

# Expression for v

**Solution:**

**The correct answer is e.)**

Energy Conservation yields:

$$mgh = \frac{1}{2}(mv^2 + I\omega^2) \Rightarrow mv^2 = 2mgh - I\omega^2$$

$$\Rightarrow v^2 = 2gh - \left(\frac{I}{m}\right)\left(\frac{v}{r}\right)^2 \Rightarrow v^2 \left[1 + \left(\frac{I}{mr^2}\right)\right] = 2gh$$

$$\therefore v = \sqrt{\frac{2gh}{1 + (I/mr^2)}}$$