PhyzJob: Conservation of Momentum Number Puzzles

PART 1: MOMENTUM

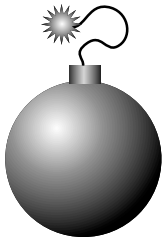
INSTRUCTIONS: In each of the scenarios below, some information regarding the system (or elements within the system) is given. Provide the missing information based on what you know about conservation of momentum.

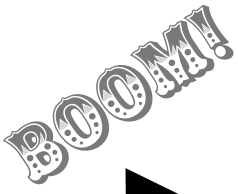
One Dimension

1. The Stationary Bomb Explodes.

p′ means momentum after an event. The ′ mark means after.

BEFORE





AFTER

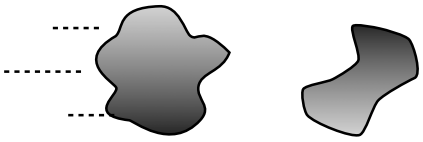
$p = 0$

$p' =$ _____ $= p_1' + p_2'$

$p_1' = -10$ kg·m/s $p_2' =$ _____

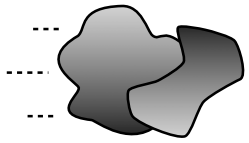
According to the Law of Conservation of Momentum, the momentum before (p) is equal to the momentum after (p').

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



$p_1 = 10$ kg·m/s $p_2 = 0$

$p_1 + p_2 = p =$ _____



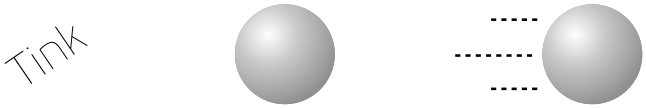
$p' =$ _____

According to the Law of Conservation of Momentum, the momentum before (p) is equal to the momentum after (p').

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

$p_1 = 10$ kg·m/s $p_2 = 0$

$p_1 + p_2 = p =$ _____



$p' =$ _____ $= p_1' + p_2'$

$p_1' = 0$ $p_2' =$ _____

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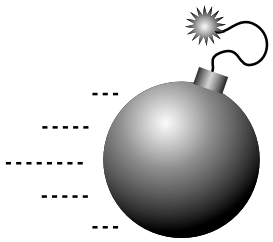
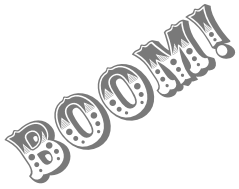
4. A Moving Bomb Explodes.

According to the Law of Conservation of Momentum, the momentum before (p) is equal to the momentum after (p').





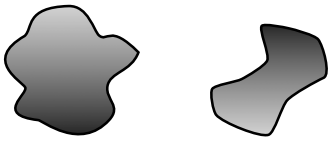
$p = 10$ kg·m/s

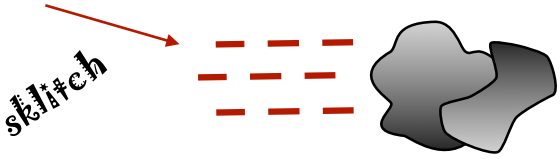
$p' =$ _____ $= p_1' + p_2'$

$p_1' = -10$ kg·m/s $p_2' =$ _____

Here are the "Speed lines".

5. Moving Blobs of Clay Collide. **Since p is +, velocity is + & speed lines follow the motion**





$p_1 = +10$ kg·m/s $p_2 =$ _____

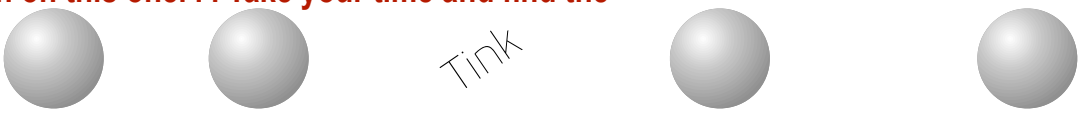
$p_1 + p_2 = p =$ _____

$p' = +4$ kg·m/s

START HERE > > > Use this 'AFTER' momentum

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

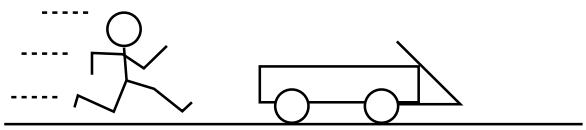
You're on your own on this one. . . Take your time and find the

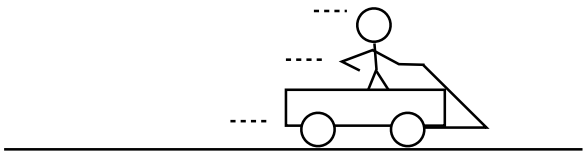


$p_1 = +10$ kg·m/s $p_2 = -13$ kg·m/s $p' =$ _____ $= p_1' + p_2'$

$p_1 + p_2 = p =$ _____ $p_1' = -8$ kg·m/s $p_2' =$ _____

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





$m_1 = 40$ kg $m_2 = 10$ kg $v_2' =$ _____

$v_1 = 5.0$ m/s $v_2 = 0$

2nd: Set the momentum BEFORE equal to the momentum after the masses stick.

1st: Find momentum before by adding the p of the child and the p of the cart

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