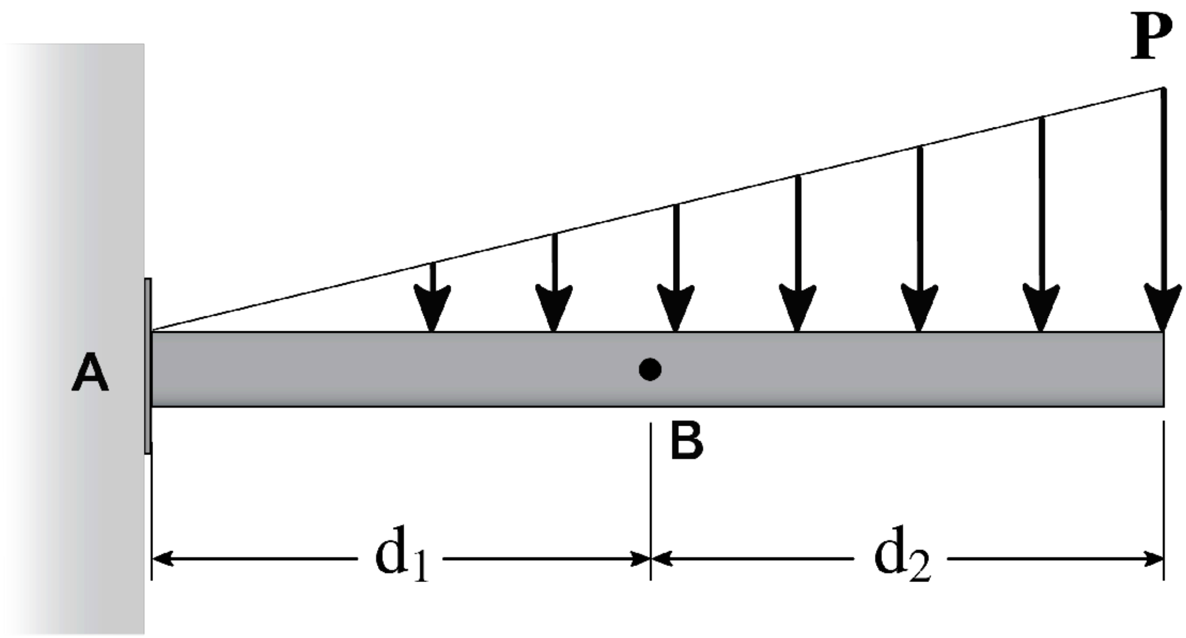

A bar that is fixed on a wall at point A supports a gradually increasing distributed load with a maximum value of P. If $d_1 = d_2 = d$, find the magnitudes of the internal forces and bending moment in the bar at point B.

Find the slope of the distributed load function.

$$m = \frac{P}{2d}$$

Determine the reaction forces at A.

$$+\rightarrow \Sigma F_x = 0$$
$$\Rightarrow A_x = 0$$

$$+\uparrow \Sigma F_y = 0 \rightarrow A_y - d \cdot P = 0$$
$$\Rightarrow A_y = d \cdot P$$

$$\Sigma M_A = 0 \rightarrow M_A - \int_0^{2d} x \cdot \frac{P}{2d} x dx = 0 \rightarrow M_A = \int_0^{2d} x \cdot \frac{P}{2d} x dx = \left[\frac{x^3 \cdot P}{6d}\right]_{x=0}^{x=2d}$$

$$\Rightarrow M_A = \frac{4}{3} d^2 \cdot P$$

Find the magnitudes of the normal force, shear force, and bending moment in the bar at point B.

Using section AB:

$$+\rightarrow \Sigma F_x = 0 \rightarrow A_x + N_B = 0$$
$$\Rightarrow N_B = 0$$

$$+\uparrow \Sigma F_y = 0 \rightarrow A_y - d\cdot\frac{P}{4} - V_B = 0$$
$$\Rightarrow V_B = \frac{3}{4}d\cdot P$$

$$\Sigma M_A = 0 \rightarrow M_B + M_A - d\cdot V_B - \left[\frac{x^3\cdot P}{6d}\right]_{x=0}^{x=d} = 0 \rightarrow M_B = \frac{3}{4}d^2\cdot P + \frac{1}{6}d^2\cdot P - \frac{4}{3}d^2\cdot P$$
$$\Rightarrow M_B = -\frac{5}{12}d^2\cdot P$$