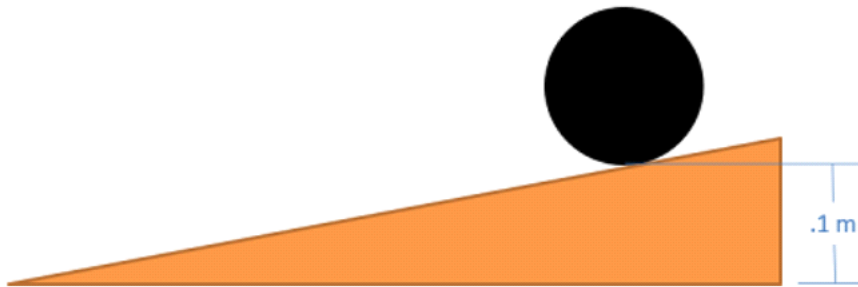


Problem 3

A 5 kg spherical ball with a radius of .05m as shown below is placed on a degree degree ramp. If the ball rolls without slipping, what is the velocity of the ball at the bottom of the ramp?



$$W = \Delta KE + \Delta PE$$

$$0 = \frac{1}{2} I \omega_f^2 + \frac{1}{2} m V_f^2 + m g \Delta h$$

rolling without slipping

$$V = -r\omega \rightarrow \omega = \frac{-V}{.05}$$

$$0 = \frac{1}{2} \left(\frac{2}{5} (5 \text{ kg}) (.05 \text{ m})^2 \right) \left(\frac{-V}{.05} \right)^2 + \frac{1}{2} (5 \text{ kg}) V^2 + (5 \text{ kg}) (9.81 \frac{\text{m}}{\text{s}^2}) (-.1 \text{ m})$$

$$0 = V^2 + 2.5 V^2 - 4.905$$

$$\boxed{V = 1.18 \text{ m/s}}$$