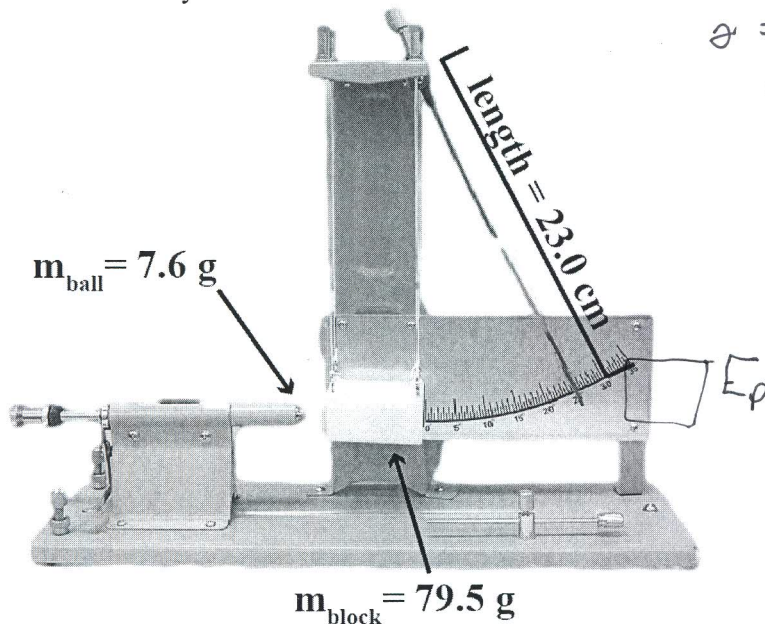


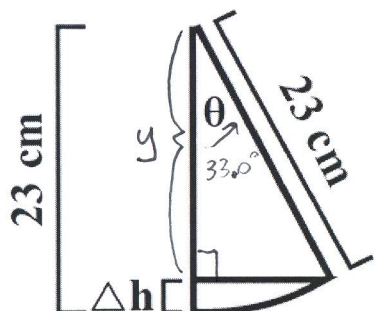
P30 Unit A: The Ballistic Pendulum

Name: Key!
 Date: Feb 10th 2016

Question: What is the initial velocity of the bullet?



$$\theta = 33.0^\circ + 32.5^\circ + 33.0^\circ = \underline{\underline{33.0^\circ}}$$



$$\cos(33.0^\circ) = \frac{y}{23 \text{ cm}} \quad y = 19.2894 \text{ cm}$$

$$\Delta h = 23.0 \text{ cm} - 19.2894 \text{ cm} = 3.7106 \text{ cm}$$

$$E_p = mgh = (0.0871 \text{ kg})(9.81 \text{ m/s}^2)(0.037106 \text{ m}) = 0.03171 \text{ J}$$

conservation of Energy

$$E_k = \frac{1}{2} m \vec{v}^2$$

$$0.03171 \text{ J} = \frac{1}{2} (0.0871 \text{ kg}) \vec{v}^2$$

$$\vec{v} = 0.8532 \text{ m/s}$$

↑
block + bullet

$$\sum \vec{p}_i = \sum \vec{p}_f$$

$$(0.0076 \text{ kg}) \vec{v} + 0 = (0.0871 \text{ kg})(0.8532 \text{ m/s})$$

↑
bullet

↑
block

↑
bullet + block

$$\vec{v} =$$

$$\vec{v}_{\text{bullet}} = \underline{\underline{90.8 \text{ m/s}}}$$

In this analysis, I used the Physics Principals of 5 and 4.