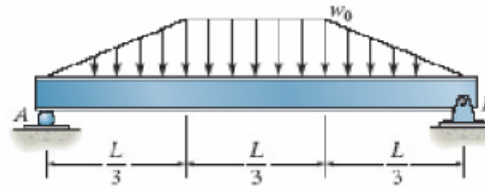


Problem 6-29

Draw the shear and moment diagrams for the beam.

Given: Set $L := 1\text{m}$ $w_0 := 1 \frac{\text{kN}}{\text{m}}$
 $a := \frac{L}{3}$



Solution:

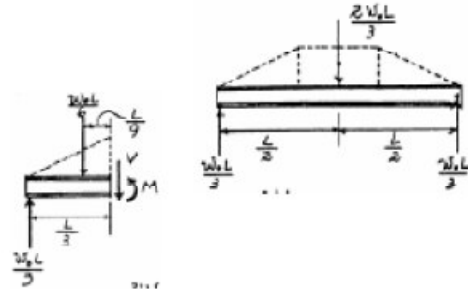
Equilibrium: Given

$$+\uparrow \Sigma F_y = 0; \quad A - 2(0.5w_0) \cdot a - w_0 \cdot a + B = 0$$

$$\curvearrowright + \Sigma M_B = 0; \quad A \cdot (3 \cdot a) - (0.5 \cdot w_0 \cdot a) \cdot \left(2a + \frac{a}{3}\right) - (w_0 \cdot a) \cdot (1.5a) - (0.5 \cdot w_0 \cdot a) \cdot \left(\frac{2a}{3}\right) = 0$$

Guess $A := 1\text{kN}$ $B := 1\text{kN}$

$$\begin{pmatrix} A \\ B \end{pmatrix} := \text{Find}(A, B) \quad \begin{pmatrix} A \\ B \end{pmatrix} = \begin{pmatrix} 0.33 \\ 0.33 \end{pmatrix} \text{kN}$$



$$x_1 := 0, 0.01 \cdot a .. a$$

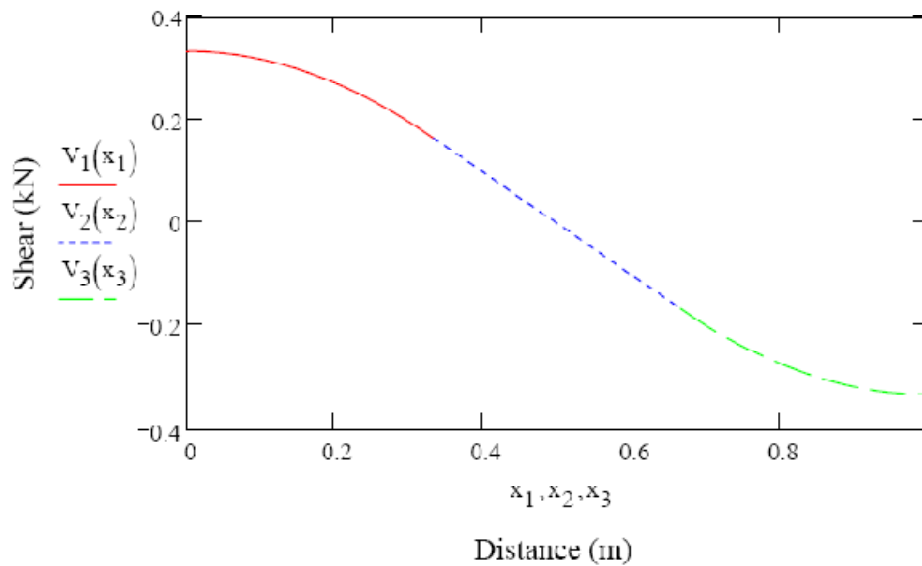
$$x_2 := a, 1.01 \cdot a .. (2a)$$

$$x_3 := (2a), 1.01 \cdot (2a) .. (3a)$$

$$V_1(x_1) := \left[A - \frac{w_0}{2} \cdot \left(\frac{x_1}{a} \right)^2 \cdot x_1 \right] \cdot \frac{1}{\text{kN}}$$

$$V_2(x_2) := \left[A - 0.5 \cdot w_0 \cdot a - w_0 \cdot (x_2 - a) \right] \cdot \frac{1}{\text{kN}}$$

$$V_3(x_3) := \left[A - 0.5 \cdot w_0 \cdot a - w_0 \cdot a - w_0 \cdot (x_3 - 2a) \cdot \left(1 - 0.5 \cdot \frac{x_3 - 2a}{a} \right) \right] \cdot \frac{1}{\text{kN}}$$



$$M_1(x_1) := \left[A \cdot x_1 - \frac{w_0}{2} \cdot \left(\frac{x_1}{a} \right) \cdot x_1 \cdot \frac{x_1}{3} \right] \cdot \frac{1}{N \cdot m}$$

$$M_2(x_2) := \left[A \cdot x_2 - \frac{w_0 \cdot a}{2} \cdot \left(x_2 - \frac{2a}{3} \right) - 0.5w_0 \cdot (x_2 - a)^2 \right] \cdot \frac{1}{N \cdot m}$$

$$M'_3(x_3) := \frac{w_0}{2} \cdot (x_3 - 2 \cdot a)^2 \cdot \left[1 - \left(\frac{x_3 - 2 \cdot a}{a} \right) \cdot \frac{1}{3} \right]$$

$$M_3(x_3) := \left[A \cdot x_3 - \frac{w_0 \cdot a}{2} \cdot \left(x_3 - \frac{2 \cdot a}{3} \right) - (w_0 \cdot a) \cdot (x_3 - 1.5 \cdot a) - M'_3(x_3) \right] \cdot \frac{1}{N \cdot m}$$

