2009-10 Momentum 6

M. $p_{1B} + p_{2B} = p_{1A} + p_{2A}$

N. $p_B - I = p_A$

O. $p_{1+2B} = p_{1A} + p_{2A}$

P. $0 = p_{1A} + p_{2A}$

Q. $p_B - I = 0$

R. $p_B + I = p_A$

S. $p_{1B} + p_{2B} = p_{1+2A}$

T. $0 + I = p_A$

U. $p_{1B} + p_{2B} = 0$

1. Choose the Conservation of Momentum Equation at the left that matches the following situations. You will not use all of the equations.

   A. _____A rocket starts at rest. It moves forward by shooting gases backwards.
   B. _____A rock at rest is thrown by someone. (*Give the equation for just the rock.*)
   C. _____Two ice skaters bump into each other and grab on.
   D. _____Two carts hit each other and stop.
   E. _____A car uses its brakes to slow down.
   F. _____A person rolling on a skateboard catches a football.

2. Impulse equals _____ or _____.
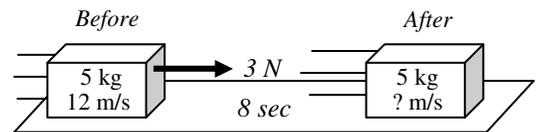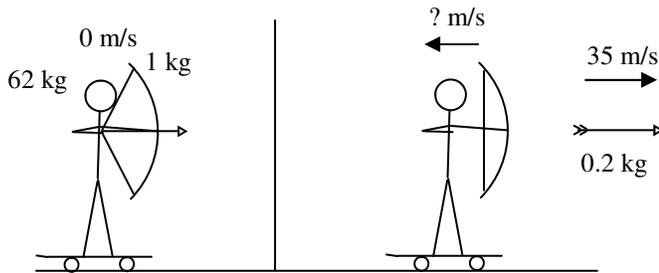
3. Slim Jim tries skateboard archery! Having gained a bit of weight during the holidays, Jim is now 62 kg. The bow is 1 kg and the arrow is 0.2 kg. If the arrow ends up going 35 m/s, how fast does Jim move backwards?

4. An object is pulled by a force as shown above.
   A. What is the mass of the object?
   B. What is the weight of the object?
   C. What is the normal force on the object?
   D. Under the diagram, calculate the final velocity of the object.

5. When two objects collide, how does the total momentum afterwards compare with the total momentum before? (more, less or the same?)
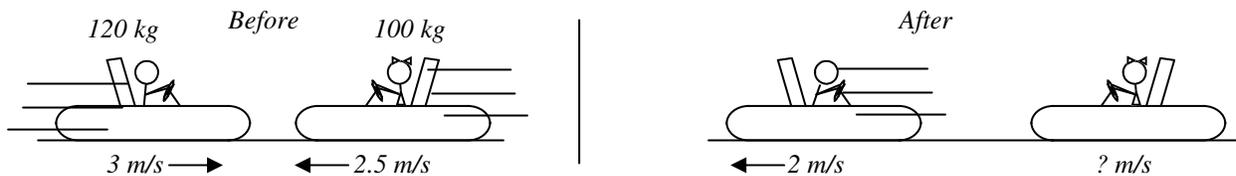

6. Slim Jim and Slim Kim are in the bumper cars at the amusement park. Jim and Kim collide face to face as shown above.
   A. Before the collision, who has negative momentum: Jim or Kim?
   B. Who has more momentum before: Jim or Kim (*you'll have to calculate*)?
   C. Keeping track of negatives, what is the net momentum before?
   D. Under the diagram, calculate Slim Kim's final velocity after the collision.
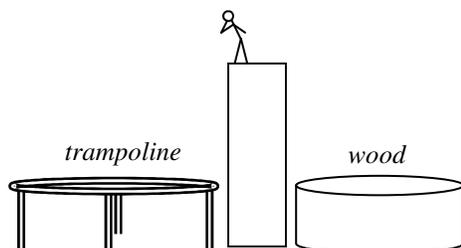
7. Slim Jim is choosing to jump onto a trampoline or a wood block.
   A. In which case will he have the most momentum before hitting?
   B. In which case will feel the most force?
   C. In which case will he take more time to stop?
   D. In which case will feel the greatest impulse?

8. Given $3K_2SO_4$
   A. How many molecules are there?
   B. How many total potassium atoms (K) are there?
   C. How many total oxygen atoms are there?
   D. Give the reaction notation (*see example at the right*):

$$6H_2O$$

Reaction notation $\longrightarrow H_{12}O_6$
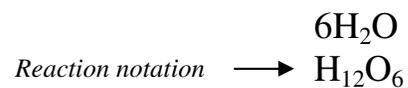
9. Balance the following reactions. (*Hint: treat anything in parenthesis as if it were just another element.*)

___ AlCl$_3$ + ___ Na$_2$(CO$_3$) → ___ Al$_2$(CO$_3$)$_3$ + ___ NaCl

____ Fe + ____ O$_2$ → ____ Fe$_2$O$_3$