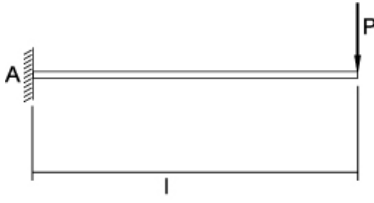


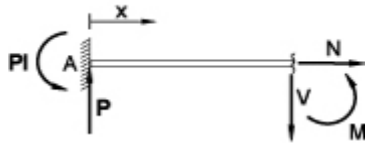
Exercício 1



$$a) \sum X = 0 = X_A$$

$$b) \sum M_{(A)} = 0 = -Pl + M_A \Rightarrow M_A = Pl$$

$$c) \sum Y = 0 = Y_A - P \Rightarrow Y_A = P$$

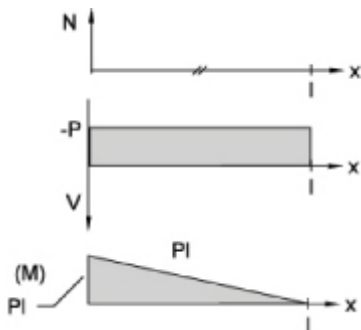


$$d) \sum X = 0 = N_{(x)}$$

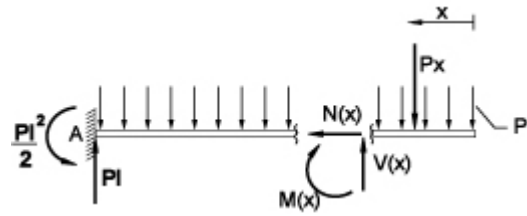
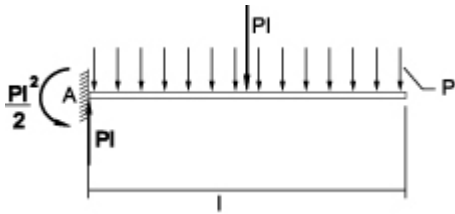
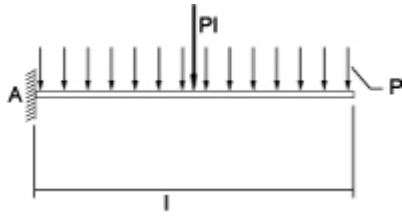
$$e) \sum Y = 0 = P - V_{(x)} \Rightarrow V_{(x)} = P$$

$$f) \sum M_S = 0 = Pl - Px + M_{(x)} \Rightarrow M_{(x)} = Px - Pl$$

Diagramas:



Exercício 2

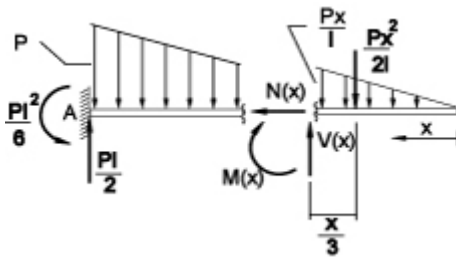
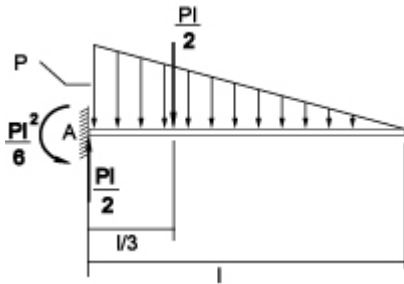


- 1) $N_{(x)} = 0$
- 2) $V_{(x)} - Px = 0 \Rightarrow V_{(x)} = Px$
- 3) $M_{(x)} + Px = 0 \Rightarrow V_{(x)} = Px$

Diagramas:



Exercício 3



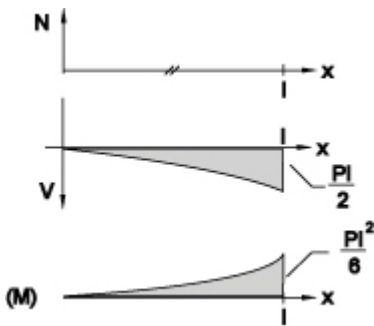
$$1) \frac{P}{l} = \frac{Px}{x}$$

$$2) N_{(x)} = 0$$

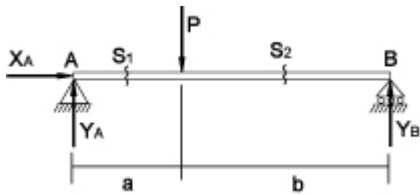
$$3) V_{(x)} - \frac{Px^2}{2l} = 0 \Rightarrow V_{(x)} = \frac{Px^2}{2l}$$

$$4) M_{(x)} + P \left(\frac{x^2}{2l} \right) \left(\frac{x}{3} \right) = 0 \Rightarrow M_{(x)} = -\frac{Px^3}{6l}$$

Diagramas



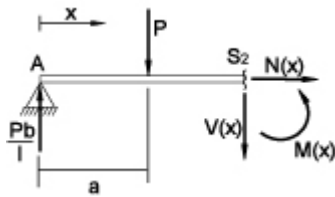
Exercício 4 :



- 1) $X_A = 0$
- 2) $Y_A - P + Y_B = 0$
- 3) $\sum M_{(A)} = 0 \Rightarrow Pa - Y_B l$
 $Y_B = \frac{Pa}{l}$
- 4) $\sum M_{(B)} = 0 \Rightarrow Y_A l - Pb = 0$
 $Y_A = \frac{Pb}{l}$

5) Seção I

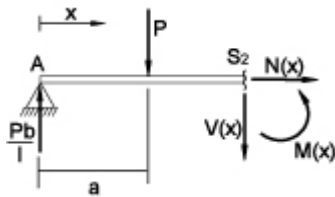
$(0 \leq x \leq a)$



- a) $N_{(x)} = 0$
- b) $V_{(x)} = \frac{Pb}{l}$
- c) $\frac{Pb}{l}x - M_{(x)} = 0 \Rightarrow M_{(x)} = \frac{Pb}{l}x$

6) Seção II

$(a \leq x \leq l)$



$$a) N_{(x)} = 0$$

$$b) \frac{Pb}{l} - P - V_{(x)} = 0$$

$$V_{(x)} = \frac{Pb}{l} - P = \frac{(Pb - Pl)}{l} = \frac{P(b-l)}{l} = -\frac{Pa}{l}$$

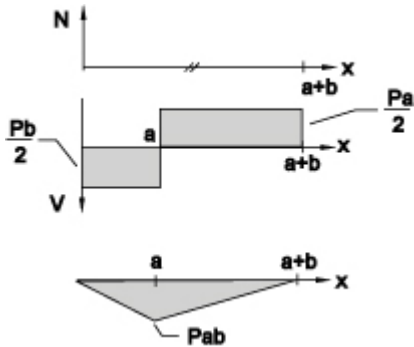
$$c) \frac{Pbx}{l} - P(x-a) - M_{(x)} = 0$$

$$M_{(x)} = \frac{Pbx}{l} - Px + Pa = \frac{(P(b-l)x + Pa)}{l} = \frac{(Pal - Pbx)}{l}$$

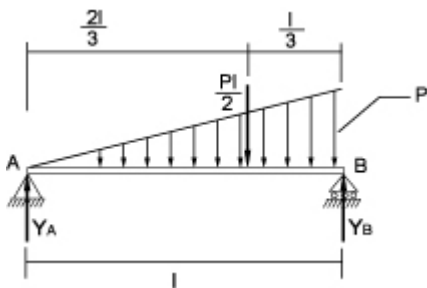
$$x = a \Rightarrow M = \frac{(-Pa^2 + Pal)}{l} = \frac{Pa(l-a)}{l} = \frac{Pab}{l}$$

$$x = l \Rightarrow M = 0$$

Diagramas :



Exercício 6 :

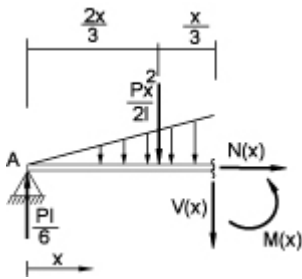


$$1) X_A = 0$$

$$2) \sum M_{(A)} = 0 = \left(\frac{Pl}{2}\right)\left(\frac{2l}{3}\right) - Y_B l$$

$$Y_B = \frac{Pl}{3}$$

$$3) \sum M_{(B)} = 0 = Y_A l - \frac{Pl}{2} \Rightarrow Y_A = \frac{Pl}{6}$$



$$4) \frac{P_x}{x} = \frac{P}{l} \Rightarrow P_x = \frac{Px}{l}$$

$$a) N = 0$$

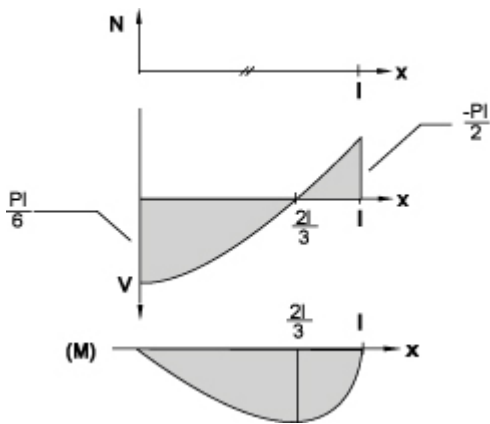
$$b) \frac{Pl}{6} - \frac{Px^2}{2l} - V = 0 \Rightarrow V = \frac{Pl}{6} - \frac{Px^2}{2l}$$

$$c) \frac{Plx}{6} - \frac{Px^2 \left(\frac{x}{2}\right)}{3l} - M = 0 \Rightarrow M = \frac{Plx}{6} - \frac{Px^3}{6l}$$

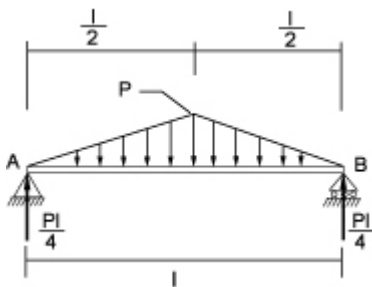
$$x = l \Rightarrow V = \frac{Pl}{6} - \frac{Pl^2}{2l} = \frac{(Pl - 3l^2)}{6} \Rightarrow V = -\frac{Pl}{3}$$

$$V = \frac{Pl}{6} - \frac{Px^2}{2l} = \frac{Pl}{6} - \frac{Px^2}{2l} = \frac{l^2}{3} = x^2 x = l \frac{\sqrt{3}}{3}$$

Diagramas :

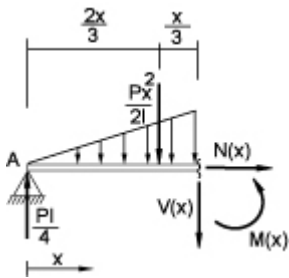


Exercício 7



$$\frac{P}{(l/2)} = \frac{P_x}{x} \Rightarrow P_x = \frac{2Px}{l}$$

$$\left(0 \leq x \leq \frac{l}{2} \right)$$

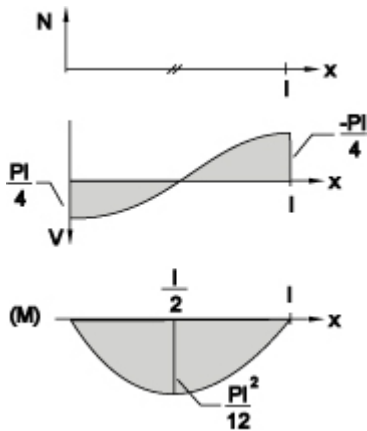


$$a) N = 0$$

$$b) \frac{Pl}{4} - \frac{Px^2}{l} - V = 0 \Rightarrow V = \frac{Pl}{4} - \frac{Px^2}{l}$$

$$c) \frac{Plx}{4} - \frac{Px^2x}{3l} - M = 0 \Rightarrow M = \frac{Plx}{4} - \frac{Px^3}{3l}$$

Diagramas :



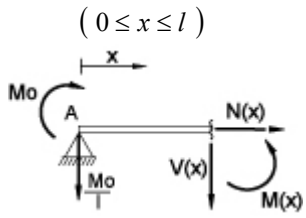
Exercício 8 :



$$1) X_A = 0$$

$$2) \sum M_{(A)} = 0 = M_0 - Y_B l \Rightarrow Y_B = \frac{M_0}{l}$$

$$3) \sum M_{(B)} = 0 = M_0 + Y_A l \Rightarrow Y_A = -\frac{M_0}{l}$$

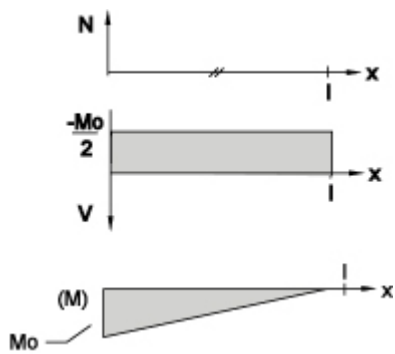


a) $N = 0$

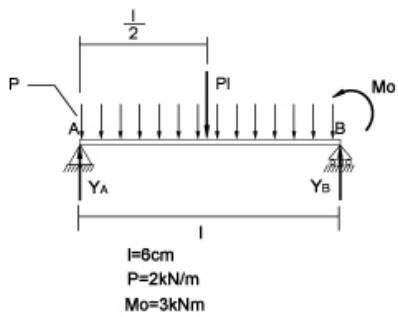
b) $V + \frac{M_0}{l} = 0 \Rightarrow -\frac{M_0}{l}$

c) $M - \frac{M_0}{l}x = 0 \Rightarrow M = \frac{M_0}{l}x$

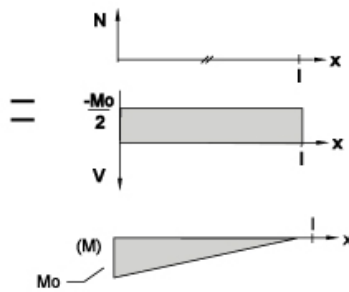
Diagramas :



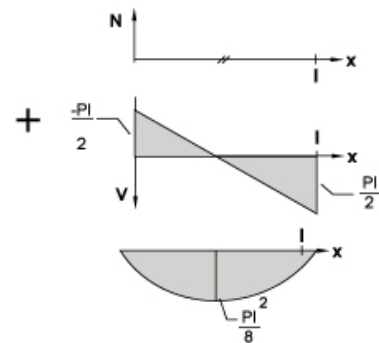
Exercício 9 :

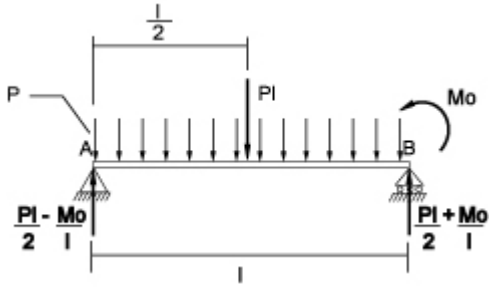


Ex5



Ex8

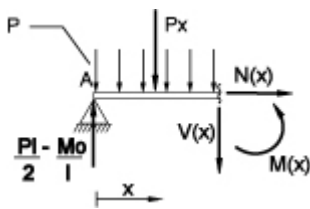




$$1) Y_A = 0$$

$$2) \sum M_{(A)} = 0 = \frac{Pl}{2} \frac{l}{2} - Y_B l + M_0 \Rightarrow Y_B = \frac{Pl}{2} + \frac{M_0}{l}$$

$$3) \sum M_{(B)} = 0 = Y_A l - Pl \frac{l}{2} + M_0 \Rightarrow Y_A = \frac{Pl}{2} - \frac{M_0}{l}$$



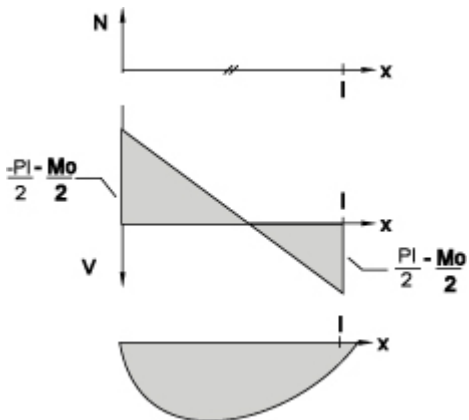
$$a) N = 0$$

$$b) \frac{Pl}{2} - \frac{M_0}{l} - Px - V = 0 \Rightarrow V = \frac{Pl}{2} - \frac{M_0}{l} - Px$$

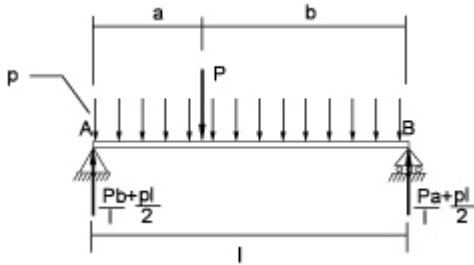
$$c) \frac{\left(\frac{Pl}{2} - \frac{M_0}{l}\right)x}{2} - Px \frac{x}{2} - M = 0$$

$$M = \left(\frac{Pl}{2} - \frac{M_0}{l}\right)x - \frac{Px^2}{2}$$

Diagramas :



Exercícios 10 :



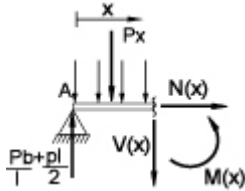
$$1) \sum M_{(A)} = 0 = Pa - Y_B l + \frac{Pl}{2}$$

$$Y_B = \frac{Pa}{l} + \frac{Pl}{2}$$

$$2) \sum M_{(B)} = Y_A l - Pb - Pl \frac{l}{2}$$

$$Y_A = \frac{Pb}{l} + \frac{Pl}{2}$$

($0 \leq x \leq a$)



a) $N_{(x)} = 0$

b) $\frac{Pb}{l} + \frac{Pl}{2} - Px - V = 0 \Rightarrow V = \frac{Pb}{l} + \frac{Pl}{2} - Px$

c) $\left(\frac{Pb}{l} + \frac{Pl}{2}\right)x = \frac{Px^2}{2}$

$$V_{(A)} = \frac{Pb}{l} + \frac{Pl}{2} - Pa = \frac{Pb}{l} + \frac{Pb}{2} - \frac{Pa}{2}$$

$$M_{(A)} = \left(\frac{Pb}{l} + \frac{Pl}{2}\right)a - \frac{Pa^2}{2} = \frac{Pb}{l} + \frac{Pa^2}{2} + \frac{Pba}{2} - \frac{Pa^2}{2}$$

$$V_{(A)} - P = \frac{Pb}{l} + \frac{Pb}{2} - \frac{Pa}{2} - P = \frac{(Pbl - Pal - 2Pa)}{2l} = \frac{Pb}{2} - \frac{Pa}{2} - \frac{Pa}{l}$$

Diagramas :

