1. A 2000-kg car traveling at 20 m/s collides with a 1000-kg car at rest at a stop sign. If the 2000-kg car has a velocity of 6.67 m/s after the collision, find the velocity of the 1000-kg after the collision.

2. An astronaut is floating in space near her shuttle when she realizes that the cord that is supposed to attach her to the ship has become disconnected. Her total mass is 91 kg. She reaches into her pocket, finds a 1-kg metal tool, and throws it out into space with a velocity of 9 m/s directly away from the ship. If the ship is 10 m away, what is her velocity after throwing the tool and how long will it take her to reach the ship?

3. On a snow covered road, a car with a mass of 1100 kg collides head-on with a van having a mass of 2500 kg traveling 8 m/s. As a result of the collision, the vehicles lock together and immediately come to rest. Calculate the speed of the car immediately before the collision. (Assume friction is negligible.)

4. A 4-kg rifle fires a 20-g bullet with a velocity of 300 m/s. Find the recoil velocity of the rifle. (Recoil velocity is the velocity that the rifle moves backward after shooting the bullet.)

5. Cart A of mass 0.5 kg, moves to the right at a speed of 60 cm/s. Cart B, of mass 1.0 kg, is at rest. The carts collide and stick together. What is the final velocity of the two-cart system?

6. Two balls roll toward each other. The red ball has a mass of 0.5 kg and a speed of 4 m/s just before impact. The green ball has a mass of 0.3 kg and a speed of 2 m/s. If the collision is completely inelastic, determine the velocity of the composite object after the collision.