

Name: \_\_\_\_\_

Solution

**Quiz #7**

(10 points; 5 minutes)

**Full credit will be given if you get the correct answer, regardless of method.****Partial credit may given only if you follow the methods from class.****Use at least 3 sig-figs throughout.**

14. Two sleds, each having mass  $m_s = 17 \text{ kg}$  are resting on ice a short distance apart from each other. A cat ( $m_c = 4 \text{ kg}$ ) starting on sled one, jumps to sled 2, and then back to sled 1. Both jumps are made with a horizontal speed of  $3.4 \text{ m/s}$  relative to the ice. What is the final speed of sled 2?

$$\text{Object} = \text{CAT} + \text{SLED 2}$$

$$P_{ix} = P_{fx}$$

$$m_c v_{ci} + 0 = m_c v_{cf} + m_2 v_{2f}$$

$$m_c (+v_c) = m_c (-v_c) + m_2 v_2$$

$$v_2 = \frac{2m_c v_c}{m_2}$$

**Your answer:**

$$v_{12} = 1.60 \text{ m/s}$$



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16. A bullet with mass  $m_B = 0.005$  kg is fired horizontally towards two blocks resting on a smooth and frictionless table. The bullet passes completely through the first block ( $m_1 = 2.0$  kg) and finally ends up embedded in the second block ( $m_2 = 1.5$  kg). The final speed of the first block is  $v_1 = 1.6$  m/s, and the final speed of the second block is  $v_2 = 1.9$  m/s. What was the initial speed of the bullet (i.e., before it struck block 1).

Object = bullet + block 1 + block 2

$$P_{ix} = P_{fx}$$

$$m_B v_{Bi} + 0 + 0 = m_1 v_1 + (m_2 + m_B) v_2$$

$$v_{Bi} = \frac{m_1 v_1}{m_B} + \left( \frac{m_2 + m_B}{m_B} \right) v_2$$

$$640 \text{ m/s} + 571.9 \text{ m/s}$$

**Your answer:**

$$v_{Bi} = 1211.9 \text{ m/s}$$

