Due 11_16

1) Force A is 10 N. Force B is 30 N. Both push on identical 5 kg objects to accelerate them from rest to 10 m/s.
   A) Since the objects are at rest before, their initial momentum is:
   B) Find their final momentum.

   C) Find the change of momentum (Δp) to speed up the 5 kg objects (it's the same amount for both).

   B) Using the impulse equation ($\Delta p = F\Delta t$), how long does Force A act on the object?

   C) How long does Force B act on the object?

   D) Which force gave more momentum to the object?
   E) Which object accelerates the object faster?

   F) So, to accelerate an object you have two choices. Give them:

2) An egg dropped on a concrete floor experiences more or less Δp than an egg dropped on a pillow?
3) The egg dropped on the concrete floor experiences more or less impulse than the egg dropped on a pillow?
4) How come the egg dropped on the pillow survives (don't use any words akin to "softer")?

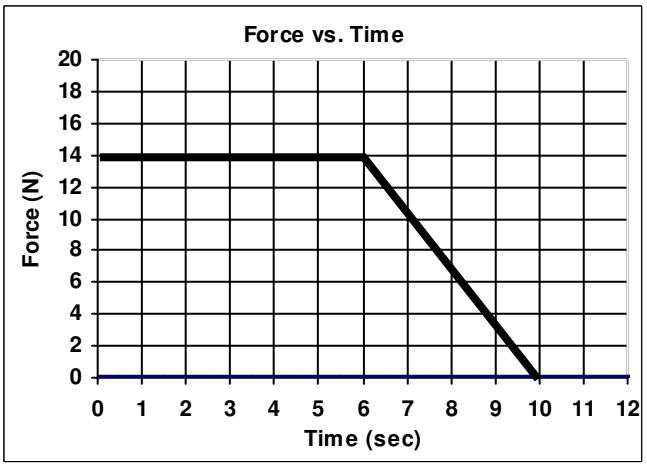
5) A 5 kg object slows from 20 m/s to 15 m/s in 6 seconds. Find the force that caused this.

6) A 2 kg object going 10 m/s feels a 3 N force for 6 seconds. Find the impulse on the object.

7) In #6, find the final velocity of the 2 kg object.

8) Use the graph to answer the following:
   A) Find the impulse on an object during the first 10 seconds of the graph.

   B) If the object started at 4 m/s and is 6 kg, find its final velocity.



9) Which of the following are external (E) or internal (I) forces?
   A.___ An explosion to the object.
   B.___ A person pushing on a ball to move it (to the ball).
   C.___ The force of a car colliding with another car (to the two cars).
   D.___ Friction.

10) An 70 kg person on a 5 kg rolling chair catches a 2 kg ball. Together the person and the ball roll backwards at 3 m/s. Find the net momentum after the ball is caught.

11) A 60 kg person catches a 0.5 kg ball. If after the catch the person and ball are going 3 m/s, find the net momentum afterwards.

12) 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?

D) According to the Law of Conservation of Momentum, what does the net momentum of the two have to equal afterwards?

E) If the person on the left ends up going 1.2 m/s afterward, find the velocity of the person on the right.

13) A 1.5 kg wayward bird going 25 m/s to the right slams into a rigid box at rest on a frictionless surface exactly at the bottom of a ramp inclined at 20^{o}. If the box weighs 30 N, find how fast the box is moving afterward if the bird stops after the collision and doesn't attach to the box. *(The bird was "CareFlight"-ed to St. Tweety's avian hospital in time, recovered for the most part, and is recuperating somewhere down south.)*

14) Now that you know how fast the box is going use Conservation of Energy to find out how far up the ramp the box will go before it mercilessly slides back down on top of the hapless bird?