A-Day: Due Mon., Nov 27 (Assigned: 11/16)
B-Day: Due Tues., Nov 28 (Assigned: 11/17)

2007 Momentum 1

Variable	Units	Variable Name	Notes:
p (small)	kgm/s	momentum	How hard it is to stop something. Can be neg or 0.
I	kgm/s or Nsec	Impulse	Causes a change of p.

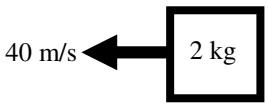
$p = mv$
$I = Ft$
$p_{net} = p_1 + p_2...$

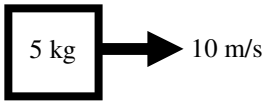
1) ***Write the above on your variable and equation charts.***

2) A 35 kg object has -450 kgm/s of momentum. Find its velocity.

3) Which has more momentum? (*choose one for each*)
A. A car when going fast or slow?
B. A heavy or light object going 10 m/s?

5) Find the momentum of the following objects:





A. _____ B. _____ C. _____

6) Which of the objects in #5 has the momentum with the greatest **magnitude** (*disregarding direction*)?

7) Which of the objects in #5 has the most **inertia**?

8) Find the net momentum of all of the objects in #5 above (*find Σp*).

9) A 10 kg object is 5 m/s moving to the left while a 3 kg object is going 4 m/s to the right.
(Remember that left is negative.)
A) Find the momentum of the 10 kg object (we'll call this momentum 1 or "p_1"):

B) Find the momentum of the 3 kg object (p_2):

C) Find the net momentum of both objects (Σp).

10) A 25 kg object moving 3 m/s to the right while a 30 kg object is moving 4 m/s to the right (yes, same direction). Calculate p_{net}.

11) A 2 kg object initially going 4 m/s to the right is later going 8 m/s. Find Δv. (Remember that Δ = final – initial.)

12) A 3 kg object going 6 m/s to the right ends up going 3 m/s to the left. Being careful of negatives and positives, find the change of momentum of the object.

13) A 500 N force pushes on an object for 6 seconds.
A) Find the impulse on the object.

B) What is the change of momentum of the object?

C) Since the force is positive, will there be a positive or negative change of speed for the object?

14) How long would it take a 30 N force to get the same impulse as in Q13?

15) So do you have to use a big force to make a big impulse?

16) Positive or negative change of speed? (*Think of a number line. [mmmmm, number lines*])

A) _____ Vi = 3 m/s; Vf = -5 m/s

B) _____ Vi = 5 m/s; Vf = -3 m/s

C) _____ Vi = -3 m/s; Vf = -5 m/s

D) _____ Vi = 3 m/s; Vf = 5 m/s

E) _____ Vi = -5 m/s; Vf = -3 m/s

Turn to next page.

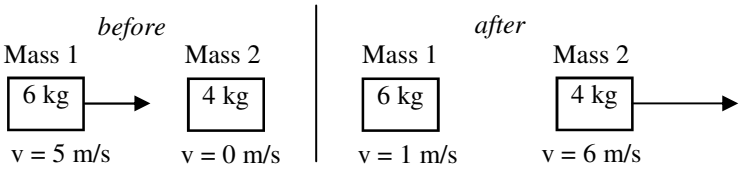
1) In the previous chapter, a force does **work** which creates _____. In this chapter a force is called an _____, which changes _____.

2) So the change of momentum of an object equals the object's change of _____.

3) How can a group of objects have a net momentum of zero?

4) A 3 kg object going 4 m/s to the right ends up going 6 m/s to the left.
A) p_i = B) Δv = C) Δp =

5) Two objects at the collide. The diagram shows their speeds before and after the collision.



A) Σp_{before} =

B) Σp_{after} =

C) How do your answers in A and B compare?

This is ALWAYS the case: momentum is conserved.

6) A 2 kg object going 10 m/s to the right feels a +3 N force for 6 seconds.
A) Calculate its initial p. B) Calculate the impulse. C) What is its final momentum?

D) Calculate the final velocity of the 2 kg object.

C) Using a very simple equation, find the acceleration of the object.

7) Object 1 is pushed by a 10 N force. Object 2 is pushed by a 30 N force. Both objects are 5 kg. The force accelerate them from rest to 10 m/s.
A) Since the objects are originally at rest, their initial momentum is:
B) The final momentum of Object 1 is (p_{1A}): C) Final momentum of Object 1 (p_{2A}) =

D) What is the change of momentum (Δp) for the Object 1: E) $\Delta p_{Object\ 2}$ =

F) Since I = Δp, how long does the 10 N force act on Object 1?

G) How long does the 30 N force act on Object 2?

H) Which force gave more momentum?
I) Which object accelerates faster?

J) So, to accelerate an object you have two choices: a small force over a _____ time or a ____ force over a _____ time.

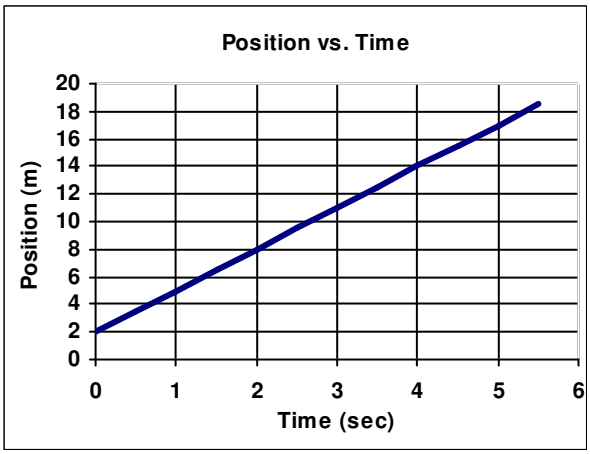
Two identical eggs are dropped from the same height. Egg A is dropped on a concrete floor, Egg B on a pillow.
8) Which one was moving faster just before it hit?
9) Which one experienced a greater force?
10) Which one survives?
11) Why? (Don't use any words like "absorb".)

12) A 5 kg object slows from 20 m/s to 15 m/s in 6 seconds.
A) Calculate the change of momentum.

B) How much impulse acted on the object?

C) Find the force that caused this.

13) The graph at the right shows the motion of a 35 kg object. Calculate its momentum.



14) Physical or chemical change?
A) _____ Burning paper.
Why?

B) _____ A sugar cube disappearing in water.
Why?

C) _____ If two liquids are put together and create heat?
D) _____ Baking soda (a solid) and vinegar (a liquid) mix to create a gas.
E) _____ Cutting up something

Preparing for the final exam, whether with your book (or the Internet or something…) answer the following:
(And you had better do this part yourself…)

15) A) How is a black hole created?

B) Why is it called a black hole?

16) What is terminal velocity?

17) Which will have a greater terminal velocity a feather or a hammer?

18) What is escape velocity?

19) What is the escape velocity of the earth?