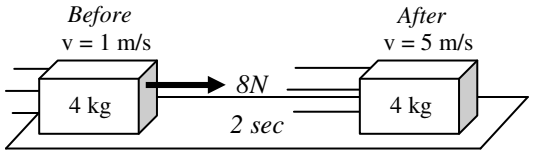
A-Day: Due Mon., Dec 8 (Assigned: 12/4)
B-Day: Due Tues., Dec 9 (Assigned: 12/5)

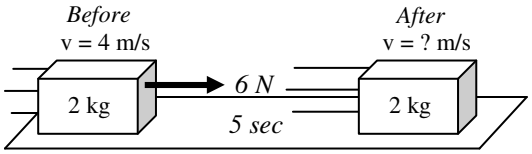
2008 Momentum 1



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

1. 4 kg object moving 1 m/s is pulled by 4 N for 2 sec. Afterwards it is moving 5 m/s. On the diagram above calculate and label the momentums and the impulse.

   Notice that the momentum the object gained came from the impulse. Impulse always equals the change of momentum!

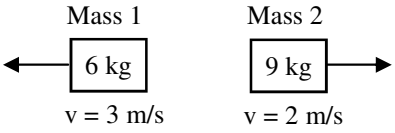


p_{before} = I = p_{after} =

2. A 2 kg object is initially moving 4 m/s. A 6 N object acts on it for 5 seconds.
   A. Calculate the initial momentum and the impulse.

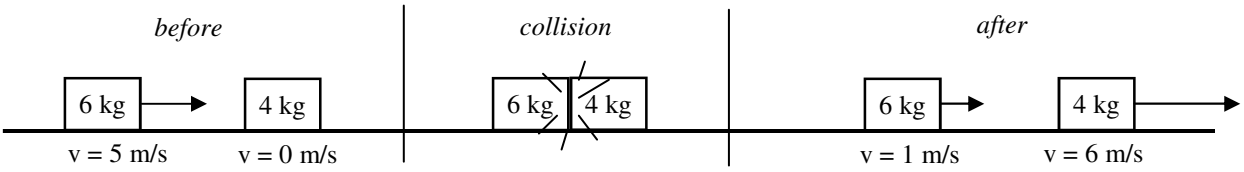
   B. How much momentum does it have afterwards?

   C. Calculate its final velocity.



3. A. Calculate momentum for both objects at the left.

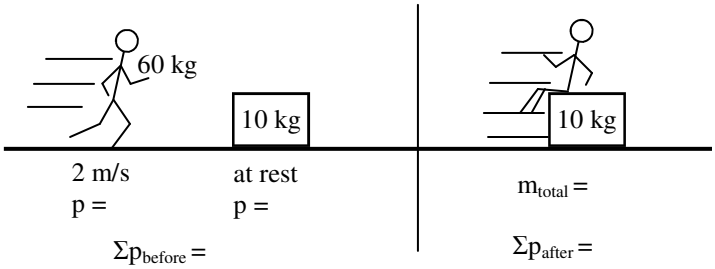
   B. Calculate the net momentum for the objects.



Σp_{before} = Σp_{after} =

4. The diagram above shows two objects before and after they collide.
   A. On the diagram above calculate and label the net momentum before and after.

   B. How does the net momentum before compare with the net momentum after?
   (*This is ALWAYS the case when object collide: momentum is conserved:* $\Sigma p_{before} = \Sigma p_{after}$.)



Σp_{before} = Σp_{after} =

5. Slim Jim is running 2 m/s towards a box that is at rest. Jim then jumps onto the box and the two slide together
   A. On the diagram, calculate the net momentum before.

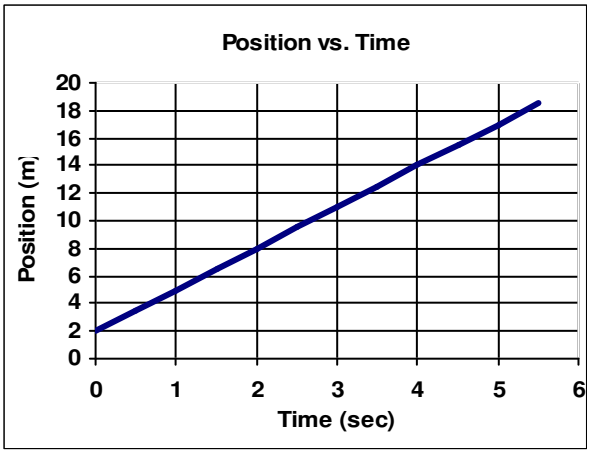
   B. What is the total mass of Jim and the box afterwards?

   C. Since momentum is always conserved, how much net momentum is there afterwards?

   D. Calculate the final velocity of Jim and the box.

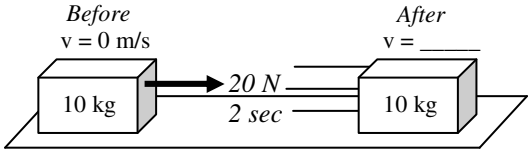
6. The graph at the right shows an the motion of a 6 kg object.
   A. Calculate the speed of the object from the graph.

   B. Calculate the momentum of the object.

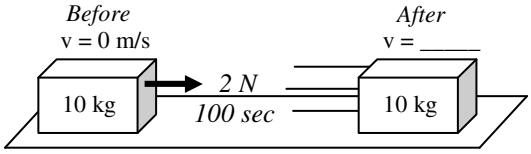


7. Give two ways that two objects could have a net momentum of zero.

8. Impulse causes a _____ of _____.



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



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

9. 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?

10. Which gives a bigger impulse: a 100 N force or a 2 N force?