Name: _____ Date:_____

Mr. Croom's Physics Chapter 6: Momentum

Inelastic Collisions

Solve the following problems

1. A train car of mass 5000 kg is moving along a track at 45 m/s. It collides with another train car of mass 3500 kg that is moving along the track in the same direction at 12 m/s. What is the velocity of the stuck-together cars after the collision.

2. (Serway, p. 214, #1)A 1500 kg car traveling at 15.0 m/s to the south collides with a 4500 kg truck that is initially at rest at a stoplight. The car and truck stick together and move together after the collision. What is the final velocity of the two-vehicle mass?

3. (Serway, p. 214, #2)A grocery shopper tosses a 9.0 kg bag of rice into a stationary 18.0 kg grocery cart. The bag hits the cart with a horizontal speed of 5.5 m/s toward the front of the cart. What is the final speed of the cart and bag?

4. (Serway, p. 214, #3)A 1.50 × 104 kg railroad car moving at 7.00 m/s to the north collides with and sticks to another railroad car of the same mass that is moving in the same direction at 1.50 m/s. What is the velocity of the joined cars after the collision?

5. (Serway, p. 214, #4)A dry cleaner throws a 22 kg bag of laundry onto a stationary 9.0 kg cart. The cart and laundry bag begin moving at 3.0 m/s to the right. Find the velocity of the laundry bag before the collision.

6. (Serway, p. 214, #5)A 47.4 kg student runs down the sidewalk and jumps with a horizontal speed of 4.20 m/s onto a stationary skateboard. The student and skateboard move down the sidewalk with a speed of 3.95 m/s. Find the following: a. the mass of the skateboard b. how fast the student would have to jump to have a final speed of 5.00 m/s

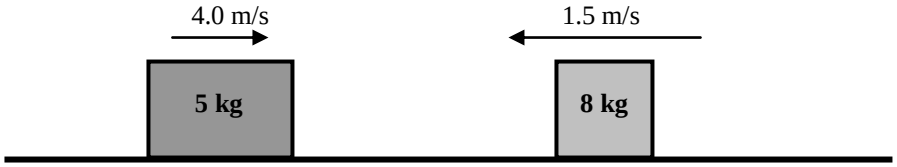
7. A 16-g mass is moving in the + x-direction at 30 cm/s while a 4-g mass is moving in the – x-direction at 50 cm/s. They collide head-on and stick together. Find their velocity after the collision.

8. Two masses are traveling to the left. Mass #1 is traveling at 5 m/s and has a mass of 4 kg. Mass #2 is traveling towards it at 13 m/s and has a mass of 6 kg. Calculate the final velocity of the combined mass if their collision is perfectly inelastic. Calculate the net loss in kinetic energy during the collision.

9. Calculate the velocity of each mass after the perfectly inelastic collision below. Find the initial and final Kinetic Energy in problem. How do they compare?

10. Calculate the velocity of the objects after they collide in the perfectly inelastic collision below. Find the initial and final Kinetic Energy in problem. How do they compare?

11. Calculate the velocity of the objects after they collide in a perfectly inelastic collision. (a) Calculate the total initial momentum of the above system. (b)Calculate the total final momentum of the above system. (c) Compare the initial momentum to the final momentum. If they are equal, explain why this is so. If they are different, explain the loss in momentum. (d) Calculate the total initial kinetic energy of the system in problem and the total final kinetic energy of the system. (e)If the kinetic energies are different, explain what happened to the lost energy. If they're the same, explain in terms of the energy of the system.



12. (Walker, p.268, # 27) A bullet with a mass of 4.0 g and a speed of 650 m/s is fired at a block of wood with a mass of 0.095 kg. The block rests on a frictionless surface, and is thin enough that the bullet passes completely through it. Immediately after the bullet exits the block, the speed of the block is 23 m/s. **(a)** What is the speed of the bullet when it exits the block? **(b)** Is the final kinetic energy of this system equal to, less than, or greater than the initial kinetic energy? Explain. **(c)** Verify your answer to part (b) by calculating the initial and final kinetic energies of the system.