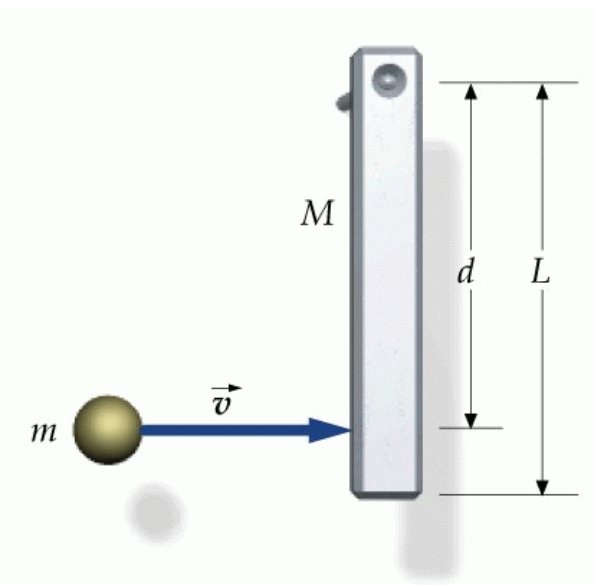


Ex : A uniform rod with $M=1.0$ kg and $L=1.5$ m can pivot at its top. It is struck by a particle with $m=0.25$ kg and $v=25.0$ m/s at a point $d=0.8L$ below the pivot. Assume that the collision is perfectly inelastic. Find the resulting angular velocity of the system.



o Use conservation of angular momentum in this collision.

$$L_i = L_f \quad \Rightarrow \quad 0.8L(mv) = I\omega$$

Here, I is that for our combined rod + particle system *after* the collision.

$$I = m(0.8L)^2 + \frac{1}{3}ML^2 = (0.25 \text{ kg})[(0.8)(1.5 \text{ m})]^2 + \frac{1.0 \text{ kg}(1.5 \text{ m})^2}{3}$$

$$\omega = \frac{0.8L(mv)}{I} = \frac{(0.8)(1.5 \text{ m})(0.25 \text{ kg})(25.0 \text{ m/s})}{1.11 \text{ kg} \cdot \text{m}^2} = 6.8 \text{ rad/s}$$