A-Day: Due Mon., Nov 27
B-Day: Due Tues., Nov 28

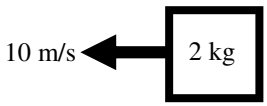
2009 Momentum 1

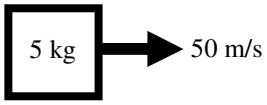
1) ***Write the above on your variable and equation charts.***

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** (*which one is the biggest, 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*).

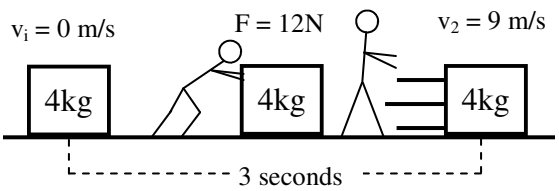
9) A 10 kg object is 5 m/s moving to the left while a 3 kg object is going 4 m/s to the right. *(Remember that left is negative.)*
A) Find the momentum of the 10 kg object (we'll call this momentum 1 or "p_1"):

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}.

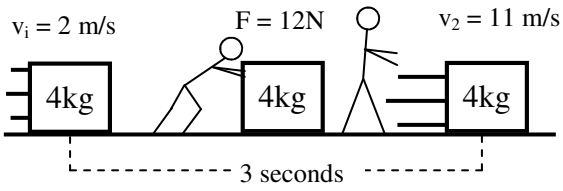
11) A 3 kg object going 6 m/s to the right ends up going 3 m/s to the left. Being careful of negatives and positives, find the change of momentum of the object. (*Remember that Δ = final – initial.)*



p_{before} = I = p_{after} =

12) Slim Jim pushes on a 4 kg box for 3 seconds.
A. Under the diagram, calculate the momentum before and after and the impulse Jim gave to the box.

B. What does the impulse equal?

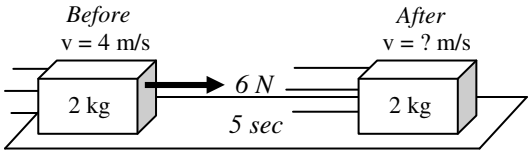


p_{before} = I = p_{after} =

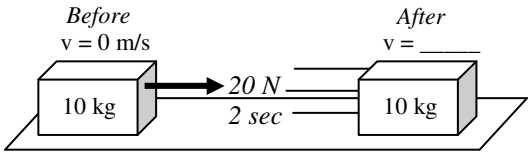
13) This time Slim Jim pushes on an object that was already moving.
A. Under the diagram, calculate the momentum before and after and the impulse Jim gave to the box.

B. What does the impulse equal?

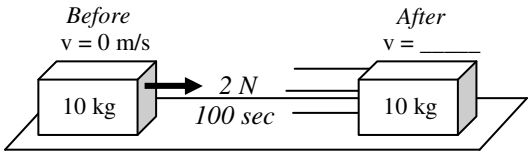
***Lecture time**: In the last chapter Work caused a change of energy because the units for work are the same as for energy: joules. It turns out that Ft (force times time) has the same units as momentum. Therefore: an impulse causes a change of momentum. So, this is our equation: $\Sigma p_{before} \pm I = \Sigma p_{before}$. Again, this is the same as in energy, where: $\Sigma E_{before} \pm W = \Sigma E_{before}$.*



14) A 2kg object at moving 4m/s. A 6N force pushes for 5 sec.
Using the same method as above, calculate the final speed of the object.



p_{before} = I = p_{after} =



p_{before} = I = p_{after} =

15) Two identical 10 kg objects begin at rest, as shown above.
A. On the diagram, calculate and label the initial momentums and impulses for each object.
B. Calculate the final momentum of each.
C. Calculate the final velocity of each object.
D. Which force gave the bigger impulse?
E. Which object (left or right) had the bigger final velocity?

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

17) Force A is 75N. Force B is 3N. Which one gives the bigger impulse?