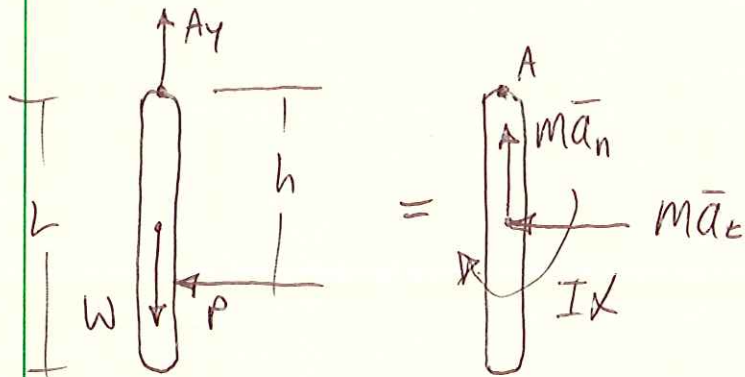


PROB. 16-77

$$L = 3 \text{ ft}, \quad W = 4 \text{ lb}, \quad P = 1.5 \text{ lb}$$

FIND h WHEN $a_x = 0$ AND α



$$\sum F_x = ma_x: -P = -m\bar{a}_t, \quad \bar{a}_t = r\alpha = \left(\frac{L}{2}\right)\alpha$$

$$P = \left(\frac{W}{g}\right)\left(\frac{L}{2}\right)\alpha, \quad \alpha = \frac{2gP}{WL}$$

$$\alpha = \frac{2\left(32.2 \frac{\text{ft}}{\text{s}^2}\right)(1.5 \text{ lb})}{(4 \text{ lb})(3 \text{ ft})} = \boxed{8.05 \frac{\text{RAD}}{\text{s}^2}}$$

$$\sum M_A = \sum (M_A)_{\text{EFF}} + \curvearrowright: -hP = -\left(\frac{L}{2}\right)m\bar{a}_t - I\alpha$$

$$h = \frac{1}{P} \left[\left(\frac{L}{2}\right)\left(\frac{W}{g}\right)\left(\frac{L}{2}\right)\alpha + \frac{1}{12}\left(\frac{W}{g}\right)L^2\alpha \right] = \frac{L^2}{3P}\left(\frac{W}{g}\right)\alpha$$

$$h = \frac{(3 \text{ ft})^2}{3(1.5 \text{ lb})} \cdot \left(\frac{4 \text{ lb}}{32.2 \frac{\text{ft}}{\text{s}^2}}\right) \left(8.05 \frac{\text{RAD}}{\text{s}^2}\right)$$

$$\boxed{h = 2.0 \text{ ft}}$$