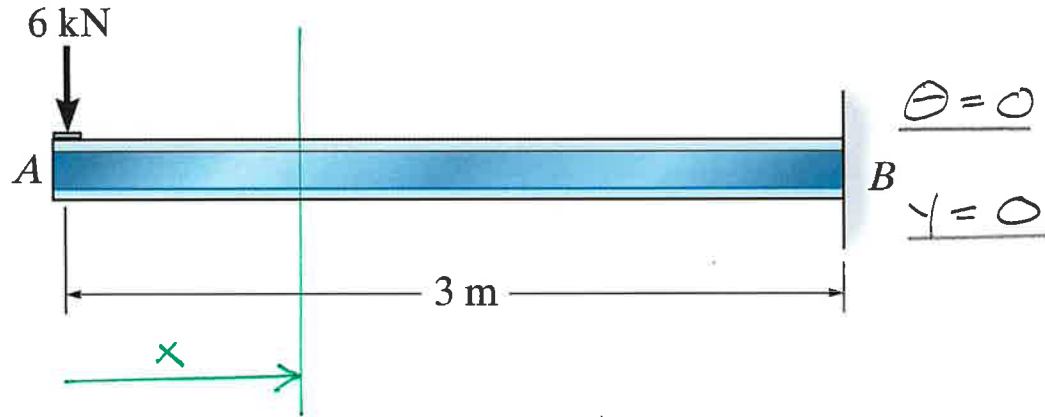


**Example 7a-5:** Determine the equations for slope and displacement in the following beam.



$$M(x=0) = 0 \checkmark$$

Free body diagram of a beam segment of length  $x$ . A 6 kN load is applied at the left end. Internal moment  $M$  and shear force are shown at the right end. The sum of moments about the right end is zero:

$$\sum M_{\text{cut}} = 0 = M + 6\text{kN}(x)$$

$$M(x) = [-6x] \text{ kNm}$$

$$\theta = \frac{1}{EI} \int (-6x) dx = \frac{1}{EI} [-3x^2 + C_1] \quad \text{kNm}^2$$

$$\theta(x=3\text{m}) = 0$$

$$= \frac{1}{EI} [-27 + C_1] \quad \underline{C_1 = 27 \text{ kNm}^2}$$

$$\theta(x) = \frac{1}{EI} [-3x^2 + 27] \quad \text{RADIANS}$$

$$y = \int \theta dx = \frac{1}{EI} [-x^3 + 27x + C_2] \text{ m} \quad \text{kNm}^3$$

$$y(x=3\text{m}) = 0$$

$$= \frac{1}{EI} [-27 + 81 + C_2]$$

$$y(x) = \frac{1}{EI} [-x^3 + 27x - 54] \text{ m}$$

$$\underline{C_2 = -54 \text{ kNm}^3}$$