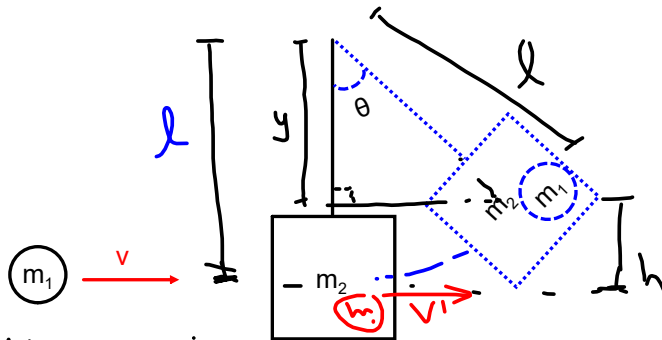


Homework

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



$$y = l \cos \theta = l - h$$

$$\text{so } h = l(1 - \cos \theta)$$

At collision

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

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

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

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

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

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

On the swing

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

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

$$m_{\text{ball+glass}} = 21.9 \text{ g} \pm 0.1$$

$$m_{\text{glass}} = 14.4 \text{ g} \pm 0.1$$

$$m_1 \rightarrow m_{\text{ball}} = 7.5 \text{ g} \pm 0.1$$

$$m_2 \rightarrow m_{\text{block}} = 79.7 \text{ g} \pm 0.1$$

$$v = \frac{7.5 + 79.7 \text{ g}}{7.5 \text{ g}} \sqrt{2(9.80 \text{ m/s}^2)(22.1 \text{ cm})(1 - \cos 17.5^\circ)}$$

$$= \underline{\underline{5.21 \text{ m/s}}}$$

Homework

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