Name: _____ Date:_____

Mr. Croom's Physics Chapter 6: Momentum

Inelastic Collisions 2

Solve the following problems

1. Marble A, with mass 5.0 g, moves at a speed of 20.0 cm/s. It collides with marble B, with mass 10.0 g, moving at 10.0 cm/s in the same direction. After the collision, marble A continues with a speed of 8.0 cm/s in the same direction. Sketch the situation, identify the system, define "before" and "after", and assign a coordinate axis. What is the speed of marble B after the collision? (Setup the problem from a momentum conservation point of view... in other words $p_{before} = p_{after}$.)

2. A 5.00-g bullet is fired with a velocity of 100.0 m/s toward a 10.0-kg stationary solid wooden block, resting on a frictionless surface. Calculate the change in momentum of the bullet if it is embedded in the block. Compute the change in momentum of the bullet if it ricochets (bounces) in the opposite direction with a speed of 99 m/s. In which case does the block end up with a greater speed?

3. A BMW with mass 1000 kg traveling at 30 m/s collides perfectly inelastically with a parked Porsche of mass 900 kg. What is the speed of combined cars after the collision?

4. A 120g hockey hockey puck, while moving at 35.0 m/s, strikes an octopus thrown on the ice by a fan. (What team's fans would do such a thing?!) The octopus has a mass of 0.265 kg. The puck and the octopus slide off together. Find their combined velocity (v_f).

5. A 95-kg fullback, running at 8.2 m/s, collides in midair with a 128-kg defensive tackle moving in the opposite direction. Both players end up with zero speed. Identify "before" and "after" and make a diagram of the situations. How fast was the tackle originally moving? (i.e. what was his initial velocity?)

6. (Walker, p. 268, # 29) A 0.430-kg block is attached to a horizontal spring that is at its equilibrium length, and whose force constant is 20.0 N/m. The block rests on a frictionless surface. A 0.0500-kg wad of steal ball is thrown horizontally at the block, hitting it with a speed of 2.30 m/s and then bouncing off and following it with a velocity of 2.0 m/s. How far does the block system compress the spring? If the ball were to attach itself in the block in the collision, what will the compression of the spring be?

7. (Walker, p. 270, #57) (perfect inelastic) A 1.30-kg block of wood sits at the edge of a table, 0.750 m above the floor. A 0.0100-kg bullet moving horizontally with a speed of 725 m/s embeds itself within the block. What horizontal distance does the block cover before hitting the ground?