A 2.50 gram bullet traveling with a velocity of $v_{ob} = 385$ m/s. It embeds itself in block wood whose mass is 275 grams. The block and embedded bullet proceed up a 37.0° incline. See figure. The amount of work done by the kinetic frictional force on the block and embedded bullet in traveling up the incline is -0.400 J.

A. [8 pts.] Find the initial speed $V$ with which the block and embedded bullet move up the incline.

$$\text{USB2 MOMENTUM CONSERVATION}$$

$$m_{bul}v_{ob} = (m_{bul} + m_{block})V$$

$$V = \frac{m_{bul}v_{ob}}{m_{bul} + m_{block}} \quad v_{ob} = \frac{2.50 \text{g} \cdot 385 \text{m/s}}{275 \text{g} + 2.50 \text{g}} = 3.4\text{m/s}$$

B. [16 pts.] What is the distance $s$ the block travels along the incline before stopping?

$$\text{USB2 ENERGY CONSERVATION}$$

$$W_{FrC} = M_E - M_{E0} \quad W_{FrC} = -0.400J$$

$$h = \sin 37.0° = 0.615$$

$$M_E = (m_{bul} + m_{block})gh$$

$$M_{E0} = \frac{1}{2} (m_{bul} + m_{block})V^2$$

$$-0.400J = (1.2775 \text{kg})(9.8\text{m/s}^2)(0.615)S$$

$$-0.400J = (1.2775 \text{kg})(3.4\text{m/s})^2$$

$$S = 0.778 \text{m}$$