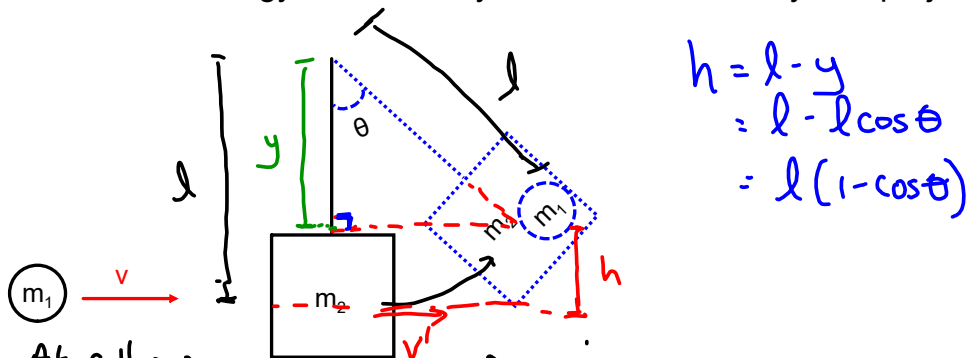


Homework

Ballistic Pendulum

A ballistic pendulum is a device that uses conservation of momentum and conservation of energy to accurately measure the velocity of a projectile



$$h = l - y$$

$$= l - l \cos \theta$$

$$= l(1 - \cos \theta)$$

At collision

$$\sum p = \sum p'$$

$$m_1 v = (m_1 + m_2) v'$$

$$v = \frac{m_1 + m_2}{m_1} \sqrt{2gh}$$

$$v = \frac{m_1 + m_2}{m_1} \sqrt{2gl(1 - \cos \theta)}$$

$$v = \frac{7.6 + 78.8g}{7.6g} \sqrt{2g(21.5 \frac{m}{s^2})(1 - \cos 17.5^\circ)}$$

$$= \frac{50.2}{5} \frac{cm}{s}$$

$$= \underline{5.02} \frac{m}{s}$$

On swing

$$(KE + PE)_{bot} = (KE + PE)_{top}$$

$$\frac{1}{2}(m_1 + m_2)v'^2 = (m_1 + m_2)gh$$

$$v' = \sqrt{2gh}$$

$$m_{ball+plate} = 21.3g$$

$$m_{plate} = 13.7g$$

$$m_{ball} = 7.6g$$

$$m_{block} = 78.8g \pm 0.1g$$

$$l = 21.5cm \pm 0.2cm$$

$$\theta = 17.5^\circ \pm 0.3^\circ$$

Homework

Problem Set Due Thursday
pages 520-1 - Read the model problem
p. 524 #41, 44