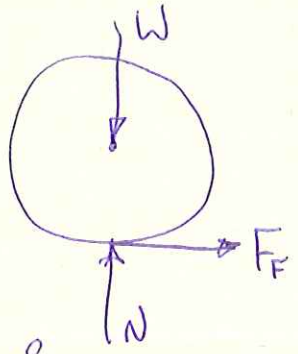
PROB. 17-8

$W_A = 8^{LB}$, $r = 0.5^{ft}$, $\omega_0 = 0$, $v = 40\frac{ft}{s}$, $\mu_K = 0.2$

FIND $\Delta\theta$ FOR W_F = CONSTANT



$N = W = mg$

$F_F = \mu_K N = \mu_K mg$

$T_1 + U_{1-2} = T_2$ ($T_1 = 0$)

$M \cdot \Delta\theta = \frac{1}{2} I \omega_F^2$

$\Delta\theta = \frac{I\omega_F^2}{2M}$

$M = rF_F = r\mu_K mg$, $\omega_F = \frac{v}{r}$, $I = \frac{1}{2}mr^2$

$$\Delta\theta = \frac{\left(\frac{1}{2}mr^2\right)\left(\frac{v}{r}\right)^2}{2(r\mu_K mg)} = \frac{v^2}{4r\mu_K g}$$

$$\Delta\theta = \frac{\left(40\frac{ft}{s}\right)^2}{4(0.5\,ft)(0.2)\left(32.2\frac{ft}{s^2}\right)}$$

$$\Delta\theta = (124.2\ RAD)\left(\frac{REV}{2\pi}\right) = 19.77\ REV$$