Momentum Problems 2
Physical Science and Technology

Use the five steps for each of these problems except where indicated.

1. A 500kg object moving at 8 m/s strikes a 200 kg object (which is standing still) and
    stops. As a result of the collision, the 200 kg object starts moving.
    a. What is the 500 kg object's momentum before the collision?
    b. What is the 200 kg object's momentum after the collision (you do not need
        to use the five steps for this!)?
    c. What is the 200 kg object's velocity after the collision?

2. Mr. Kirsch is swinging on a rope. He has a mass of 86 kg. At the very bottom of his
    swing he hits Mr. Bregar, who is standing still. Mr. Kirsch comes to a complete stop
    and Mr. Bregar goes flying as a result of the collision. At the moment of the
    collision, Mr. Kirsch's velocity was 11.92 m/s. Mr. Bregar's mass is 61 kg.
    a. What is Mr. Kirsch's momentum before the collision?
    b. What is Mr. Bregar's momentum after the collision (you do not need to use
        the five steps for this!)?
    c. What is Mr. Bregar's velocity after the collision?

3. Brittney Spears is driving an automobile at 15.8 m/s. She sees a cute bunny rabbit
    standing still on the road and adeptly swerves so that she hits it straight on. The total
    momentum of Brittney and her automobile is 1,700 kg m/s. After the collision,
    Brittney's automobile comes to a complete stop. As a result of the collision, the
    rabbit takes a brief trip at 98.7 m/s (the rabbit lands on its feet, uninjured).
    a. What is the rabbit's momentum after the collision (you do not need to use
        the five steps for this!)?
    b. What is the mass of the rabbit?

4. In problem #3 above, what is the combined mass of Brittney and her automobile?

5. Mr. Bregar is barreling down a football field at 2.4 m/s. He has a mass of 87 kg.
    Justin Bieber, with a mass of 52.9 kg, is running straight towards him. How fast will
    Justin have to run in order to bring Mr. Bregar to a complete stop when they collide?
    (Hint - to get him to stop, Justin will have to have the exact same momentum as Mr.
    Bregar).