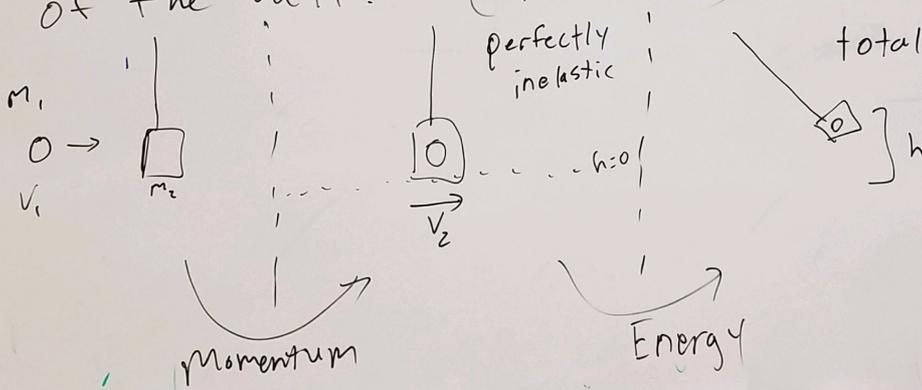


## Balistic pendulum lab

In this lab, we will determine the launch velocity of a metal ball. The metal ball will embed itself into a pendulum & swing upward. By measuring the change in height of the pendulum & by using the laws of conservation of energy & conservation of momentum, you can calculate the initial velocity of the ball. (Prediction)

$$M_{\text{ball}} = 70\text{g} \quad M_{\text{pendulum}} = 275\text{g}$$

$$\text{total mass} = 345\text{g}$$



$$p_0 = p_f$$

$$m_1 v_1 = (m_1 + m_2) v_2$$

Momentum of ball before collision

Momentum of ball-pendulum system after collision

$$\text{Energy } E_0 = E_f$$

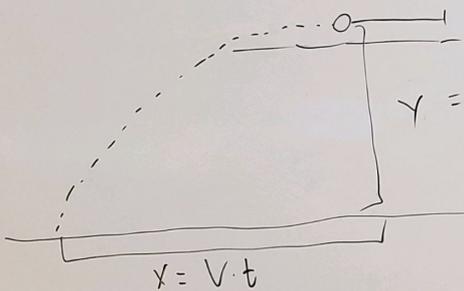
$$\frac{1}{2} m v_2^2 = m g h$$

kinetic energy of system = gravitational potential energy of system

$$\frac{1}{2} (m_1 + m_2) v_2^2 = (m_1 + m_2) g h$$

$$v_2 = \sqrt{2gh}$$

Part 2 | measuring velocity (range & height)



$$y = \frac{1}{2} g t^2$$

$$v = \frac{x}{t}$$

$$t = \sqrt{\frac{2y}{g}}$$

Repeat all measurements at least 3 times & average