A-Day: Due Mon., Jan 4
B-Day: Due Tues., Jan 5

2009 Momentum 5

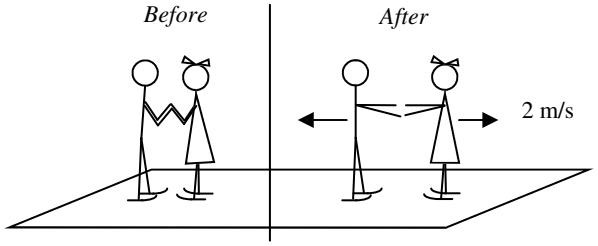
Remember: you must remake your quiz BEFORE the test!

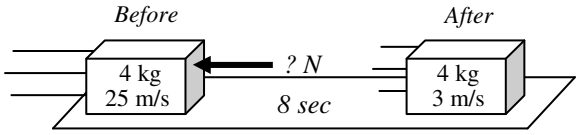
M. $p_{1B} + p_{2B} = p_{1A} + p_{2A}$
N. $p_B - I = p_A$
O. $p_{1+2B} = p_{1A} + p_{2A}$
P. $0 = p_{1A} + p_{2A}$
Q. $p_B - I = 0$
R. $p_B + I = p_A$
S. $p_{1B} + p_{2B} = p_{1+2A}$
T. $0 + I = p_A$
U. $p_{1B} + p_{2B} = 0$

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 person moving on a rolling chair throws a medicine ball.
   B. _____ A car moving 15 m/s uses its brakes to slow down.
   C. _____ A moving object stops.
   D. _____ Pool balls collide and ricochet off each other.
   E. _____ A car starts to move.
   F. _____ A gun is fired.

You will use one of these equations to solve all the next three problems.

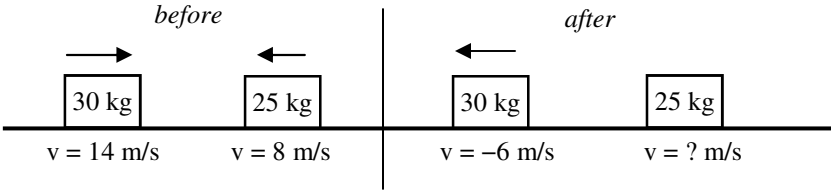
2. Slim Jim and Kim go ice skating. Standing amorously on the ice, they push off from each other. Jim is 60 kg and Kim is 40 kg. If Kim ends up moving to the right at 2 m/s. Under the diagram, calculate Jim's final velocity.





3. A 4 kg object moving 25 m/s slows down for 8 seconds to 3 m/s. Under the diagram, calculate the force.

4. Two objects collide, as shown at the right.



   A. Calculate the total momentum before the collision (p_{net})?

   B. After the collision does the net momentum increase, decrease or stay constant?

   C. Under the diagram, calculate the final velocity of the 25 kg object.

   D. Now that you know the final velocity of the 25kg object, calculate the kinetic energy of each object.

   E. Calculate the total kinetic energy before and after the collision.

   F. Are they equal?

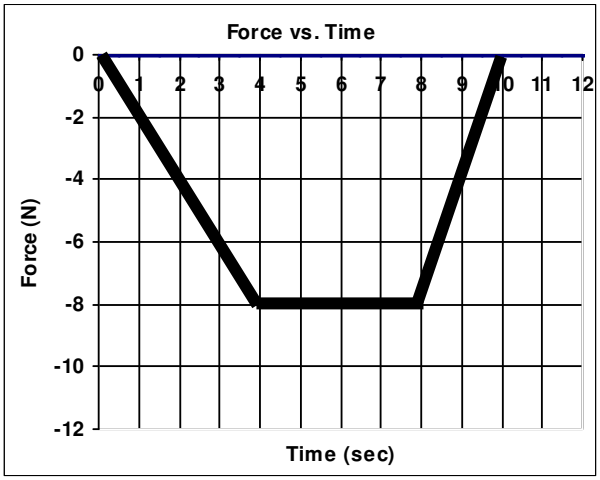
   G. Was this an elastic or inelastic collision?

$Ek_{30kg\ before}$ _____ $Ek_{25kg\ before}$ _____ | $Ek_{30kg\ after}$ _____ $Ek_{25kg\ after}$ _____

$\Sigma Ek_{before} =$ _____ | $\Sigma Ek_{after} =$ _____

5. Two 45 kg objects are moving 12 m/s. Object A stops by hitting a brick wall. Object B stops by running into sand.
   A. Which one felt the bigger force?
   B. Which had the bigger stopping time?
   C. Which one felt the bigger impulse?

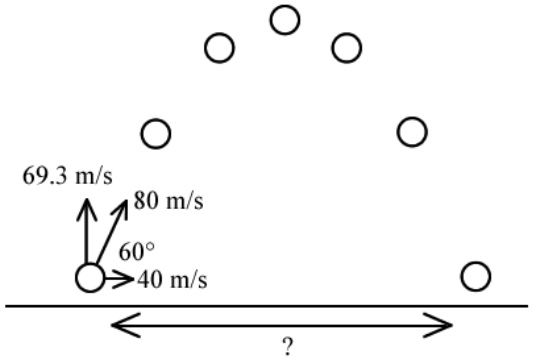
6. True or false: a bigger force always produces a bigger impulse?



7. A. Calculate the impulse on the graph.

   B. If impulse = Δp and it ends with 220 kgm/s of momentum, how much momentum did it start with ($\Sigma p_B \pm I = \Sigma p_A$, remember)?

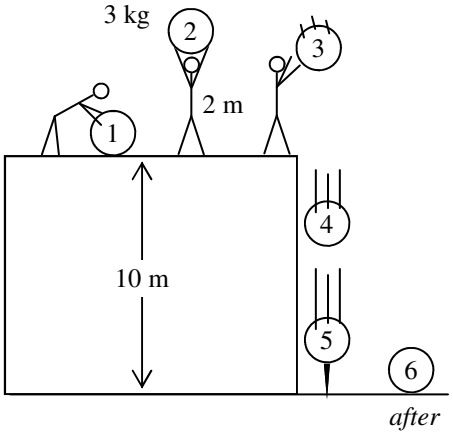
8. An object is launched 80 m/s at an angle of 60° from the ground to the ground.
   A. Fill in the variables for both the x and y-directions. Put "?" if unknown.
   B. Calculate how far away it lands



y-dir.	x-dir.
a_y =	a_x =
Vy_i =	Vx_i =
Vy_f =	Vx_f =
Δy =	Δx =
t = 2.5sec	t =

9. A 6 kg object is moving 3 m/s. It has 27 J and 18 kgm/s. After 12 N acts for 4.5 seconds and 33.75m, it is going 12 m/s. This takes 90 W and results in 2 m/s^2. Assign variables for the all of the above quantities.

A. 6 kg =	D. 18 kgm/s =	G. 33.75 m =	J. 2 m/s^2 =
B. 3 m/s =	E. 12 N =	H. 12 m/s =	
C. 27 J =	F. 4.5 sec =	I. 90 W =	



10. Slim Jim lifts a 3 kg rock 2 m above a cliff.
    A. What kind of work or energy does Jim use to lift the object from position 1 to 2?
    B. What is the total height at 2?
    C. Calculate the energy the 3 kg rock has at position 2.
    D. How much total energy will it have at position 4?
    E. If position 4 is half way down, how much kinetic energy does it have at position 4?
    F. How much total energy will it have at 5?
    G. How much total energy does it have at 6?
    H. How much energy does it lose from 5 to 6?
    I. How much work was done by the spike to stop the rock?