

# PhyzJob: Conservation of Momentum Number Puzzles


## PART 1: MOMENTUM



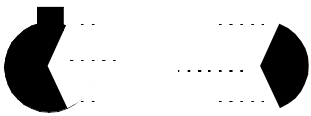
**INSTRUCTIONS:** In each of the scenarios below, some information regarding the system (or elements within the system) is given. Provide the missing information based on what you know about conservation of momentum.

### One Dimension

1. The Stationary Bomb Explodes.

BEFORE  *BOOM!*

$p = 0$

AFTER 

$p' = \underline{\hspace{2cm}} = p_1' + p_2'$

$p_1' = -10 \text{ kg}\cdot\text{m/s}$        $p_2' = \underline{\hspace{2cm}}$

2. A Blob of Clay Collides With a Stationary Blob of Clay.

 *sklitch*

$p_1 = 10 \text{ kg}\cdot\text{m/s}$        $p_2 = 0$

$p_1 + p_2 = p = \underline{\hspace{2cm}}$



$p' = \underline{\hspace{2cm}}$

3. A Metal Ball Collides With a Stationary Metal Ball.

 *> Tink <*

$p_1 = 10 \text{ kg}\cdot\text{m/s}$        $p_2 = 0$

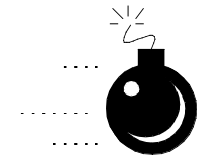
$p_1 + p_2 = p = \underline{\hspace{2cm}}$



$p' = \underline{\hspace{2cm}} = p_1' + p_2'$

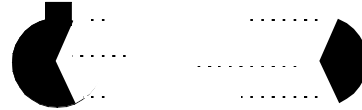
$p_1' = 0$        $p_2' = \underline{\hspace{2cm}}$

4. A Moving Bomb Explodes.



$p = 10 \text{ kg}\cdot\text{m/s}$

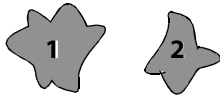
**BOOM!**



$p' = \underline{\hspace{2cm}} = p_1' + p_2'$

$p_1' = -10 \text{ kg}\cdot\text{m/s} \quad p_2' = \underline{\hspace{2cm}}$

5. Moving Blobs of Clay Collide. (YOU draw the “speed lines.”)



$p_1 = +10 \text{ kg}\cdot\text{m/s}$

$p_2 = \underline{\hspace{2cm}}$

$p_1 + p_2 = p = \underline{\hspace{2cm}}$

**sklitch**



$p' = +4 \text{ kg}\cdot\text{m/s}$

6. Moving Metal Balls Collide. (YOU draw the “speed lines.”)



**> Tink <**

$p_1 = 10 \text{ kg}\cdot\text{m/s}$

$p_2 = -13 \text{ kg}\cdot\text{m/s}$

$p_1 + p_2 = p = \underline{\hspace{2cm}}$



$p' = \underline{\hspace{2cm}} = p_1' + p_2'$

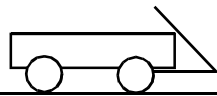
$p_1' = -8 \text{ kg}\cdot\text{m/s} \quad p_2' = \underline{\hspace{2cm}}$

7. A New Kind of Mystery. A Running Child Jumps Into a Stationary Wagon.



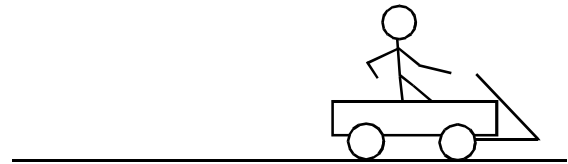
$m_1 = 40 \text{ kg}$

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



$m_2 = 10 \text{ kg}$

$v_2 = 0$



$v' = ?$