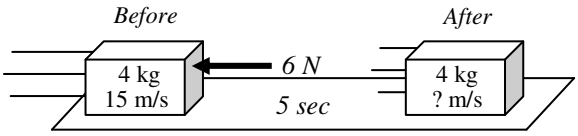
A-Day: Due Fri., Dec 11
B-Day: Due Mon., Dec 14

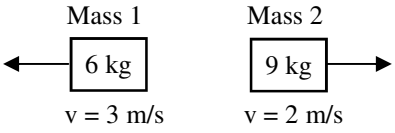
2009 Momentum 2



$\Sigma p_{before} \pm I = \Sigma p_{before}$

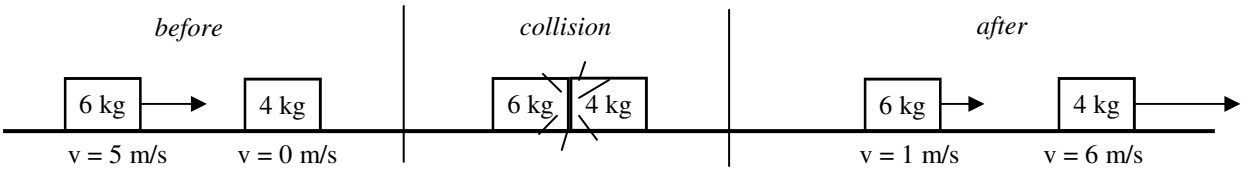
1. A 4 kg object is moving 15 m/s to the right. A 6 N force pushes for 5 seconds to the left.
   A. How much momentum does it start with?

   B. How much impulse acted on the object?
   C. What is it's change of momentum?
   D. Under the diagram, calculate the final velocity of the object.



2. A. Calculate momentum for both objects at the left.

   B. Calculate the net momentum for the objects.

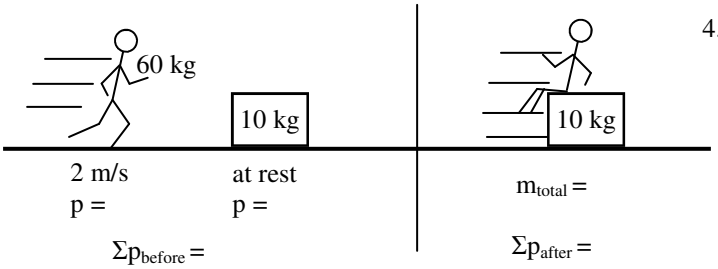


$\Sigma p_{before} =$ $\Sigma p_{after} =$

3. The diagram above shows two objects before and after they collide.
   A. On the diagram above calculate and label the net momentum before and after.

   B. How does the net momentum before compare with the net momentum after?

   (*This is ALWAYS the case when object collide: momentum is conserved:* $\Sigma p_{before} = \Sigma p_{after}$.)



$\Sigma p_{before} =$ $\Sigma p_{after} =$

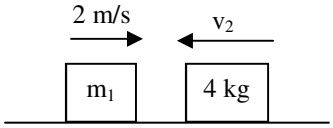
4. Slim Jim is running 2 m/s towards a box that is at rest. Jim then jumps onto the box and the two slide together
   A. On the diagram, calculate the net momentum before.
   B. What is the total mass of Jim and the box afterwards?

   C. Since momentum is always conserved, how much net momentum is there afterwards?

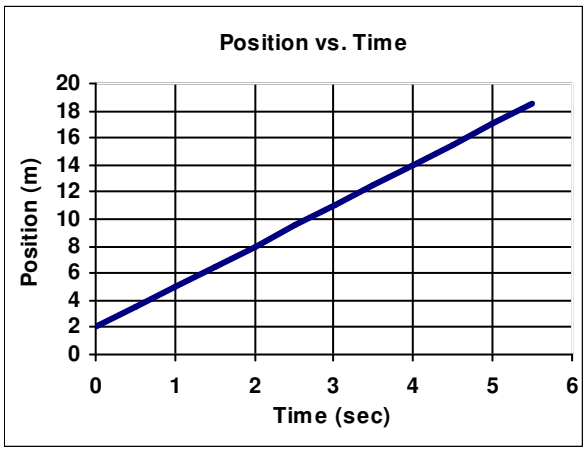
   D. Under the diagram, calculate the final velocity of Jim and the box.

5. Give two ways that two objects could have a net momentum of zero.

6. Impulse causes a _____ of _____.



7. What is the net momentum of the two objects at the left?
   (*Your answer will have variables in it.)*



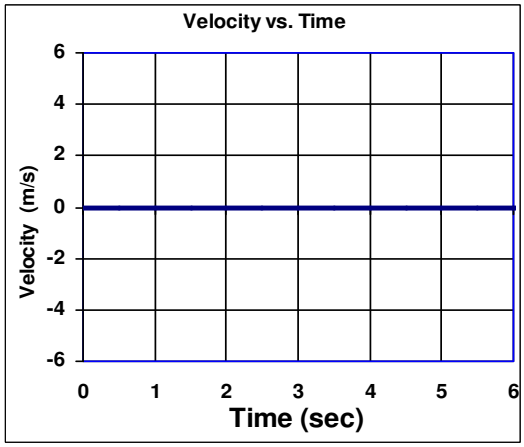
8. The graph at the right shows an the motion of a 6 kg object.
   A. Use graph to calculate the speed of the object.

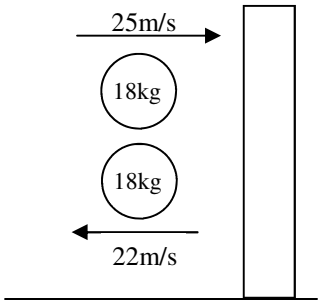
   B. Calculate the momentum of the object.

   C. What is the y-intercept of the graph (give the #)?

   D. What does the y-intercept of this graph tell us about the object?

   E. Transfer the position graph to the velocity graph below it.





9. An 18kg object hits a wall and bounces back. Remembering that $\Delta p = p_f - p_i$, calculate the change of momentum of the object.

Now, for some review…

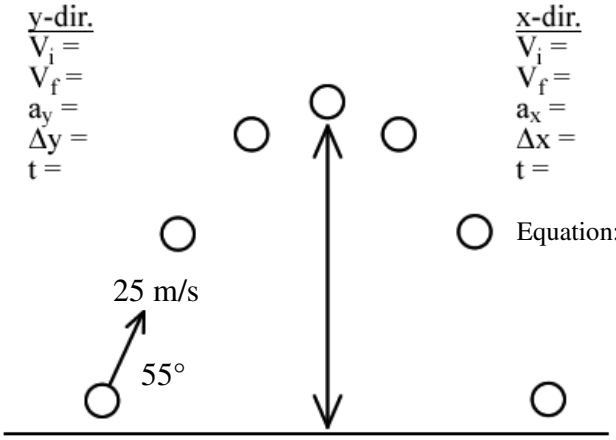
(*Using your "Projectile Motion" notes*)

10. An object is shot 25 m/s at an angle of 55º from the ground, to the ground *(−15 point for blank)*.
    A. Use trig to find the x and y components of the initial velocity.

    B. Fill in the variable lists.

    C. Use a kinematic equation to calculate the time it is in the air.

    D. Calculate how far away it lands.



Chemical change—the substance changes to something else. Physical change—it stays the same substance. If you can say "It is still (whatever)" it is a physical change.

11. Chemical or physical change?
    A. ____ Burning paper.
    B. ____ Melting ice.
    C. ____ Baking soda mixed into vinegar.
    D. ____ Cutting up a piece of paper.
    E. ____ You mix two liquids together and they get colder.
    F. ____ Dissolving salt into water.
    G. ____ You mix two liquids together and they change color.