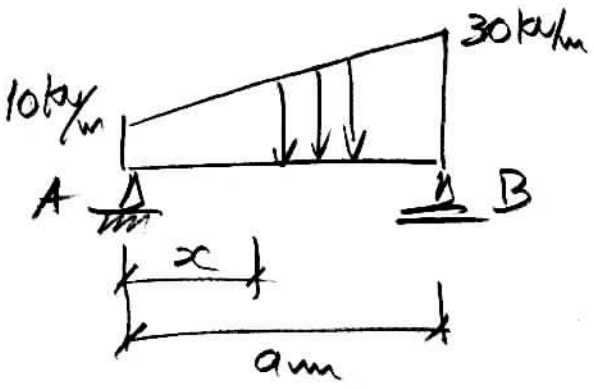
TE1-3.4



$$q(x) = \frac{(30-10)}{9} \cdot x + 10$$

$$q(x) = \frac{20}{9}x + 10$$

$$R = \int_0^9 \frac{20}{9}x + 10\,dx$$

$$R = \left[\frac{20}{9}\frac{x^2}{2} + 10x\right]_0^9 = 180\,kN$$

$$M_R = \int_0^9 q(x) \cdot x\,dx = \int_0^9 \frac{20}{9}x^2 + 10x\,dx$$

$$M_R = \left[\frac{20}{9}\frac{x^3}{3} + 10\frac{x^2}{2}\right]_0^9 = 945\,kNm$$

$$\bar{x} = M_R / R = 945\,kNm / 180\,kN = 5{,}25\,m$$

(+) $\Sigma M_B = 0 \quad V_A \times 9 - 180\,(9 - 5{,}25) = 0 \quad V_A = 75\,kN$

(+↑) $\Sigma V = 0 \quad 75 - 180 + V_B = 0 \quad V_B = 105\,kN$

$$Q(x) = -\int q(x)\,dx = -\frac{20}{9}\frac{x^2}{2} - 10x + C_1$$

Como $Q(x=0) = 75\,kN \quad C_1 = 75$

$$Q(x) = -\frac{10}{9}x^2 - 10x + 75$$

$$M(x) = \int Q(x)\,dx = -\frac{10}{9}\frac{x^3}{3} - 10\frac{x^2}{2} + 75x + C_2$$

Como $M(x=0) = 0 \quad C_2 = 0$

$$M(x) = -\frac{10}{27}x^3 - 5x^2 + 75x$$