**Problems: Momentum /Collisions**

1. An 1800 kg luxury sedan stopped at a traffic light is struck from the rear by a compact car with a mass of 900 kg. The two cars become entangled as a result of the collision. If the compact car were moving at a velocity of +20 m/s before this collision, what is the velocity of entangled mass after the collision?
2. A 85 kg students stands in the middle of a frozen pond of a radius 5 m. He is unable to get to the other side because of a lack of friction. To overcome this difficulty, he throws his 1.2 kg physics book horizontally toward the north at a speed of 5 m/s.
3. With what speed does the student move now?
4. How long will it take to reach the south shore?
5. A 7 kg bowling ball collides head on with 2 kg bowling pins that were originally at rest. The pin flies forward with a speed of 3 m/s. If the ball continues forward with a speed of 1.8 m/s, what was the initial speed of the ball?
6. A 0.2 kg plastic ball moves with a velocity of 0.3 m/s. It collides with a second plastic ball of mass 0.1 kg, moving along the same line at a velocity of 0.1 m/s. After the collision, the velocity of the 0.1 kg ball is 0.26 m/s. What is the new velocity of the first ball?
7. The 0.1 kg plastic ball travels at 0.2 m/s east and strikes a 0.2 kg ball which is initially at rest. After the collision, the 0.2 kg ball moves at 0.15 m/s.
8. Determine the velocity of the 0.1 kg ball.
9. What does your negative answer indicate?
10. A 0.015 kg bullet is shot into a 5.085 kg wooden block standing on a frictionless surface. The block with the bullet in it acquires a velocity of 1 m/s. Calculate the velocity of the bullet before striking the block.