2008 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. $p_{1B} + 0 = p_{1+2A}$

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 pushes on a cart that is already moving.
   B. _____ An arrow hits a target. The arrow and target move backwards.
   C. _____ A plane rolling down the runway stops.
   D. _____ A moving bomb explodes into two parts.
   E. _____ Two moving cars hit each other and bounce off.
   F. _____ Two people on roller skates push off from each other.
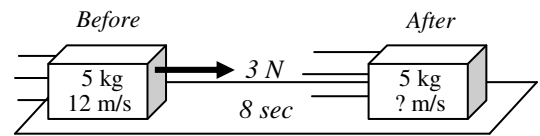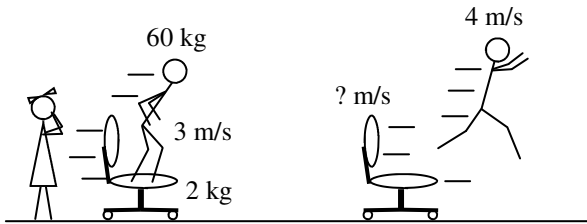

2. Much to Kim's horror, Slim Jim tries to impress her. Since she knows he is a very poor skate boarder, he chooses to jump from a rolling chair. Below the diagram above, calculate the final velocity of the chair.

3. 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.
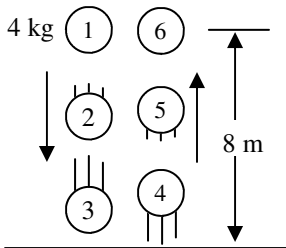
4. A 4 kg ball is dropped from 8 m. It rebounds back to its original height.
   A. Calculate the energy it has at position 1.

   B. How much energy does it have at position 2?
   C. How much energy does it have at position 3?
   D. Calculate how fast it is moving at position 3.

   E. Since it comes back to the same height, does it have more, less or the same energy as before?
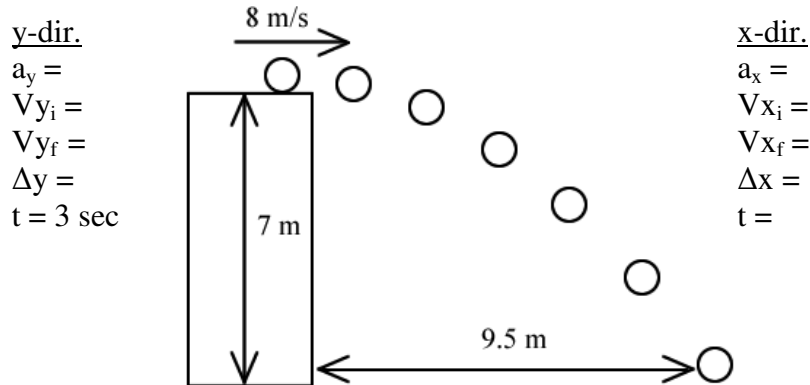   F. What kind of collision did the ball have with the ground?
   G. Why?
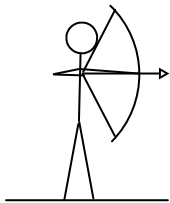
5. Slim Jim is also an archer.
   A. When he pulls back the bow, what kind of force is the bow string gaining?
   B. What kind of energy does the bow have when pulled back?
   C. What kind of work or energy does Jim have to use to pull back the bow?
   D. When released, which is greater: the force of the bow on the arrow or the force of the arrow on the bow?

6. For the two objects at the right, give their mass and weight.

   m = _____
   F_W = _____

   50 kg

   m = _____
   F_W = _____

   1.8 kg
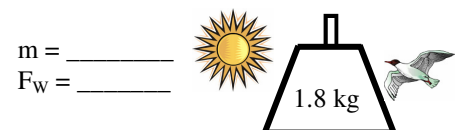
7. An object is shot horizontally from atop a 7m tall ledge.   Fill in the information on the diagram.
    Put "?" for any unknowns. Notes: "*Projectile Motion*".

    8 m/s

    y-dir.
    $a_y =$
    $Vy_i =$
    $Vy_f =$
    $\Delta y =$
    $t = 3$ sec

    7 m

    9.5 m

    x-dir.
    $a_x =$
    $Vx_i =$
    $Vx_f =$
    $\Delta x =$
    $t =$

8. An object is dropped. How far will it drop in 6 seconds? Notes: "*Freefall*"
    A. What is the initial velocity of a dropped object?
    B. What is the acceleration of the object?
    C. Figure out how far it falls in 6 seconds.

    18 m/s

9. An object is moving 18 m/s at 40 degrees. Resolve it into its x and y components.
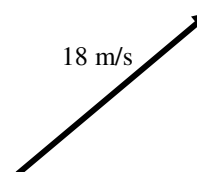
10. A. What is the MA (Mechanical Advantage) of the ramp below?
    B. What is the weight of the object?
    C. How much force does Slim Jim need to pull the box up the ramp?

    50N

    2m   10m   50N