A-Day: Due Fri., Dec 1 (Assigned: 11/29)
B-Day: Due Mon., Dec 4 (Assigned: 11/30)

Momentum 3

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 #1 above:

4) What is the impulse for #2 above:

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

7) Give two ways that a group of objects could have a net momentum of zero:

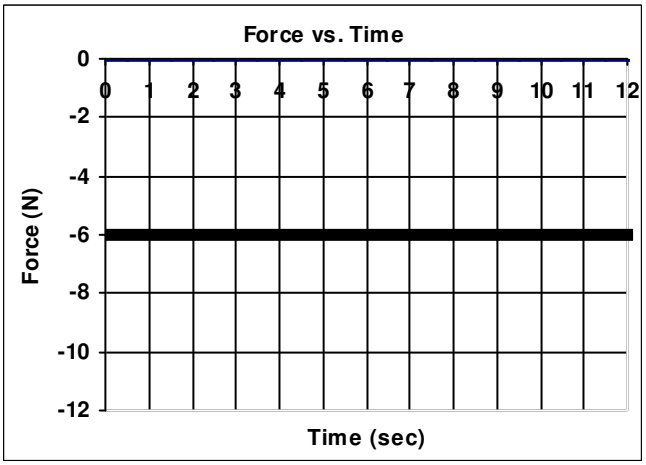
8) If an object's kinetic energy is zero, what is its momentum?

9) A 75 kg object feels a 8 N force for 10 seconds. Find the impulse on the object.

10) A 2 kg object going 30 m/s feels a -4 N force for 8 seconds, find the object's final velocity.

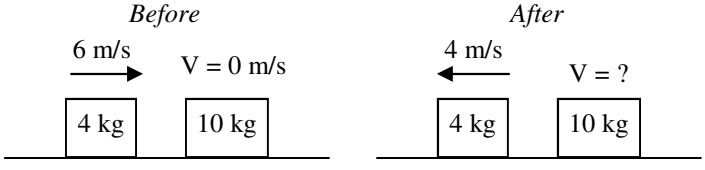
11) A 20 kg object originally going 12 m/s feels the impulse shown on the graph.
   A) What is the magnitude of the force given on the graph? (How big is it?)
   B) Will the object speed up or slow down?
   C) How much time is shown on the graph?
   D) Find the impulse shown on the graph.

   E) Using the above information, find the object's final velocity.



12) Why do "crumple zones" (parts of a car that collapse during a crash) keep you safe?

13) 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 4 m/s to the left. Find the final velocity of the 10 kg object.



14) A 3 kg object going 2 m/s to the right hits a 2 kg object going 4 m/s to the left. Afterwards, the 3 kg object is going 0.5 m/s to the right. How fast is the 2 kg object moving?

A) Draw the situation before and after:

Before *After*

B) Solve for the final velocity of the 2 kg object.

15) Two people originally at rest are 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, what do we know about how far each will go?

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 afterward, find the velocity of the person on the right.

16) 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.

A) What is the mass of the person-chair-ball combo?

B) What is the combo's momentum afterwards (p_a)?

C) What must be Σp_b?

D) Find the initial velocity of the 2 kg ball.

17) Does an increase of mass increase or decrease the force of gravity?
18) Does a decrease of distance increase or decrease the force of gravity?
19) If you triple the mass, how much does the force of gravity change?
20) If you triple the distance, how much does the force of gravity change?

21) A 70 kg person stands on the surface of planet Zorg. If the mass of Zorg is 2.5 x 1023 kg and rzorg = 6.5 x 108 m,

A) find the force of gravity of the planet pulling on the person.

B) What would be the force of gravity on this same 70 kg person if they were on the earth?