

Honors Physics: **Momentum Review**

Name: KEY

Directions: Please show your work for full credit.

1. A 8kg rifle is used to fire a 50g bullet. If the bullet leaves the gun at 800m/s, what was the recoil velocity of the gun?

5 m/s

$$8v = .05 \times 800$$

2. Two cars are driving in the same direction. If the 2400kg car is going 15m/s and strikes the rear of the 3000kg going 9m/s, what is the resulting speed?

11.7 m/s

$$m_1 v_1 + m_2 v_2 = (m_1 + m_2) v_{sys}$$

$$(2400 \times 15) + (3000 \times 9) = (2400 + 3000) v$$

3. A .24kg softball was thrown with a force of 3500n and a speed of 35m/s. After it was hit it had a velocity in the other direction of 32m/s. How long was the bat in contact with the ball?

.0045 s

$$F \cdot t = \Delta mv$$

$$p_b .24 \times 35 = 8.4 \quad \left. \begin{array}{l} p_a .24 \times 32 = 7.68 \end{array} \right\} \text{add}$$

$$3500 \cdot t = 16.08$$

4. A 56g raquetball is struck so that its speed is 63m/s after being hit. If the club hits the ball for 4×10^{-4} s, what is the force on the ball?

8820 n

$$F \cdot t = \Delta mv$$

$$F = \frac{.056 \times 63}{4 \times 10^{-4}}$$

5. A 15,000kg railroad car travels at 18m/s. A 5000kg load is dropped straight down into the car. What is the speed of the system?

13.5 m/s

$$m_1 v_1 = (m_1 + m_2) v_2$$

$$15000 \times 18 = (15000 + 5000) v$$

6. A bullet is fired horizontally into a 4.4kg block of wood attached to a string. If the bullet's mass is 22g and has an initial speed of 340m/s, how high will the block/bullet rise?

.145 m

$$m_1 v_1 = (m_1 + m_2) v_2$$

$$.022 \times 340 = (4.4 + .022) v$$