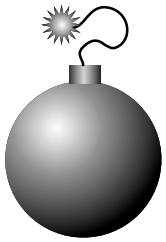
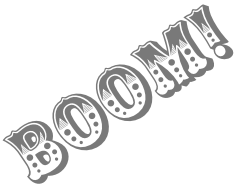
PhyzJob: Conservation of Momentum Number Puzzles

PART 2: SPEED

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 



AFTER 

$v = 0$ m/s

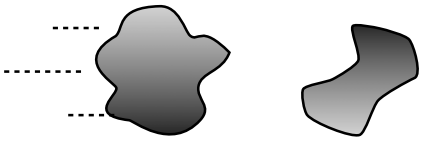
$m_1 = 7.0$ kg
$v_1' = -1.43$ m/s

$m_2 = 3.0$ kg
$v_2' = ?$

EXAMPLE

DON'T THINK:	$p = p'$	SOLVE:	$0 = m_1v_1' + m_2v_2'$
	$p_1 + p_2 = p_1' + p_2'$		$m_2v_2' = -m_1v_1'$
	$m_1v_1 + m_2v_2 = m_1v_1' + m_2v_2'$		$v_2' = -m_1v_1'/m_2$
THINK:	$v_1 = v_2 = v = 0$		$v_2' = -7.0\ kg \cdot -1.43\ m/s\ /\ 3.0\ kg$
APPLY:	$0 = m_1v_1' + m_2v_2'$		$v_2' = 3.3\ m/s$

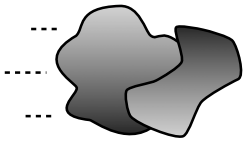
2. Moving Blobs of Clay Collide.



$m_1 = 5.0$ kg
$v_1 = 8.0$ m/s

$m_2 = 3.0$ kg
$v_2 = 0$ m/s

Sketch



$v' = ?$

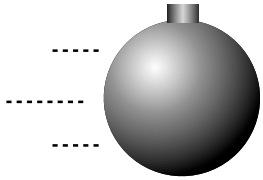
Find the momentum before: _____

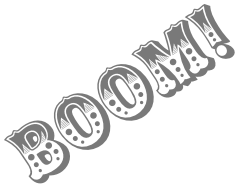
Now the moving mass is 5 kg + 3 kg = 8 kg.

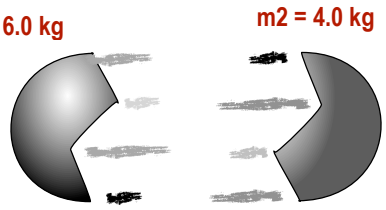
Set the momentum before equal to the momentum of the 8kg combined mass, then solve for v'.

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.







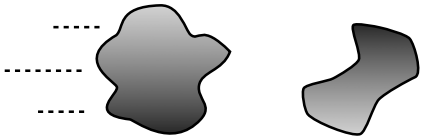
$m_1 = 6.0$ kg $m_2 = 4.0$ kg $v = +9.0$ m/s $v_1' = -7.5$ m/s $v_2' = ?$

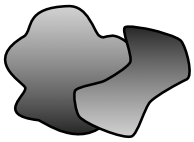
This one is not very clear. It is intended to show that a 10 Kg bomb is initially moving at +9.0 m/s.

Find the momentum BEFORE.

Now that you have found the momentum BEFORE, you can set that equal to the momentum of shard 1 plus the momentum of shard 2.

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





$m_1 = 8.0$ kg $m_2 = 5.0$ kg
$v_1 = +4.0$ m/s $v_2 = -2.0$ m/s

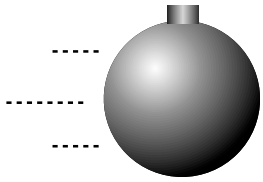
$v' = ?$

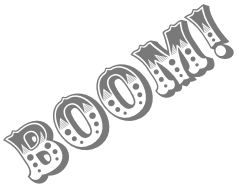
$$p = p'$$

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

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

5. A Moving Bomb Explodes.





$m_1 = 4.0$ kg $m_2 = 3.0$ kg $v = ?$ $v_1' = -5.0$ m/s $v_2' = +12$ m/s

5. 2 m/s 3. 34 m/s 4. 1.7 m/s 2. 5.3 m/s

Here are the answers so you can check your work.

db