A-Day: Due Wed., Dec 12 (Assigned: 12/10)
B-Day: Due Thurs., Dec 14 (Assigned: 12/11)

2007 Momentum 3

Write these two equations on your chart: Conservation of momentum: $\mathbf{\Sigma p_{before} \pm I = \Sigma p_{after}}$; and $\mathbf{\Delta p = I.}$

1) A 6 kg object speeds up from 5 m/s to 20 m/s. Find Δp.

2) A 10 kg object slows down from 25 m/s to 5 m/s. Find Δp.

3) What is the impulse for Q1 above: What is the impulse for Q2 above:

4) Can an object ever have a negative kinetic energy? Why or why not?
(*Hint: look at the equation.)*

5) Can an object ever have a negative momentum? Why or why not?

6) If an object's kinetic energy is zero, what is its momentum?

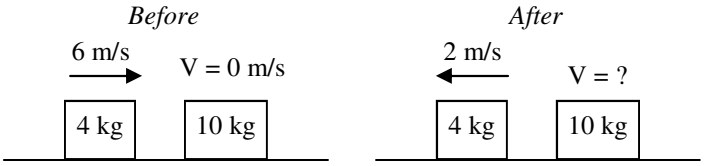
7) Use the equations at the right to answer the following questions.
   A) Which have two independent objects beforehand?
   B) Which show a combined object afterwards?
   C) Which one shows all objects are at rest beforehand?
   D) Which show all objects are at rest afterwards?
   E) Which show an object speeding up due to a force?

A) $p_B + I = p_A$
B) $p_{1B} + p_{2B} = p_{1A} + p_{2A}$
C) $p_{1B} + p_{2B} = p_{1+2A}$
D) $p_{1+2B} = p_{1A} + p_{2A}$
E) $p_{1B} + p_{2B} = 0$
F) $0 = p_{1A} + p_{2A}$

8) If the net momentum before equals the net momentum after, is there an external impulse?

9) A 2 kg object going 30 m/s feels a -4 N force for 8 seconds, find the object's final velocity.
Conservation of Momentum Equation: Solve:

10) A 4 kg object going 6 m/s collides with a 10 kg object at rest. After the collision the 4 kg object is going 2 m/s to the left. Find the final velocity of the 10 kg object.
Conservation of Momentum Equation: Solve:



11) Two people are originally at rest on frictionless surface (***wet, oily ice on roller skates, OK?!***).
They push off from each other. Answer the following:
   A) What was their momentum before?
   B) What happens to the two people?

   C) If the person on the left is 80 kg and the person on the right is 60 kg, which person moves faster afterwards?
   E) According to the Law of Conservation of Momentum, what does the net momentum of the two have to equal afterwards?

   D) If the person on the left ends up going 1.2 m/s to the left, use conservation of momentum to find the velocity of the person on the right.
Conservation of Momentum Equation: Solve:

12) An 70 kg person sitting in a 5 kg rolling chair (at rest) catches a 2 kg ball. Afterwards the person-chair-ball combo rolls backwards at 0.5 m/s. Calculate the initial velocity of the 2 kg ball.
Conservation of Momentum Equation: Solve:

13) Given $3Na_2CO_3$,
A) What is the coefficient?
B) What is the subscript on oxygen?
C) How many sodium atoms are there in each molecule?
D) How many molecules of sodium carbonate are there?
E) How many total oxygen atoms are there?
F) How many total sodium atoms are there?

14) For reaction notation for A) $3CaCrO_4$ = B) $6Na_2(SO_4)$ =

Studying for the final.

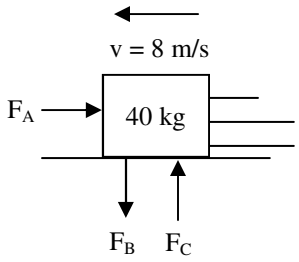
15) An object is at rest
A) Give two kinds of energy it could have.

B) Give a kind of energy it could not have.

16) The picture at the right shows an object ***moving to the left*** at 8 m/s.
A) Identify force A:
B) Identify force B:
C) Identify force C:
D) Calculate force B:

E) Calculate force C:

F) Calculate how much energy it has.



G) If all the forces are shown, will the object have a positive or negative acceleration?

H) If it takes 6 seconds to stop, calculate force A.