2007 PreAP Momentum 4—due 11/29

Please read these pages in the book: 214; 220 (study the graph at the bottom left); 226 –230; study the chart on 230. I gave you the wrong names for the different kinds of collisions: use the ones from the book.

1) A 60 N force acts for 3 seconds on a 4 kg object originally going 8m/s.
   A) Find the change of momentum due to the 60 N force.

   B) Find the final velocity of the object.

   C) How long would a 25 N force have to act to give the same final speed to the object?

   D) How long would it take a 5 N force to give the same final speed?

   E) How long would it take a 1 N force to accelerate the object to the same final speed?

2) A 3 kg object going 10 m/s hits a wall and bounces off. Afterwards it is going 6 m/s.
   A) Find the change of momentum of the object.

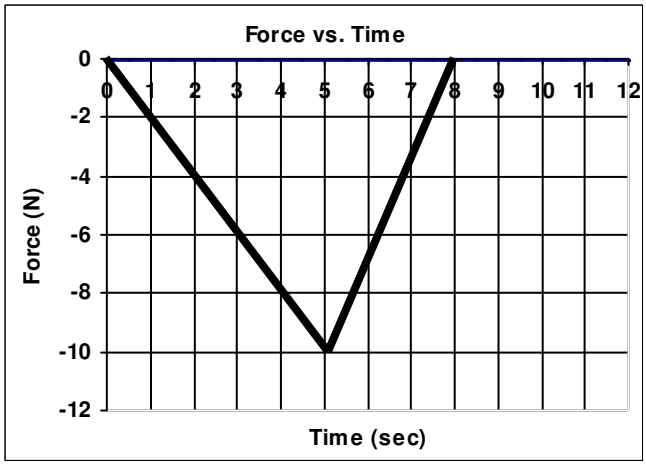
3) A 4 kg object going 8 m/s strikes and sticks to a 3 kg object originally at rest.
   A) Find the velocity of the two objects after the collision.
   B) Find the final kinetic energy of the two objects.

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

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

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

7) Using the graph at the right, find the initial velocity of a 2 kg object that ends up going 12 m/s.



8) Are the following elastic, inelastic, or perfectly inelastic?
   A.___ They collide, stick together, and do not conserve kinetic energy.
   B.___ They collide, remain independent, and kinetic energy is conserved.
   C.___ They collide, do not stick together, and kinetic energy is not conserved.
   D.___ A football player catching the football.
   E.___ Two cars collide and are mangled in the crash.
   F.___ A superball hits the ground and bounces back to its original height.

9) A 2 kg ball going 3 m/s to the right hits a 3 kg ball going 4 m/s to the left. If afterwards the 3 kg ball is going 2 m/s to the right figure out if the collision was elastic or inelastic.

   From the book: Chapter 6 #22, 34, 51

   Hint for 51. You can't use conservation of momentum for the whole problem. The first part is a collision. The second part is a pendulum moving up (which we have done).

10) Define these variables (with units): α; θ; ω; v_t; s; F_c; a_t.

The rotational kinematic equations look exactly like the linear kinematic equation, but with rotational quantities.

11) Calculate the angular acceleration of an object that speeds up rotating from 3 rad/sec to 8 rad/sec in 6 radians.