

17.53

$$\omega_1 = \left(3600 \frac{\text{REV}}{\text{MIN}}\right) \left(\frac{\text{MIN}}{60 \text{ S}}\right) \left(\frac{2\pi}{\text{REV}}\right) = 120\pi \frac{\text{RAD}}{\text{S}}, \quad \omega_2 = 0$$

$$\epsilon = 70^\circ, \quad W = 6 \text{ LB}, \quad k = 2 \text{ IN} = \frac{1}{6} \text{ FT} \quad \text{FIND } M$$

PRINCIPLE OF IMPULSE AND MOMENTUM:

ANGULAR MOMENTUM ABOUT A:  $\uparrow$ :

$$-I\omega_1 + M\epsilon = -I\omega_2$$

$$M = \frac{I\omega_1}{\epsilon}$$

$$I = mk^2 = \frac{W}{g} \cdot k^2$$

$$M = \frac{Wk^2\omega_1}{g\epsilon} = \frac{(6 \text{ LB}) \left(\frac{1}{6} \text{ FT}\right)^2 \left(120\pi \frac{\text{RAD}}{\text{S}}\right)}{\left(32.2 \frac{\text{FT}}{\text{S}^2}\right) (70^\circ)} = 0.02787 \text{ FT-LB}$$

$$M = 0.3345 \text{ IN-LB}$$