Name: ____

Mr. Croom's Physics

Date:

Chapter 6: Momentum

Introduction to Momentum

Solve the following problems

- 1. A 5 kg ball is throw at 20m/s, how much momentum does it have?
- 2. If a 1200 kg car has a momentum of 36,000 N*s. What is the velocity of the car?
- 3. A person running at 4m/s has a momentum of 280 N*s, What is the person's mass?
- 4. Show mathematically why an 80 000 pound (36 000 kg) big rig traveling at 2 miles per hour (0.90 m/s) has the same momentum as a 4 000 pound (1 800 kg) SUV traveling at 40 miles per hour (18 m/s).

5. (Walker, p. 267, #1) What speed must a 0.142 kg baseball have if its momentum is to be equal in magnitude to that of a 1180 kg car mving at 13.4 m/s ?

6. (Walker, p. 267, #2) Find the total momentum of the birdds. Two 4.00 kg ducks heading south at 1.10m/s, and 9.00 kg goose heading north at 1.30 m/s.

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7. (Walker, p. 267, #3) A 20.0-kg dog is running northward at 2.50 m/s, while a 5.00-kg cat is running eastward at 3.00 m/s. Their 70.0-kg owner has the same momentum as the two pets taken together. Find the direction and magnitude of the owner's velocity.

8. (Walker, p. 267, #4) Two air track carts move toward one another on an air track. Cart 1 has a mass of 0.45 kg and a speed of 1.1 m/s. Cart 2 has a mass of 0.65 kg. (a) What speed must cart 2 have if the total momentum of the system is to be zero? (b) Since the momentum of the system is zero, does it follow that the kinetic energy of the system is also zero? (c) Verify your answer to part (b) by calculating the system's kinetic energy.

9. (Walker, p. 267, #5) A 0.150-kg baseball is dropped from rest. If the magnitude of the baseball's momentum is 0.780 kg•m/s just before it lands on the ground, from what height was it dropped?

10. (Walker, p. 267, #6) A 220-g ball falls vertically downward, hitting the floor with a speed of 2.5 m/s and rebounding upward with a speed of 2.0 m/s. Find the magnitude of the change in the ball's momentum.

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BONOUS QUESTION: (Walker, p. 267, #7) Object 1 has a mass m_1 and a velocity $\vec{\mathbf{v}}_1 = (2.80 \text{ m/s})\hat{\mathbf{x}}$. Object 2 has a mass m_2 and a velocity $\vec{\mathbf{v}}_2 = (3.10 \text{ m/s})\hat{\mathbf{y}}$. The total momentum of these two objects has a magnitude of 17.6 kg • m/s and points in a direction 66.5° above the positive *x* axis. Find m_1 and m_2 .