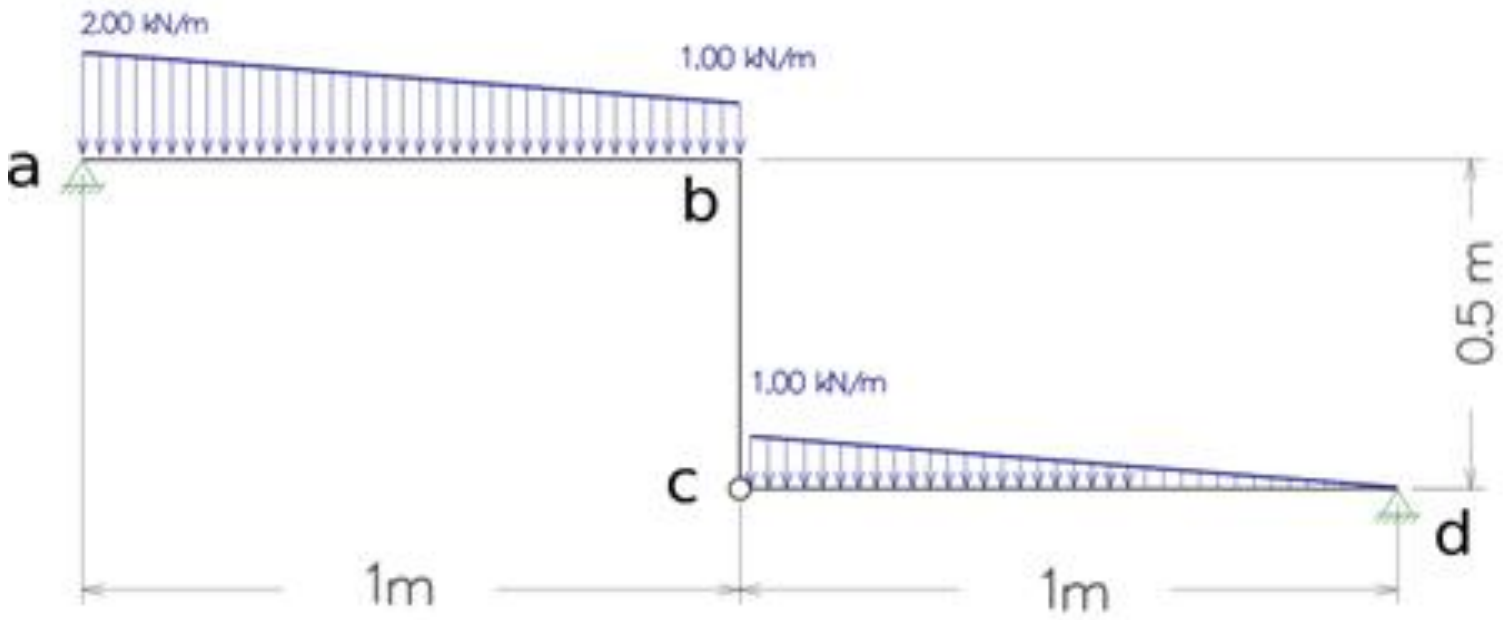
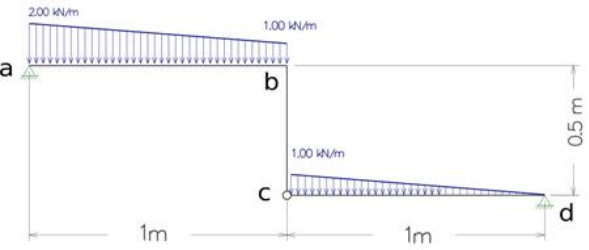
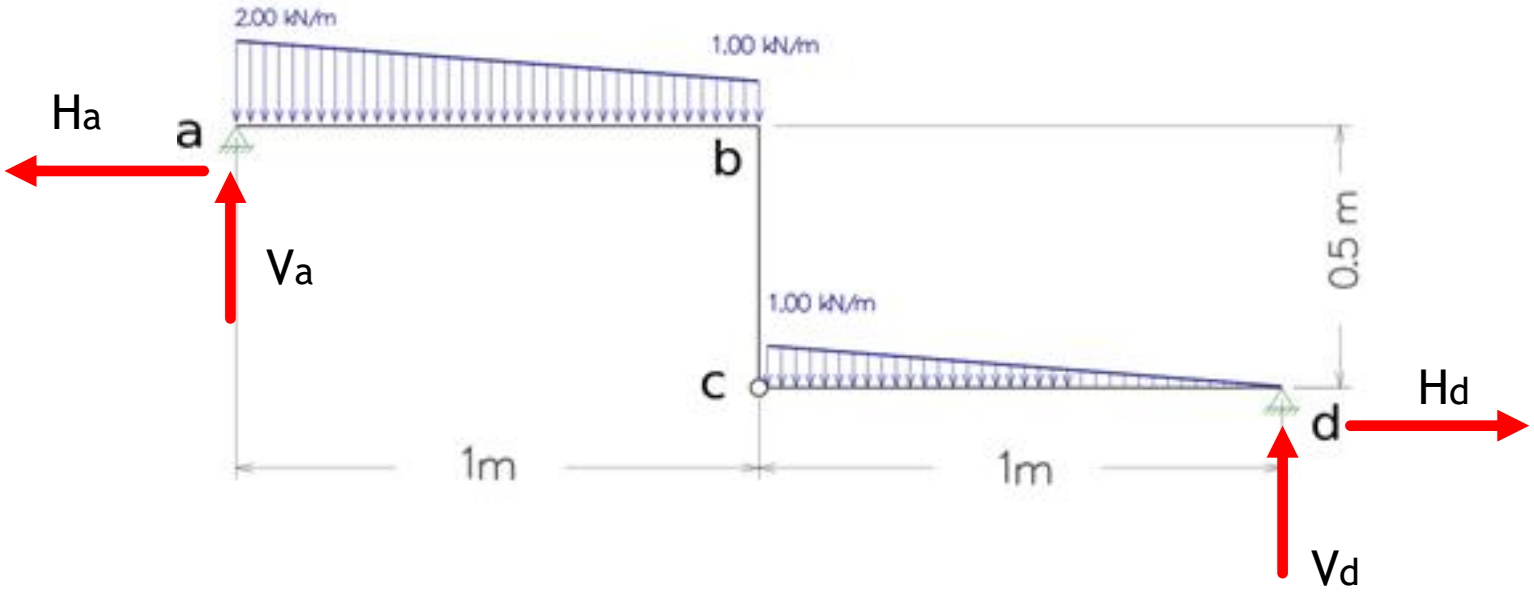
Calcular leyes de esfuerzo

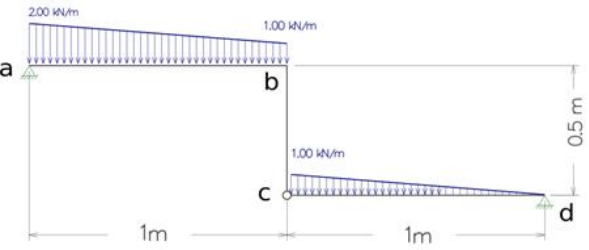




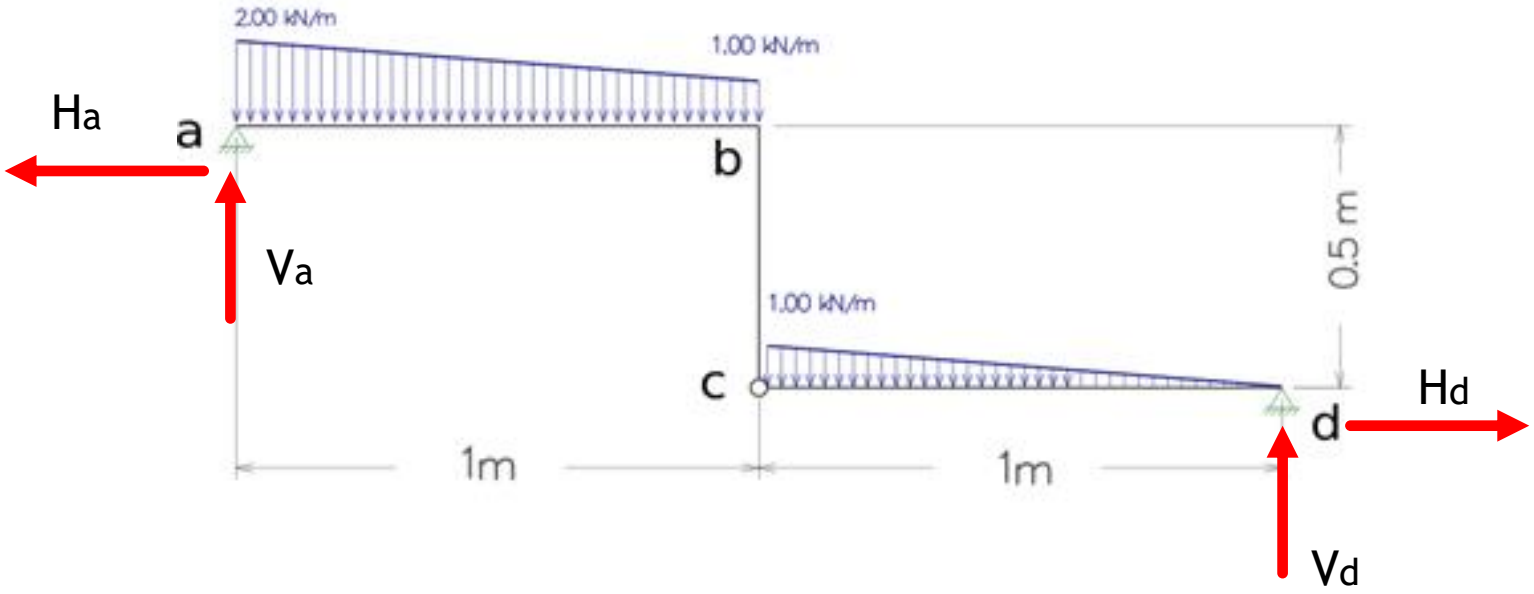
Reacciones



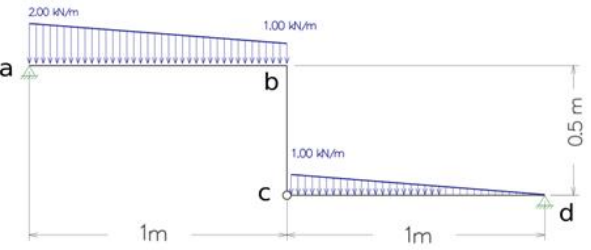
$$\sum M_c = 0 \rightarrow V_D - \frac{1}{2}.1.1.\frac{1}{3} = 0 \rightarrow \mathbf{V_D = \frac{1}{6}\ kN}$$



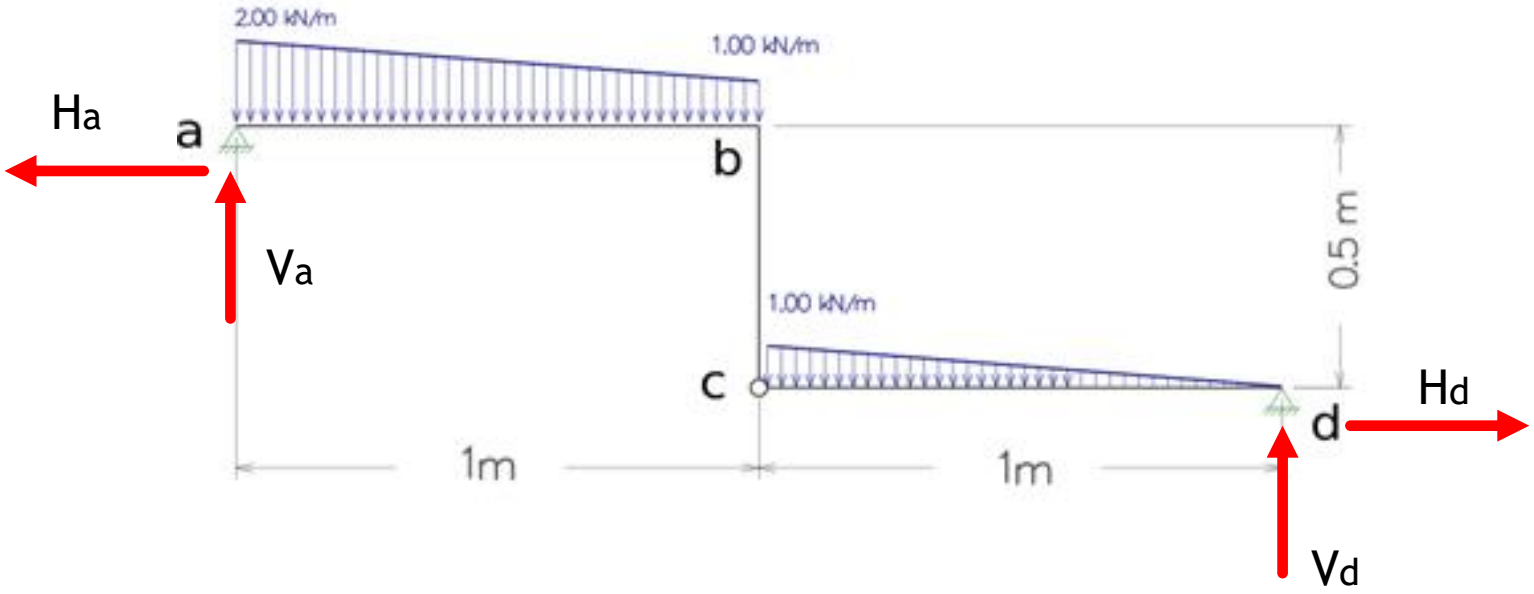
Reacciones



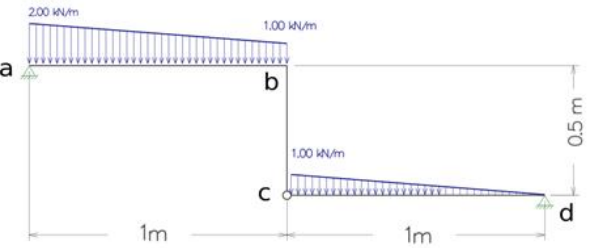
$$\sum F_y = 0 \rightarrow V_A + V_D = \frac{1}{2} + 1.1 + \frac{1}{2} \rightarrow \mathbf{V_A = \frac{11}{6}\ kN}$$



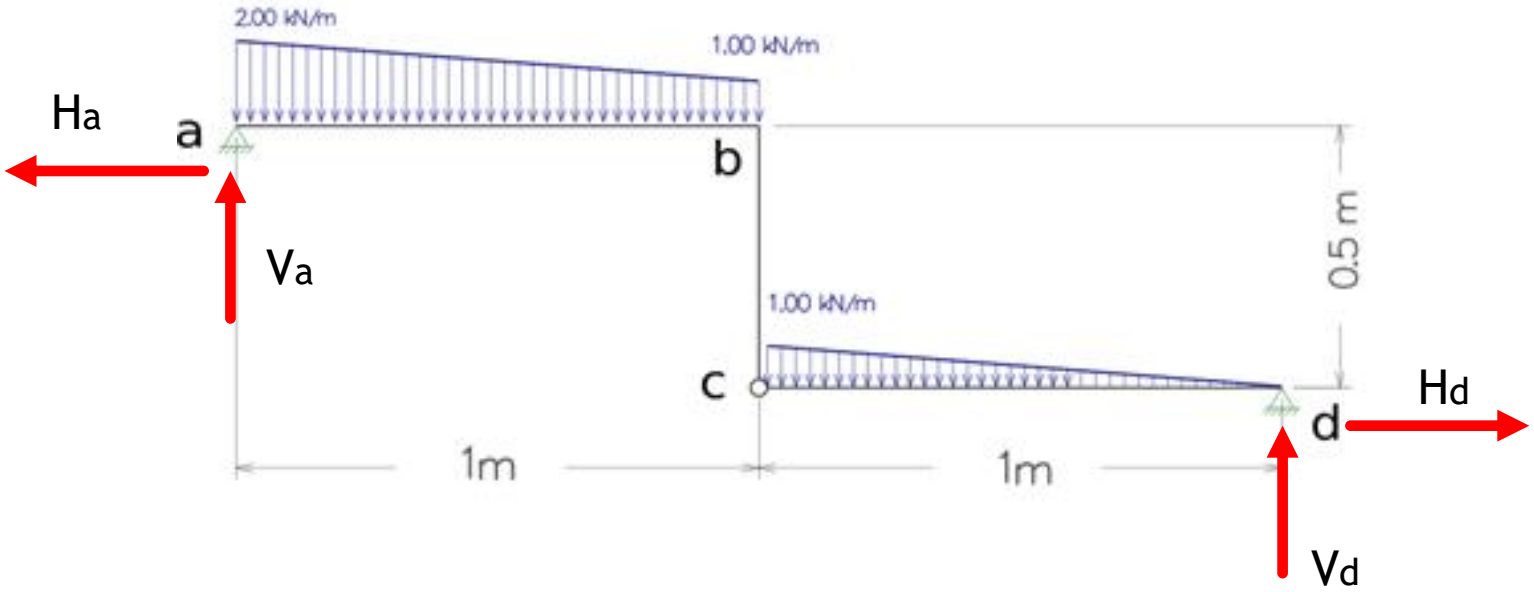
Reacciones



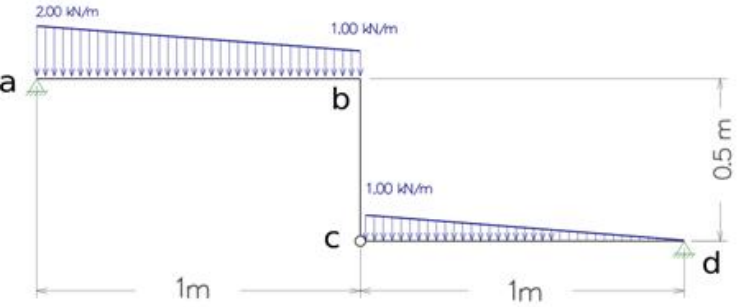
$$\sum M_a = 0 \rightarrow 2.\frac{1}{6} - \frac{1}{2}H_D - \frac{1}{2}.1.1.\left(1+\frac{1}{3}\right) - 1.1.\frac{1}{2} - 1.1.\frac{1}{2}.\frac{1}{3} = 0 \rightarrow \mathbf{H_D = 2\ kN}$$



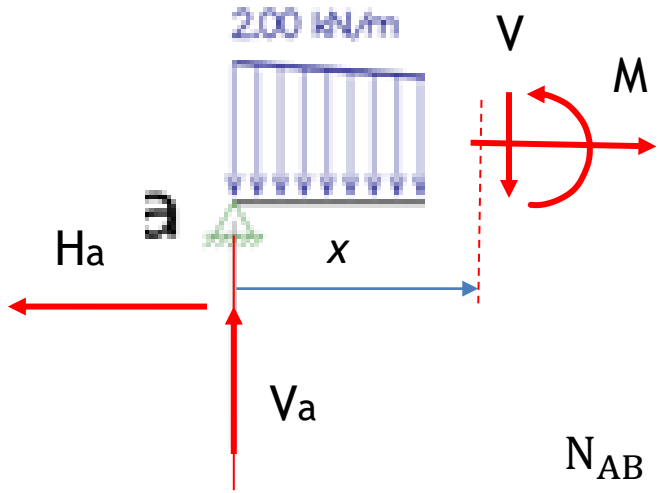
Reacciones



$$\sum F_x = 0 \rightarrow \mathbf{H_A = -2\ kN}$$



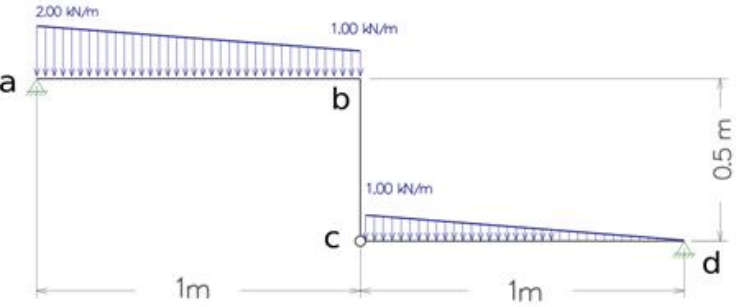
TRAMO AB



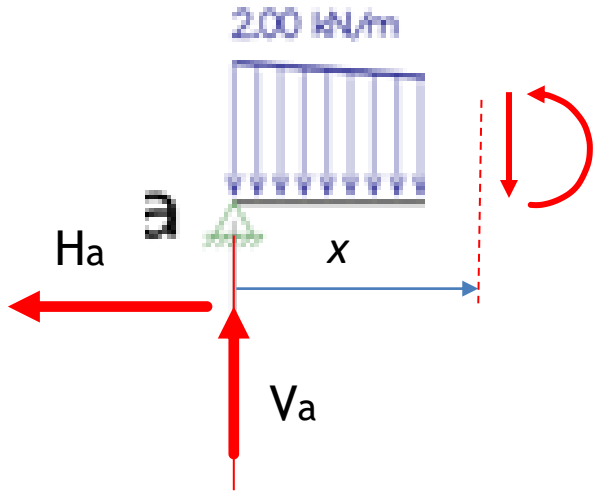
$$N_{AB} = 2\ \text{kN}\ (\text{T})$$

$$V_{AB}(x) = \frac{11}{6} - x - V_T(x)$$

$$M_{AB}(x) = \frac{11}{6}x - \frac{x^2}{2} - M_T(x)$$



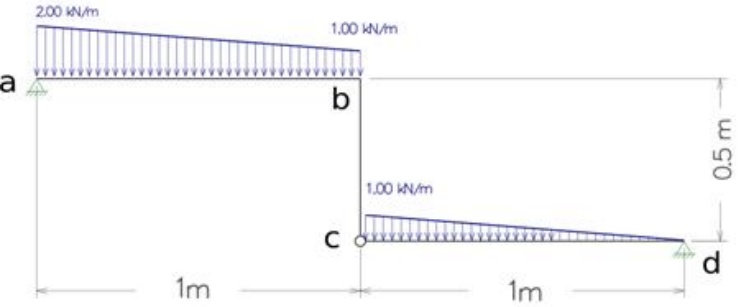
TRAMO AB



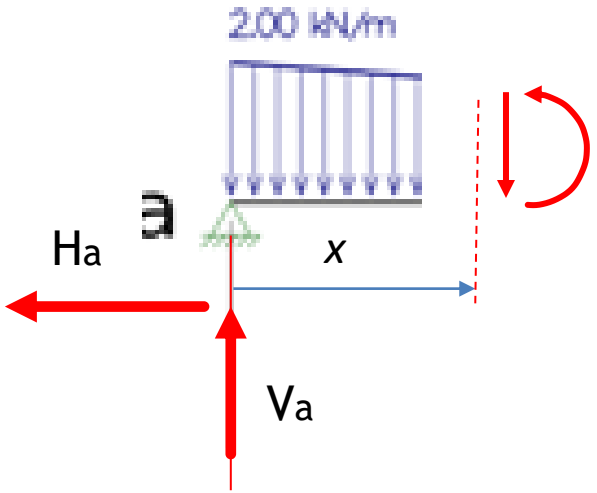
$$q(x) = q_0\left(1 - \frac{x}{L}\right) = (1 - x) \longrightarrow V_T(x) = \int_0^x (1 - \xi).\,d\xi = x - \frac{x^2}{2}$$

$$\downarrow$$

$$M_T(x) = \int_0^x \left(\xi - \frac{\xi^2}{2}\right).\,d\xi = \frac{x^2}{2} - \frac{x^3}{6}$$

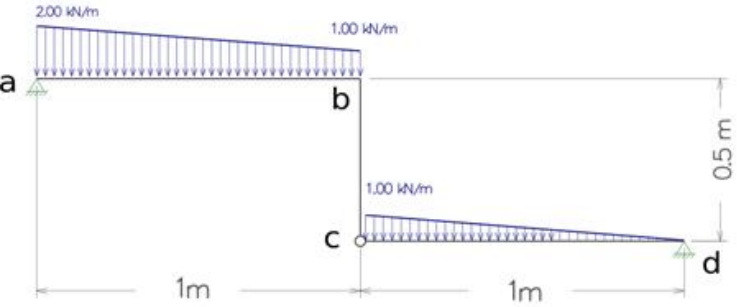


TRAMO AB

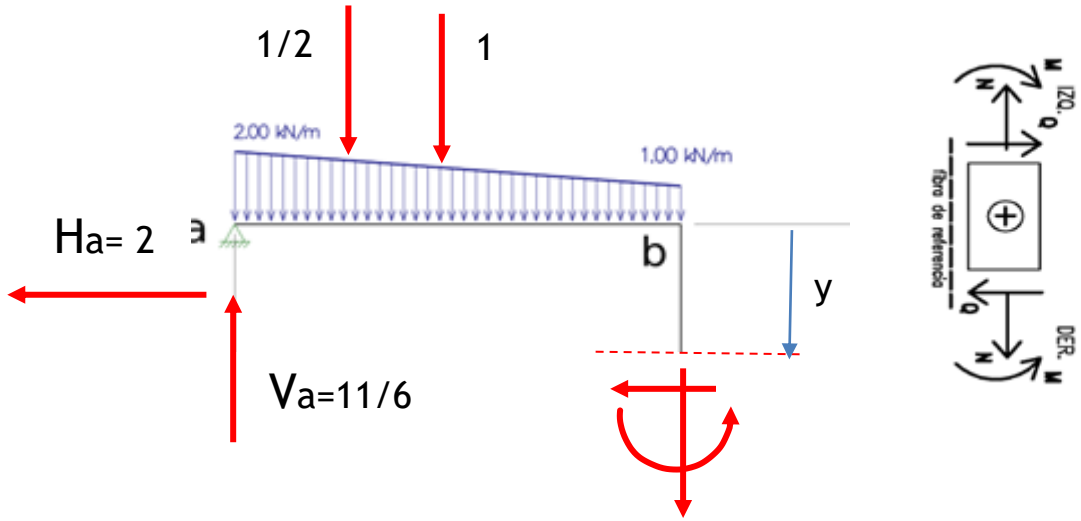


$$V_{AB}(x) = \frac{11}{6} - x - \left(x - \frac{x^2}{2}\right) = \frac{x^2}{2} - 2x + \frac{11}{6}$$

$$M_{AB}(x) = \frac{11}{6}x - \frac{x^2}{2} - \left(\frac{x^2}{2} - \frac{x^3}{6}\right) = \frac{x^3}{6} - x^2 + \frac{11}{6}x$$



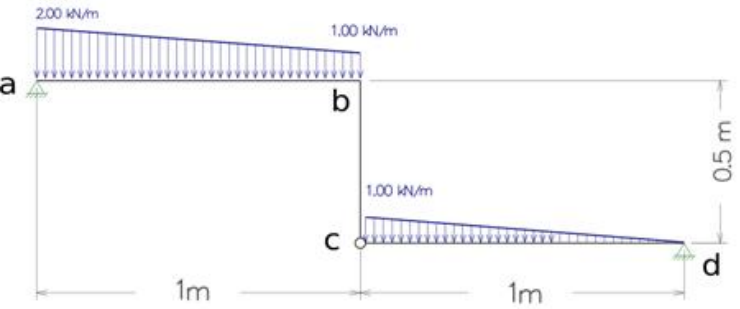
TRAMO BC



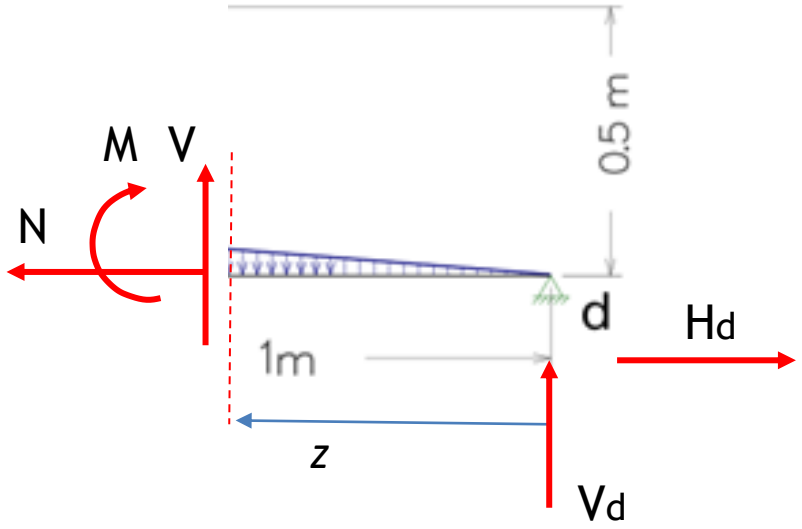
$$N + 1 + \frac{1}{2} - \frac{11}{6} = 0 \rightarrow N = {}^{1}/_{3}\ (T)$$

$$V = -2$$

$$M + 1.\frac{1}{2} + \frac{1}{2}.\frac{2}{3} - 2y + {}^{11}/_{6} = 0 \rightarrow M = 1 - 2y$$



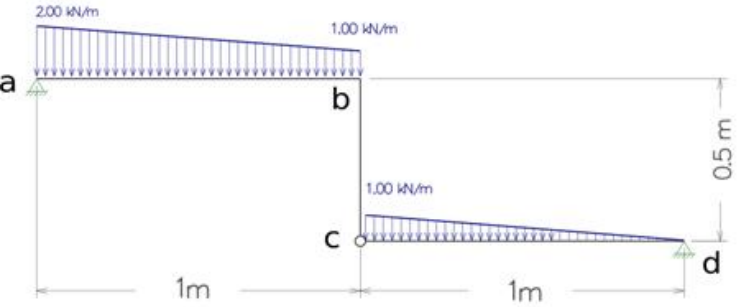
TRAMO CD



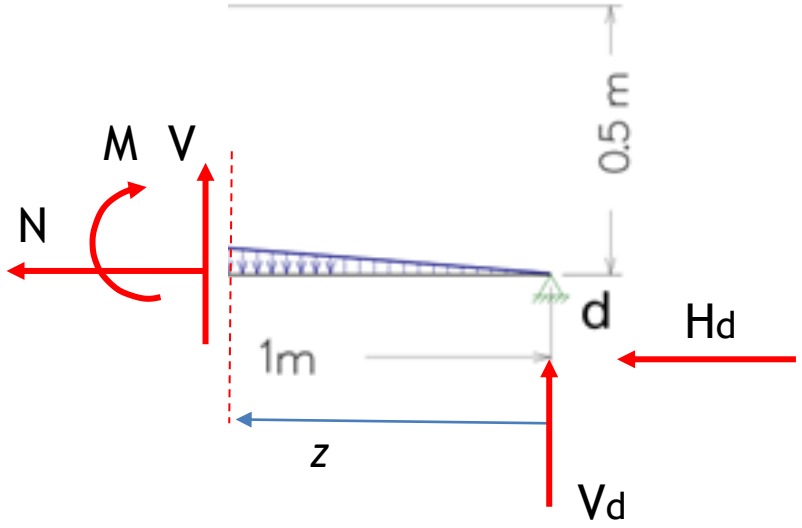
$$N_{AB} = 2\ \text{kN}\ (\text{T})$$

$$V_{CD}(z) = -\frac{1}{6} + V_T(z)$$

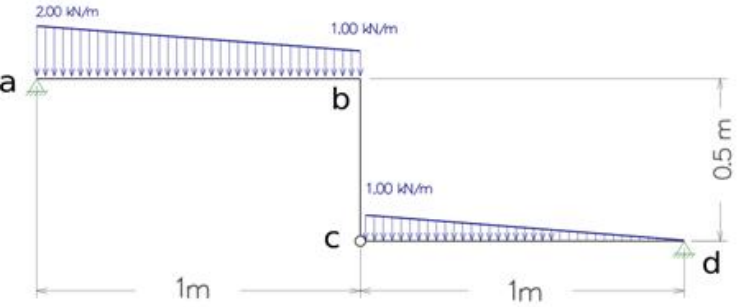
$$M_{CD}(z) = \frac{1}{6}z + M_T(z)$$



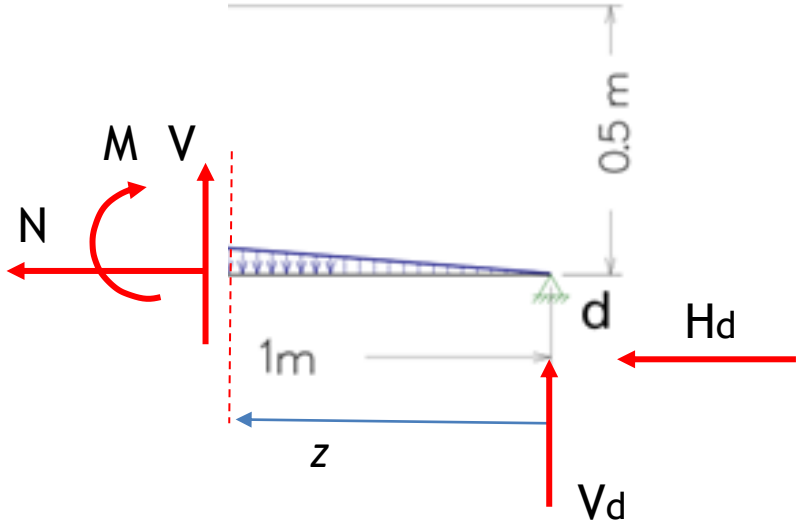
TRAMO CD



$$q(z) = q_0 \frac{z}{L} = z \Rightarrow V_T(z) = \int_0^z \xi . d\xi = \frac{z^2}{2} \Rightarrow M_T(z) = \int_0^z \frac{\xi^2}{2} . d\xi = \frac{z^3}{6}$$

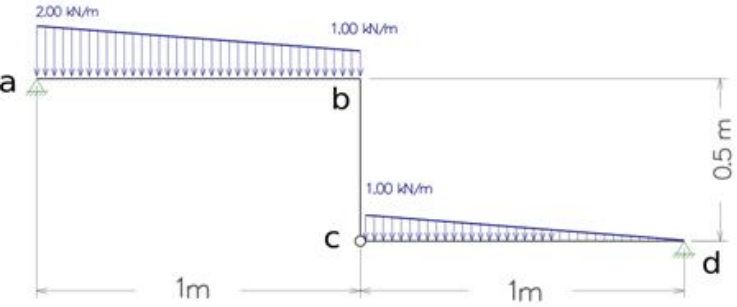


TRAMO CD

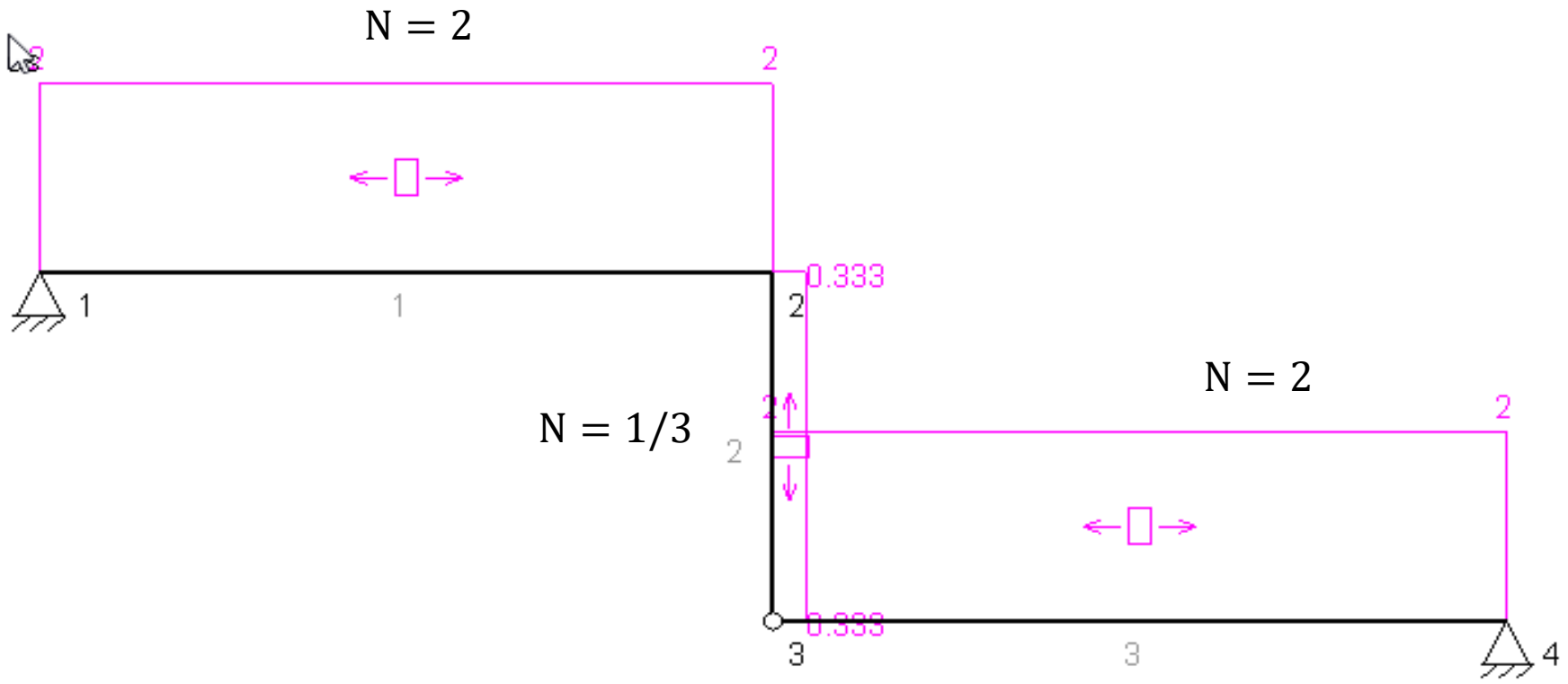


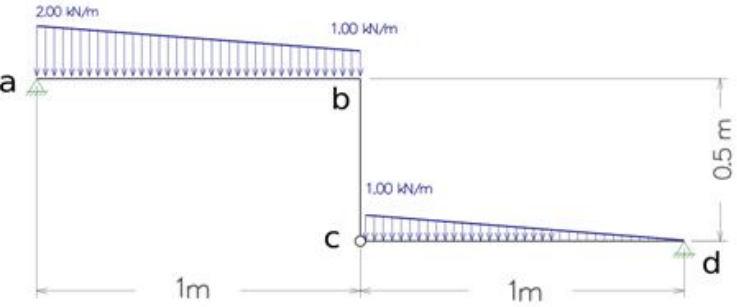
$$V_{CD}(z) = -\frac{1}{6} + \frac{z^2}{2}$$

$$M_{CD}(z) = \frac{1}{6}z - \frac{z^3}{6}$$



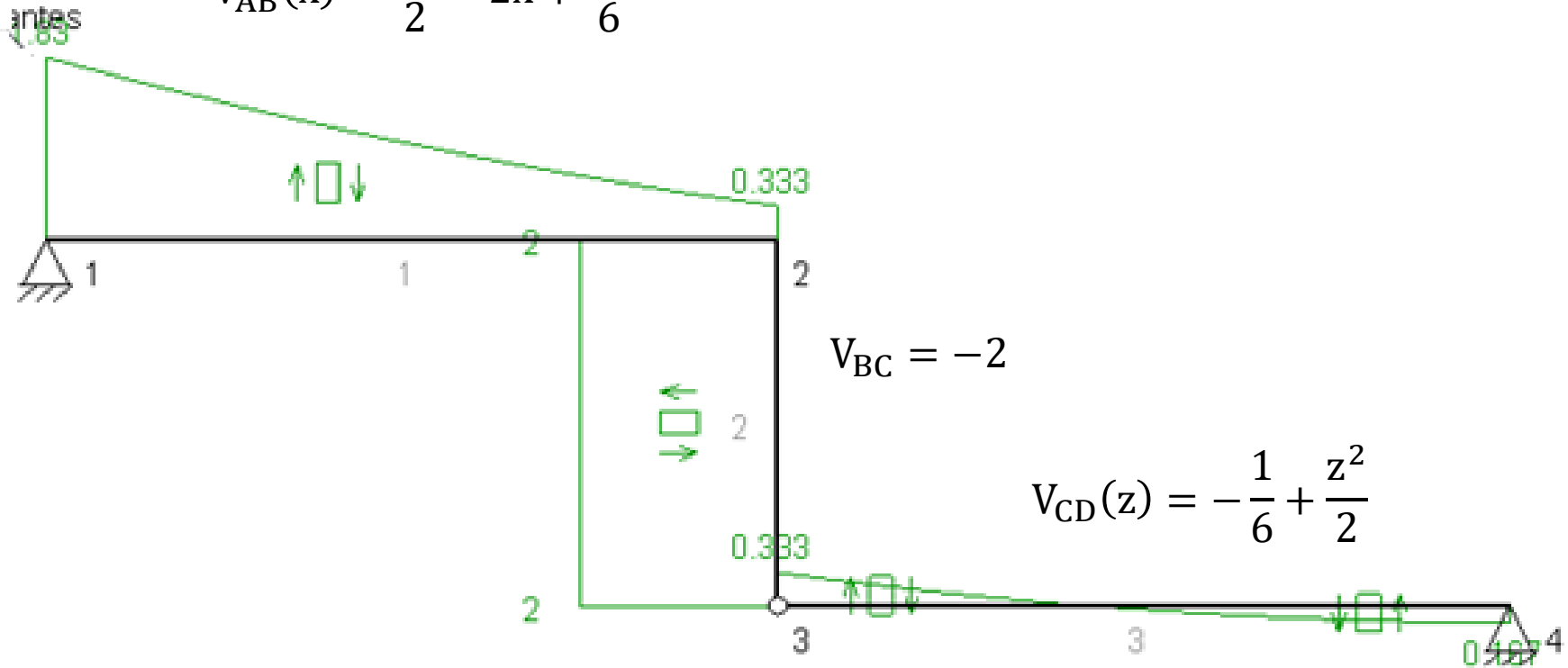
NORMAL FORCE LAWS





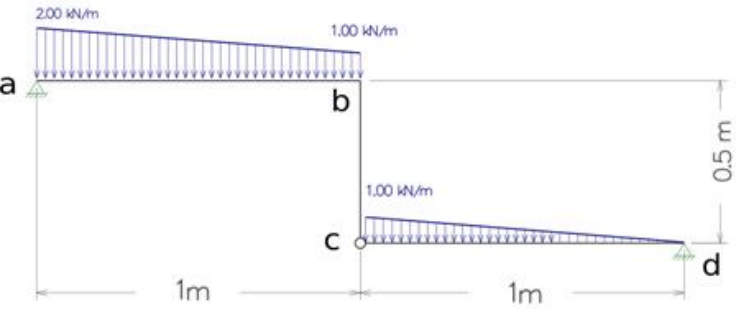
SHEAR FORCE LAWS

$$V_{AB}(x) = \frac{x^2}{2} - 2x + \frac{11}{6}$$



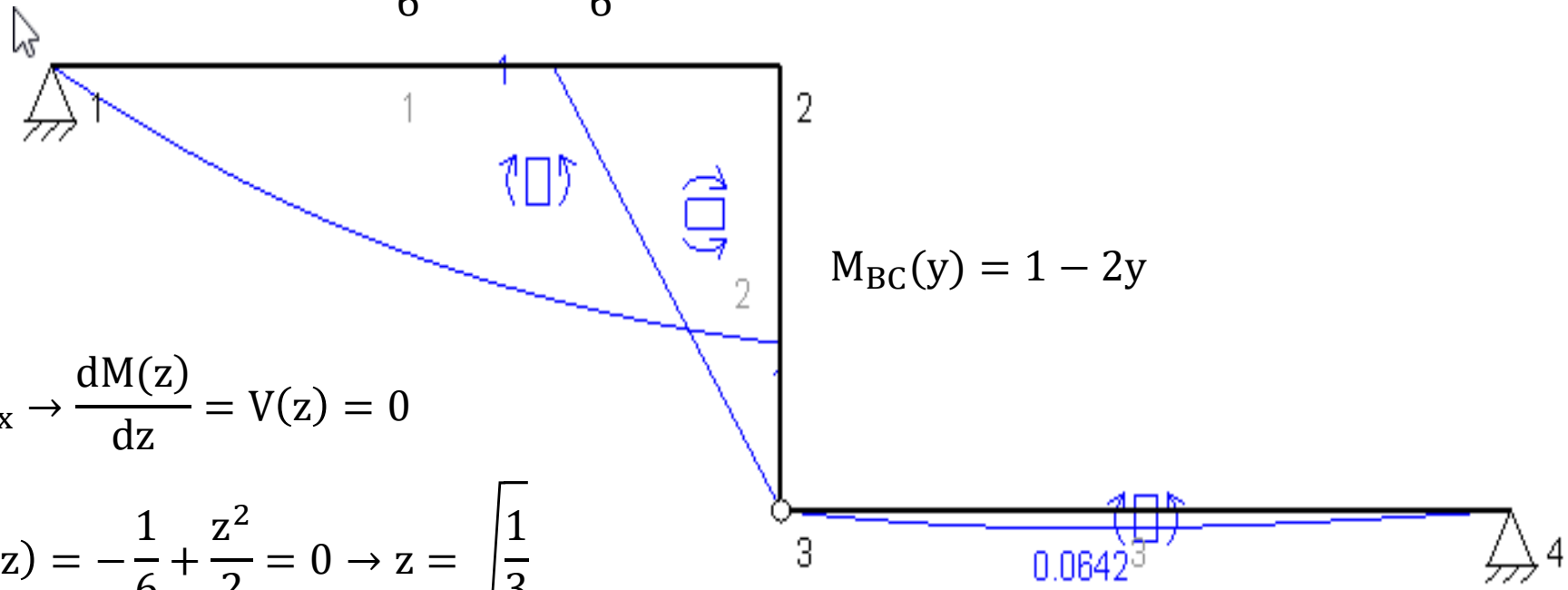
$$V_{BC} = -2$$

$$V_{CD}(z) = -\frac{1}{6} + \frac{z^2}{2}$$



BENDING MOMENT LAWS

$$M_{AB}(x) = \frac{x^3}{6} - x^2 + \frac{11}{6}x$$



$$M_{BC}(y) = 1 - 2y$$

$$M_{max} \rightarrow \frac{dM(z)}{dz} = V(z) = 0$$

$$V_{CD}(z) = -\frac{1}{6} + \frac{z^2}{2} = 0 \rightarrow z = \sqrt{\frac{1}{3}}$$

$$M_{CD}^{max} = \frac{1}{\sqrt{3}}\left(\frac{1}{6} - \frac{1}{18}\right) = \frac{1}{\sqrt{3}}\left(\frac{1}{9}\right) = 0.0642\ \text{kN.m}$$

$$M_{CD}(z) = \frac{z}{6} - \frac{z^3}{6}$$