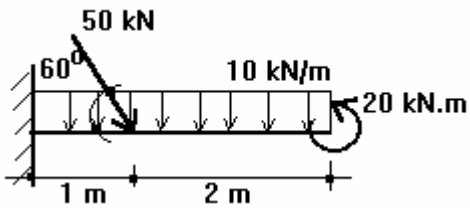
$$\begin{aligned} R: V_A &= 40 \text{ kN} \\ H_A &= 0 \\ M_A &= 75 \text{ kN.M (anti horário)} \end{aligned}$$

9.



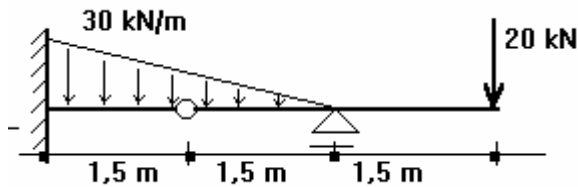
$$\begin{aligned} R: V_A &= 70 \text{ kN} \\ H_A &= 0 \\ M_A &= 140 \text{ kN.m (anti hor)} \end{aligned}$$

10.



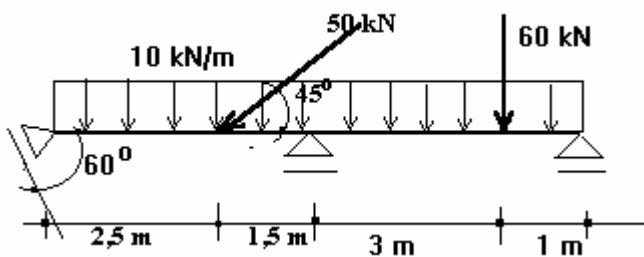
$$\begin{aligned} R: V_A &= 73,4 \text{ kN} \\ H_A &= 25 \text{ kN} (\leftarrow) \\ M_A &= 68,3 \text{ kN} (\text{anti hor}) \end{aligned}$$

11.



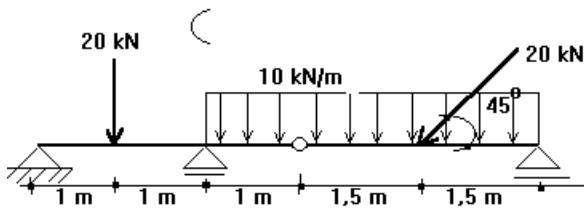
$$\begin{aligned} R: V_A &= 21,25 \text{ kN} \\ H_A &= 0 \\ M_A &= 3,75 \text{ kN.m} (\text{anti}) \\ V_B &= 43,75 \text{ kN} \end{aligned}$$

12.



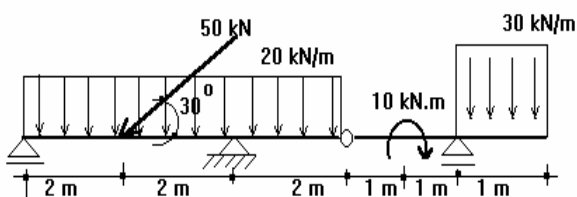
$$\begin{aligned} R: R_A &= 40,81 \text{ kN} \\ V_B &= 102,8 \text{ kN} \\ V_C &= 52,14 \text{ kN} \end{aligned}$$

13.



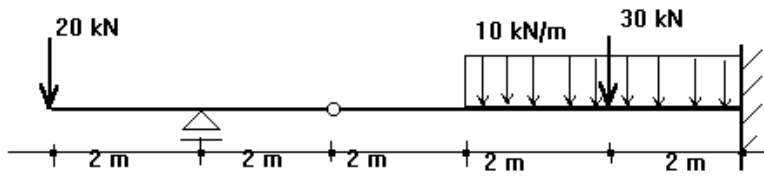
$$\begin{aligned} R: V_A &= -3,5 \text{ kN} \\ H_A &= 14 \text{ kN} (\rightarrow) \\ V_B &= 55,5 \text{ kN} \\ V_C &= 22 \text{ kN} \end{aligned}$$

14.



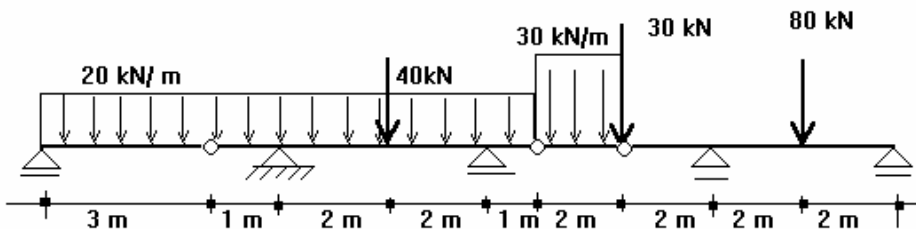
$$\begin{aligned} R: V_A &= 48,75 \text{ kN} \\ V_B &= 83,75 \text{ kN} \\ H_B &= 43,3 \text{ kN} (\rightarrow) \\ V_C &= 42,5 \text{ kN} \end{aligned}$$

15.



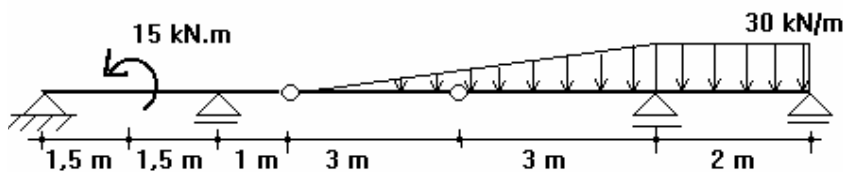
$$\begin{aligned} R: \quad &V_A = 40 \text{ kN} \\ &V_B = 50 \text{ kN} \\ &M_B = 20 \text{ kN.m (hor)} \\ &H_B = 0 \end{aligned}$$

16.



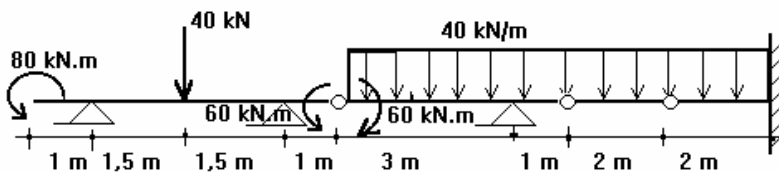
$$\begin{aligned} R: \quad &V_A = 30 \text{ kN} \\ &V_B = 110 \text{ kN} \\ &V_C = 110 \text{ kN} \\ &V_D = 130 \text{ kN} \\ &V_E = 10 \text{ kN} \end{aligned}$$

17.



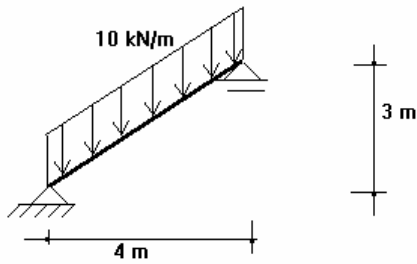
$$\begin{aligned} R: \quad &V_A = 2,5 \text{ kN} \\ &V_B = 5 \text{ kN} \\ &V_C = 180 \text{ kN} \\ &V_D = -37,5 \text{ kN} \end{aligned}$$

18.



$$\begin{aligned} R: \quad &V_A = 60 \text{ kN} \quad V_B = 0 \\ &V_C = 180 \text{ kN} \\ &V_D = 120 \text{ kN} \\ &M_D = 160 \text{ kN.m (hor)} \end{aligned}$$

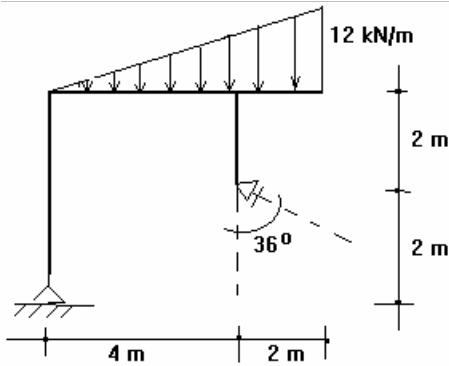
19.



$$R: V_A = V_B = 25 \text{ kN}$$

$$H_A = 0$$

20.

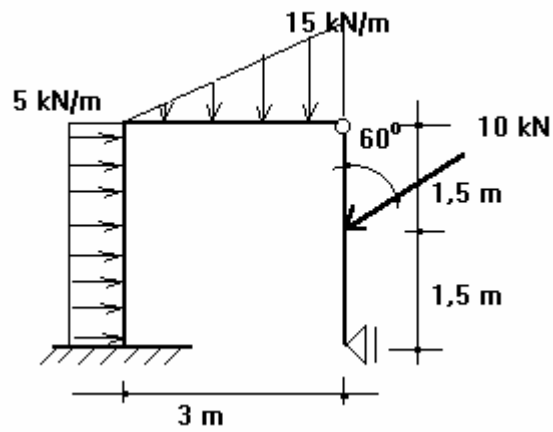


$$R: V_A = 9,6 \text{ kN}$$

$$H_A = 19,22 \text{ kN}$$

$$R_B = 32,58 \text{ kN}$$

21.



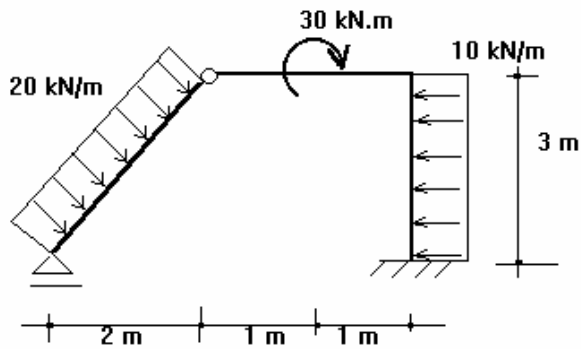
$$R: V_A = 27,5 \text{ kN}$$

$$H_A = 10,67 \text{ kN} (\leftarrow)$$

$$M_A = 69,51 \text{ kN.m (ANTI)}$$

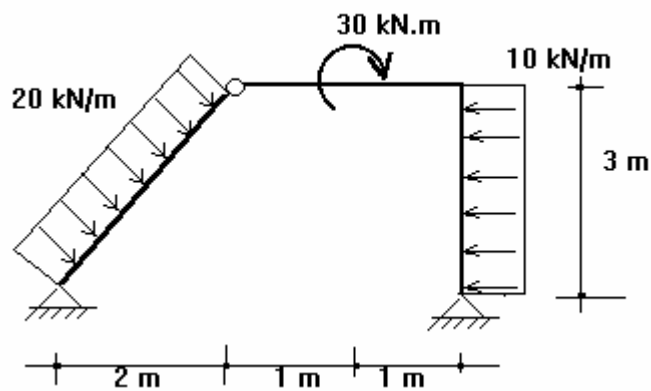
$$H_B = 4,33 (\rightarrow)$$

22.



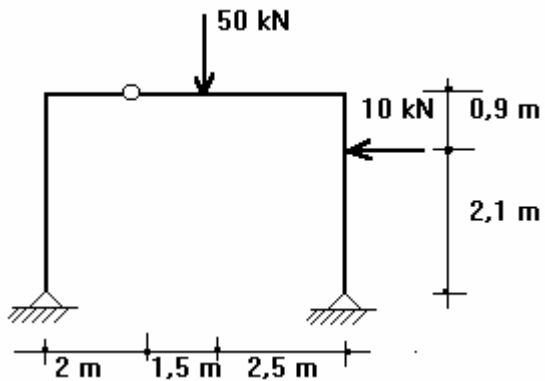
$$\begin{aligned}
 R: \quad &V_A = 65,2 \text{ kN} \\
 &V_B = -25,2 \text{ kN} \\
 &H_B = 30 \text{ kN} (\leftarrow) \\
 &M_B = 215,4 \text{ kN.m (anti hor)}
 \end{aligned}$$

23.



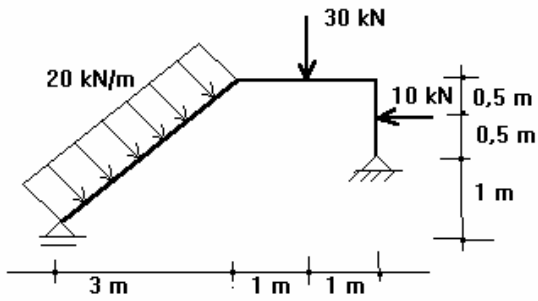
$$\begin{aligned}
 R: \quad &V_A = 11,3 \text{ kN} & H_A = 35,8 \text{ kN} (\leftarrow) \\
 &V_B = 28,65 \text{ kN} & H_B = 5,9 \text{ kN} (\rightarrow)
 \end{aligned}$$

24.



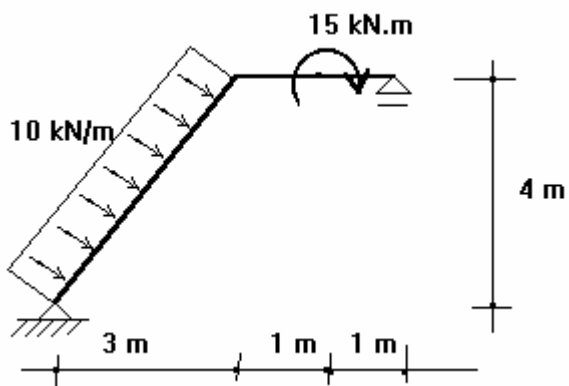
$$\begin{aligned}
 R: \quad &V_A = 24,33 \text{ kN} \\
 &H_A = 16,22 \text{ kN} (\rightarrow) \\
 &V_B = 25,67 \text{ kN} \\
 &H_B = 6,22 \text{ kN} (\leftarrow)
 \end{aligned}$$

25.



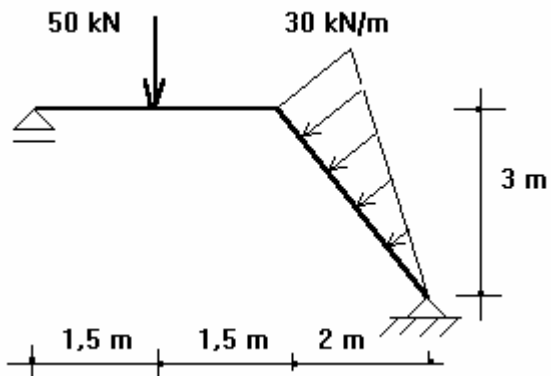
$$\begin{aligned} R: \quad V_A &= 48,96 \text{ kN} \\ V_B &= 40,94 \text{ kN} \\ H_B &= 29,9 \text{ kN} (\leftarrow) \end{aligned}$$

26.



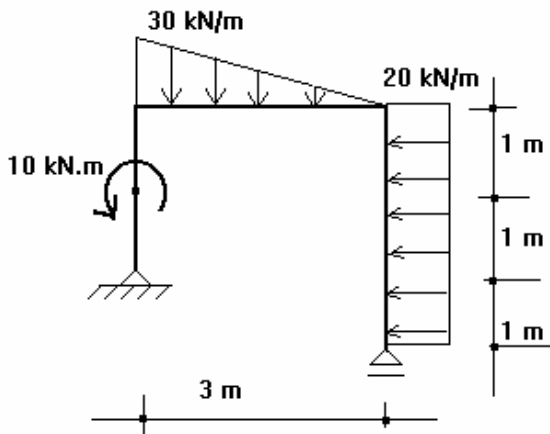
$$\begin{aligned} R: \quad V_A &= 2 \text{ kN} \\ V_B &= 28 \text{ kN} \\ H_A &= 40 \text{ kN} (\leftarrow) \end{aligned}$$

27.



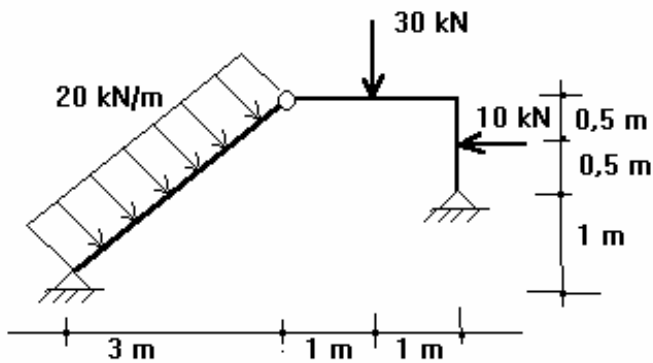
$$\begin{aligned} R: \quad V_A &= 60,98 \text{ kN} \\ V_B &= 19,04 \text{ kN} \\ H_B &= 44,92 \text{ kN} (\rightarrow) \end{aligned}$$

28.



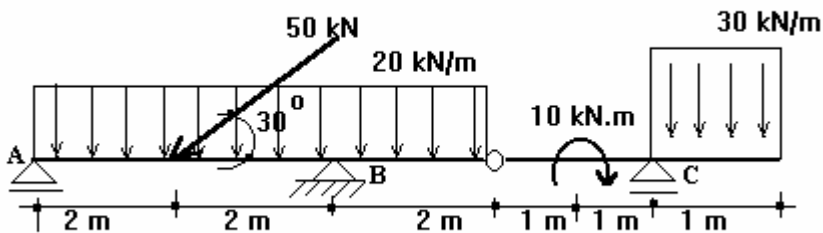
$$R : \begin{aligned} V_A &= 43,33 \text{ kN} \\ V_B &= 1,67 \text{ kN} \\ H_A &= 60 \text{ kN} (\rightarrow) \end{aligned}$$

29.



$$R: \begin{aligned} V_A &= 51,46 \text{ kN} & H_A &= 12,08 \text{ kN} (\rightarrow) \\ V_B &= 38,54 \text{ kN} & H_B &= 42,08 \text{ kN} (\leftarrow) \end{aligned}$$

30.



R:

$$\begin{aligned} V_A &= 48,75 \text{ kN} \\ V_B &= 83,75 \text{ kN} \\ H_B &= 43,3 \text{ kN} (\rightarrow) \\ V_C &= 42,5 \text{ kN} \end{aligned}$$