



Find v of the block at the bottom of the swing:

$$KE_1 + PE_1 = KE_2 + PE_2$$

$$\frac{1}{2} m \cdot v_1^2 + m \cdot g \cdot h_1 = \frac{1}{2} m \cdot v_2^2 + m \cdot g \cdot h_2$$

$$\frac{1}{2} \cdot v_1^2 + 0 = 0 + (9.8 \text{ m/s}^2)(.12 \text{ m})$$

$$v_1 = 1.53 \text{ m/s}$$

From conservation of momentum:

Bullet

$$m_1 = 7.0 \text{ g} = .007 \text{ kg}$$

$$v_1 = ?$$

$$v_1' = 200 \text{ m/s}$$

Block

$$m_2 = 1.5 \text{ kg}$$

$$v_2 = 0 \text{ m/s}$$

$$v_2' = 1.53 \text{ m/s (from above)}$$

$$p_1 + p_2 = p_1' + p_2'$$

$$m_1 \cdot v_1 + m_2 \cdot v_2 = m_1 \cdot v_1' + m_2 \cdot v_2'$$

$$(.007 \text{ kg})(v_1) + 0 = (.007 \text{ kg})(200 \text{ m/s}) + (1.5 \text{ kg})(1.53 \text{ m/s})$$

$$v_1 = 528.6 \text{ m/s}$$