

PhyzJob: Conservation of Momentum Number Puzzles

PART 2: VELOCITY



INSTRUCTIONS: In each of the scenarios below, some information regarding the system (or elements within the system) is given. Determine the missing speed based on what you know about conservation of momentum.

1. A Stationary Bomb Explodes.

BEFORE  *BOOM!* AFTER 

$v = 0 \text{ m/s}$

$m_1 = 7.0 \text{ kg}$
 $v_1' = -1.43 \text{ m/s}$

$m_2 = 3.0 \text{ kg}$
 $v_2' = ?$

DON'T THINK:	$p = p'$
	$p_1 + p_2 = p_1' + p_2'$
	$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$
THINK:	$v_1 = v_2 = v = 0$
APPLY:	$0 = m_1v_1' + m_2v_2'$

SOLVE: $0 = m_1v_1' + m_2v_2'$

$m_2v_2' = -m_1v_1'$

$v_2' = -m_1v_1'/m_2$

$v_2' = -7.0 \text{ kg} \cdot -1.43 \text{ m/s} / 3.0 \text{ kg}$

$v_2' = 3.3 \text{ m/s}$

2. Moving Blobs of Clay Collide.

 *sklitch* 

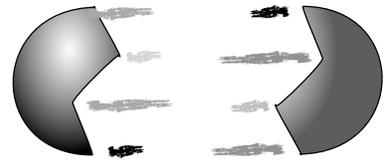
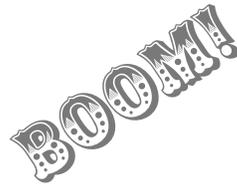
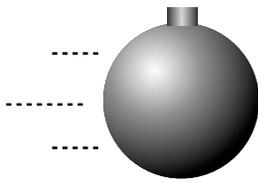
$m_1 = 5.0 \text{ kg}$
 $v_1 = 8.0 \text{ m/s}$

$m_2 = 3.0 \text{ kg}$
 $v_2 = 0 \text{ m/s}$

$v' = ?$

DON'T THINK:	$p = p'$
	$p_1 + p_2 = p_1' + p_2'$
	$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$
THINK:	$v_2 = 0, v_1' = v_2' = v'$
APPLY:	$m_1v_1 = m_1v' + m_2v'$

3. A Moving Bomb Explodes.



$$m_1 = 6.0 \text{ kg} \quad m_2 = 4.0 \text{ kg}$$

$$v = +9.0 \text{ m/s}$$

$$v_1' = -7.5 \text{ m/s}$$

$$v_2' = ?$$

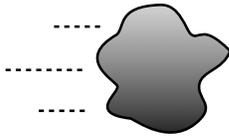
$$p = p'$$

$$p_1 + p_2 = p_1' + p_2'$$

$$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$$

$$v_1 = v_2 = v$$

4. Moving Blobs of Clay Collide. (YOU draw the "speed lines.")



$$m_1 = 8.0 \text{ kg}$$

$$v_1 = +4.0 \text{ m/s}$$

$$m_2 = 5.0 \text{ kg}$$

$$v_2 = -2.0 \text{ m/s}$$

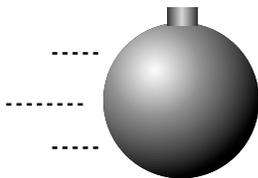
$$v' = ?$$

$$p = p'$$

$$p_1 + p_2 = p_1' + p_2'$$

$$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$$

5. A Moving Bomb Explodes.



$$m_1 = 4.0 \text{ kg} \quad m_2 = 3.0 \text{ kg}$$

$$v = ?$$

$$v_1' = -5.0 \text{ m/s}$$

$$v_2' = +12 \text{ m/s}$$

5. 2m/s 3. 34 m/s 4. 1.5 m/s 2. 5.3 m/s