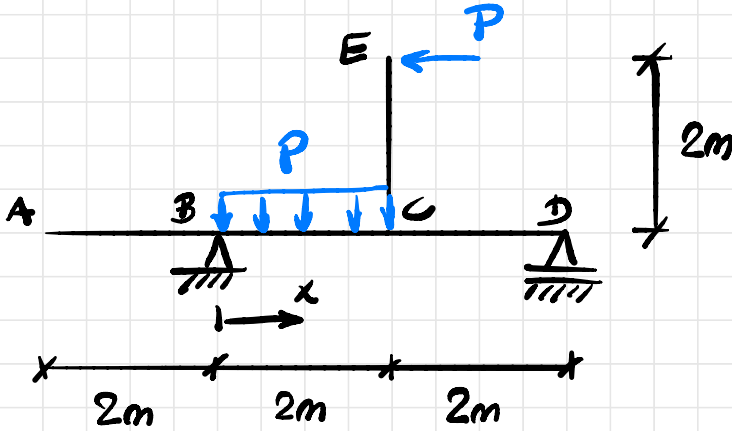
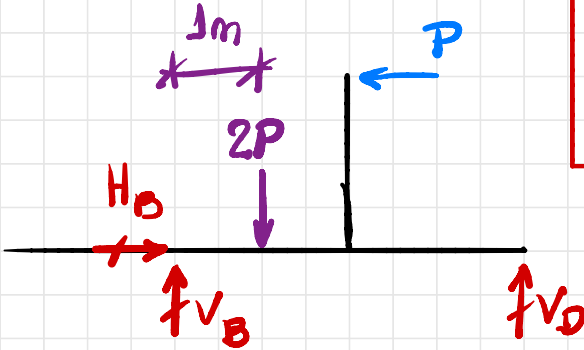


Q1



a) DCL



$$\begin{aligned} a) \quad H_B &= P, \\ V_B &= 2P \end{aligned}$$

$$\sum F_H = 0: H_B - P = 0 \Rightarrow H_B = P$$

$$\sum F_V = 0: V_B + V_D - 2P = 0$$

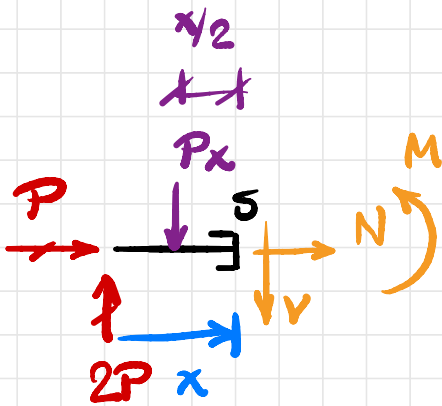
$$\text{v)} \quad \sum M_B = 0: -2P \cdot 1 + P \cdot 2 + V_D \cdot 4 = 0$$

$$V_D = 0 \Rightarrow V_B = 2P$$

b) Transporte para B:

como não há carregamentos entre A e B, não há esforços a serem transportados.

Corte entre B e C ($0 < x < 2m$):



$$\begin{aligned} b) N &= -P, \\ V &= P(2-x) \\ M &= P(2x - x^2/2) \end{aligned}$$

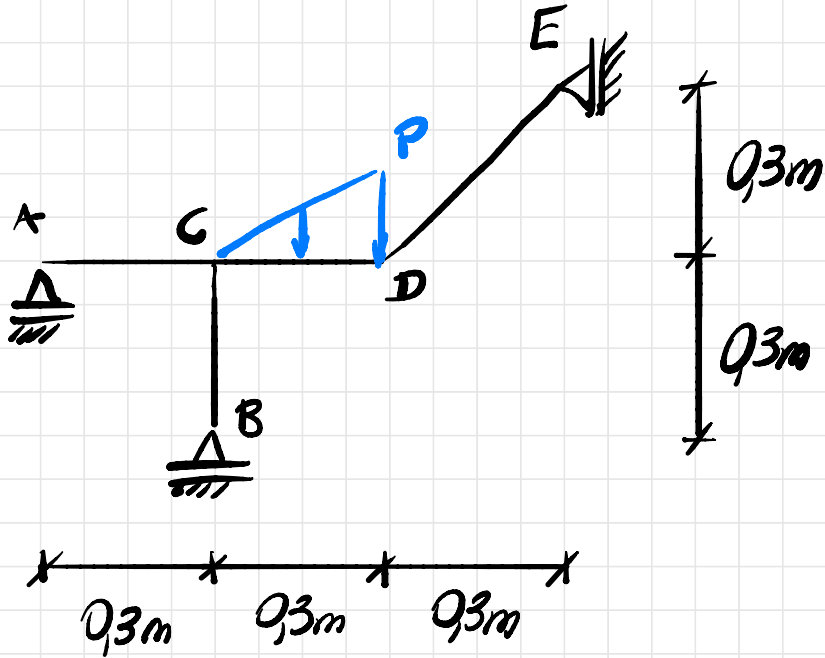
$$\sum F_H = 0: P + N = 0 \Rightarrow N = -P$$

$$\sum F_V = 0: 2P - Px - V = 0 \Rightarrow V = P(2-x)$$

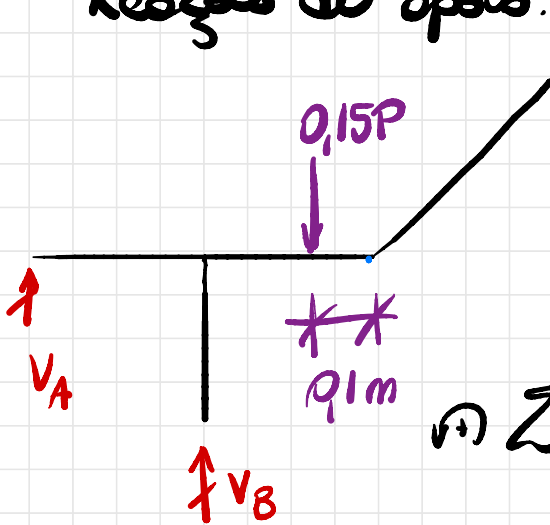
$$\textcircled{+} \sum M_B = 0: M - 2P \cdot x + Px \left(\frac{x}{2}\right) = 0$$

$$M = P(2x - x^2/2)$$

Q2



Reações do apoio:



$$\sum F_H = 0: H_E = 0$$

$$\sum F_V = 0: V_A + V_B = 0,15P$$

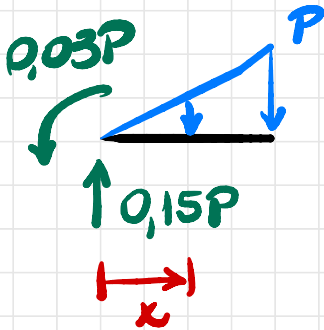
$$\begin{aligned} \sum M_A = 0: & V_B \cdot 0,9 - 0,15P \cdot 0,9 \\ & - H_E \cdot 0,3 = 0 \end{aligned}$$

$$V_B = 0,25P$$

\Rightarrow

$$V_A = -0,1P$$

Transporte para C:



$$q(x) = P \frac{x}{0,3}$$

$$\frac{dV}{dx} = -q(x) \Rightarrow \frac{dV}{dx} = -\frac{Px}{0,3}$$

$$V(x) = -\frac{Px^2}{0,6} + C_1 ; V(0) = 0,15P$$

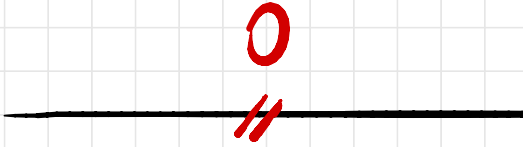
$$\therefore V(x) = 0,15P - \frac{Px^2}{0,6}$$

$$\frac{dM}{dx} = V(x) \Rightarrow \frac{dM}{dx} = 0,15P - \frac{Px^2}{0,6}$$

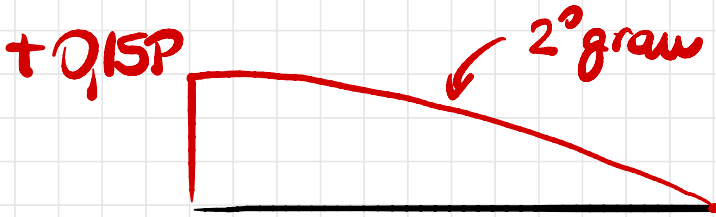
$$M(x) = 0,15Px - \frac{Px^3}{1,8} + C_2 ; M(0) = -0,03P$$

$$\therefore M(x) = -0,03P + 0,15Px - \frac{Px^3}{1,8}$$

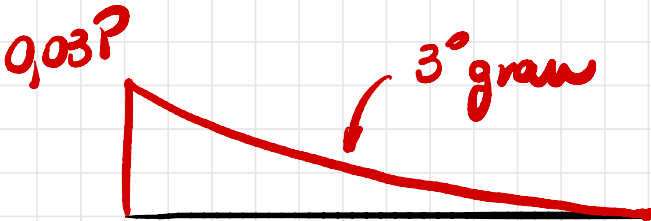
Diagramas:



$N[kN]$

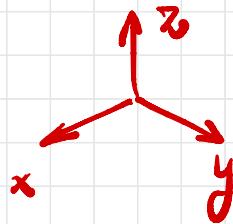
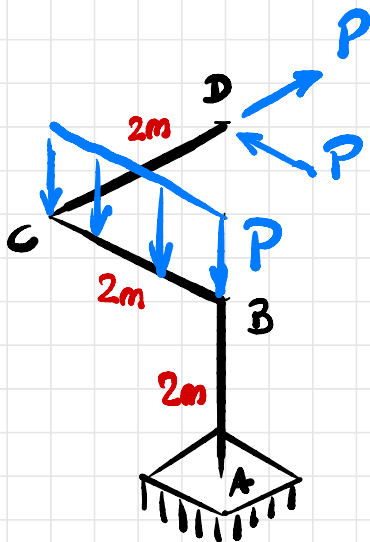


$V[kN]$

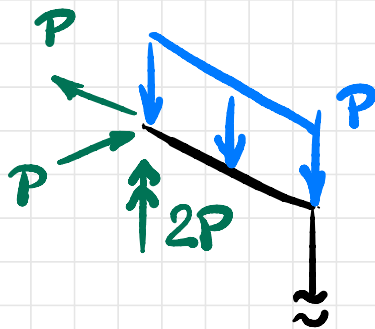


$M[kNm]$

Q3



Transporte para D:



Diagramas:

