Phys101 Assignment Cover Sheet

First Name:_____ Last Name:_____ Mark: _____

Student ID:_____ Date: _____

Phys101 Written Assignment #7

Due Wed/Thur. March 30/31, 2011, at the end of tutorial

Textbook (Giancoli, 6th edition) page 318 problem #26.

26. A 25.0-g bullet strikes a 0.600-kg block attached to a fixed horizontal spring whose spring stiffness constant is $7.70\times10^{3}\ \mathrm{N/m}$. The block is set into vibration with an amplitude of 21.5 cm. What was the speed of the bullet before impact if the bullet and block move together after impact?

WRITTEN ASSIGNMENT #7.

26) A 25.0 g bullet strikes a 0.600 kg block attached to a fixed horizontal spring whose spring stiffness constant is 7.70×10^3 N/m. The block is set into vibration with an amplitude of 21.5 cm. What was the speed of the bullet before impact if the bullet & block move together after impact?

After collision:

$$E_i = E_f$$

$$\frac{1}{2}(m+M)v^2 = \frac{1}{2}kA^2$$

$$\left(0.6 + \frac{25}{1000}\right)v^2 = (7700)\left(\frac{21.5}{100}\right)^2$$

$$0.625\ v^2 = 356$$

$$v = 23.9 \text{ m/s}$$

During Collision:

$$\Sigma p_i = \Sigma p_f$$

$$m_1 v_1 + m_2 v_2 = m_1 v_1 + m_2 v_2$$

$$\left(\frac{25}{1000}\right)v_1 + 0 = (0.625)(23.9)$$

$$0.025\ v_1 = 14.9$$

$$\boxed{v_1 = 596 \text{ m/s}}$$