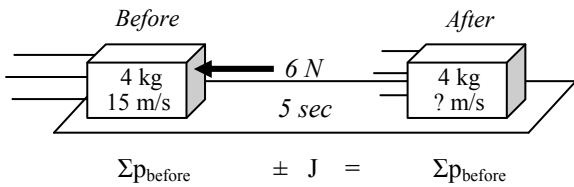


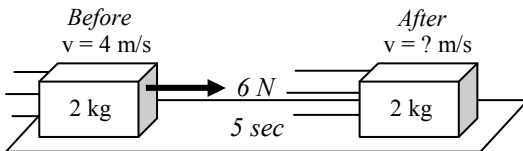
PreAP Momentum 2

With some of Energy 11

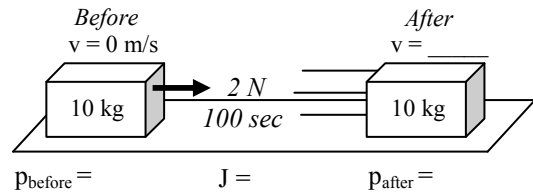
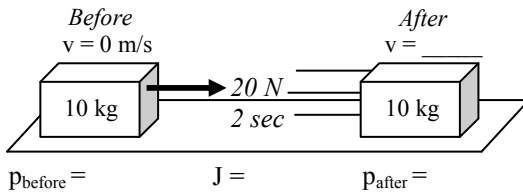


So, this is our equation: $\Sigma p_{\text{before}} \pm J = \Sigma p_{\text{after}}$. Again, this is like energy, where: $\Sigma E_{\text{before}} \pm W = \Sigma E_{\text{after}}$.

- 1) A 4 kg object is moving 15 m/s. A force is applied to the left.
 - A. Is the impulse positive or negative?
 - B. Will the object gain or lose momentum?
 - C. * Fill in the information under the diagram and solve for the final velocity.



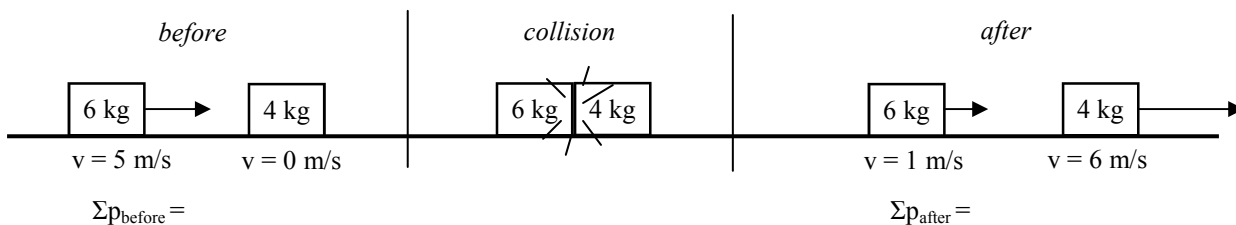
- 2) A 2kg object at moving 4m/s. A 6N force pushes for 5 sec. Using the same method as above, calculate the final speed of the object.



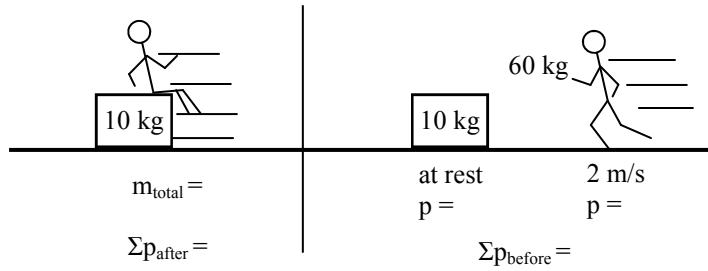
- 3) Two identical 10 kg objects begin at rest, as shown above.
 - A. On the diagram, calculate and label the initial momentums and impulses for each object.
 - B. * Calculate the final momentum of each.
 - C. Calculate the final velocity of each object.
 - D. Which force gave the bigger impulse?
 -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

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

5) Consider two other forces. Force A is 75N. Force B is 3N. Which one gives the bigger impulse?

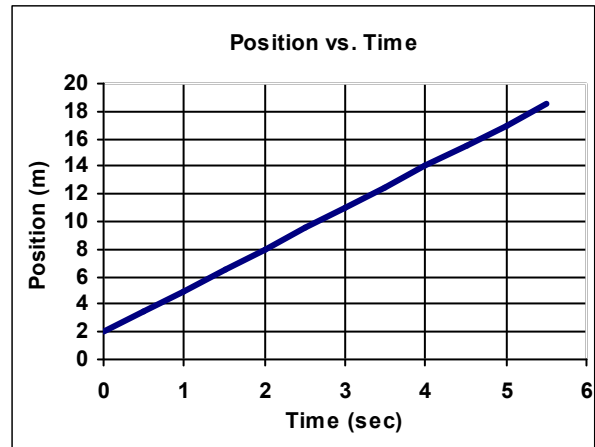


- 6) The diagram above shows two objects before and after they collide.
 - A. On the diagram above calculate and label the net momentum before and after.
 - B. How does the net momentum before compare with the net momentum after?
 (This is ALWAYS the case when objects collide: momentum is conserved: $\Sigma p_{\text{before}} = \Sigma p_{\text{after}}$. And a collision is also when two objects hit and connect. Momentum is also conserved when objects split apart.)

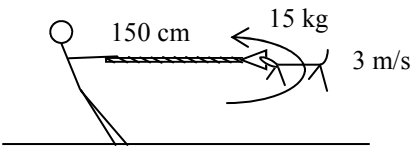


- 7) Slim Jim is running 2 m/s towards a box that is at rest. Jim then jumps onto the box and the two slide together
- On the diagram, calculate the net momentum before.
 - What is the total mass of Jim and the box afterwards?
 - Since momentum is always conserved, how much net momentum must there be afterwards?
 - * Calculate the final velocity of Jim and the box.

- 8) The graph at the right shows the motion of a 6 kg object.
- * Calculate the speed of the object from the graph.
 - Calculate the momentum of the object.



From: "2011 PreAP Energy 11":



- 9) A tetherball is held by a rope and goes around in a circular path. Assume the rope is parallel to the ground.
- * Calculate the centripetal acceleration of Bim (the dog).
 - What force provides this acceleration?
 - * Calculate the centripetal force.
 - What is the angle between the force and Bim's velocity?
 - * Calculate the work the rope does in one half of a circle.

- 10) A 30 N object is lifted 5 m in 2 seconds.
- * How much potential energy was gained?
 - How much work was done to lift the object?
 - How much power was used to lift the object?

Q1C: 7.5 m/s Q3B: 40 kgm/s Q7D: -1.7 m/s
 9E: none. $W = Fd\cos\theta$, $\theta = 90^\circ$ and $\cos 90^\circ = 0$. 10A) 150 J

Q8A: find the slope 9A: 6 m/s² 9C: 90 N