Momentum Problem Set 2

1. In 1987 , Marisa Canafoglia, of Italy, roller-skated at a record -setting speed of 40.3 km/h. If the magnitude of Canafoglia's momentum was 6.6 x 10^2 kg·m/s, what was her mass?

2. The record for the smallest dog in the world belongs to a terrier who had a mass of only 113g. Suppose this dog runs to the right with a speed of 2.00 m/s when it suddenly sees a mouse. The dog becomes scared and uses its paws to bring itself to rest in 0.8s. What is the force required to stop the dog? What is the dog's stopping distance?

3. In 1994, a pumpkin with a mass of 449kg was grown in Canada. Suppose you want to push a pumpkin with this mass along a frictionless horizontal surface. You give the pumpkin a good push, only to find yourself sliding back at a speed of 4m/s. How far will the pumpkin slide 3.0 s after the push? Assume your mass to be 60.0kg.

4. The heaviest wild lion ever measured had a mass of 313 kg. Suppose this lion is walking by a lake when it sees an empty boat floating at rest near the shore. The curios lion jumps into the boat with a speed of 6m/s, causing the boat and the lion in it to move away from the shore with a speed of 2.5 m/s. How much kinetic energy is dissipated in this inelastic collision?

5. (2D) A 1.5 kg ball moving East at 0.4 m/s collides with a stationary 0.5 kg ball. If after collision the 1.5 kg ball travels north at 0.15 m/s. What was the magnitude and the direction of the second ball after collision?

6. (2D) Suppose a freshman of mass 50 kg is running east around the corner of the hallway at 3 m/s while a senior of mass 80 kg is walking south at the same corner at 1 m/s. If they stick together for a few moments after they collide, what is the magnitude and direction of their velocity?

8. (2D) A small stick of dynamite is used to explode a 100 kg block of concrete. The block splits into three major fragments such that one 30 kg piece goes directly south at 40 m/s and another 30 kg piece goes west at 35 m/s, then what is the magnitude and direction of the third piece's velocity?