Directions: SHOW ALL OF YOUR WORK !!   LABEL ALL UNITS!

1. A rifle with a mass of 5.0 kg fires a bullet with a mass of 150 grams at a velocity of 700 m/s.
    Determine the recoil velocity of the rifle.   5 pts.

2.   A glass ball with a mass of 5.0 grams moves with a velocity of 20 cm/s. This ball collides with a
    second glass ball with a mass of 10 grams, which is moving along the same line and direction with a
    velocity of 10 cm/s. After the collision, the 5.0 gram mass is still moving along the same line, but
    with a velocity of 8.0 cm/s.   What is the velocity of the 10 gram mass? 5 pts.

3.   A car weighing 14,680 N and moving at 25 m/s horizontally is acted upon by a 640 N force until it is
    brought to a halt. Determine the car's momentum (before braking force is applied) and the time
    required by the braking force.   5 pts.

4. A 10,000 kg railroad car traveling at a speed of 20 m/s strikes an identical railcar at rest. If the cars lock together as a result of the collision. What is their common speed afterwards? 5 pts.

Bonus: A 44 gram bullet strikes a 1.54 kg block of wood placed on a horizontal surface just in front of the gun. If the coefficient of kinetic friction between the block and the surface is 0.28, and the impact drives the block a distance of 18.0 meters before it comes to rest. What was the muzzle speed of the bullet? 3 pts.