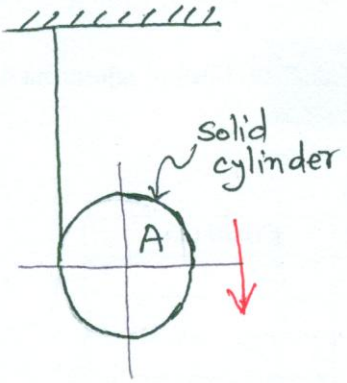
1442/p.421



$v_{A_0} = 0$

$S = 15$ ft

$\bar{v}_{A_f} = ?$

$\Delta PE = ?$

$U_{net} = W_A \times 15$

$$\Delta KE = \frac{1}{2}\cdot\frac{W_A}{g}\left(\bar{v}_{A_f}^2 - \bar{v}_{A_0}^2\right) + \frac{1}{2}\bar{I}_A\left(\omega_{A_f}^2 - \omega_{A_0}^2\right)$$

$$\omega_{A_0} = \frac{\bar{v}_{A_0}}{r_A} = 0 \quad , \quad \omega_{A_f} = \frac{\bar{v}_{A_f}}{r_A}$$

$$\bar{I}_A = \frac{1}{2} m_A r_A^2 = \frac{1}{2}\cdot\frac{W_A}{g}\cdot r_A^2$$

$$\therefore \Delta KE = \frac{1}{2}\cdot\frac{W_A}{g}\cdot\bar{v}_{A_f}^2 + \frac{1}{2}\cdot\frac{W_A}{2g} r_A^2 \cdot \frac{\bar{v}_{A_f}^2}{r_A^2}$$

$$= \frac{W_A}{2g}\bar{v}_{A_f}^2 + \frac{W_A}{4g}\bar{v}_{A_f}^2$$

$$= \frac{3}{4}\cdot\frac{W_A}{g}\cdot\bar{v}_{A_f}^2$$

According to the principles of work and kinetic energy

$$U_{net} = \Delta KE$$

$$\Rightarrow W_A \times 15 = \frac{3}{4}\cdot\frac{W_A}{g}\cdot\bar{v}_{A_f}^2$$

$$\therefore \bar{v}_{A_f} = \sqrt{\frac{15\times 4\times 32.2}{3}} = \boxed{25.38 \text{ fps.}}$$

$$\Delta PE = -W\times 15 = \boxed{-15W}$$

$-$ve sign means decrease in potential energy