Name: _____

Date: _____

Section C D F

The Masters School DOBBS
Mr. Alex Rawson
Physics

Momentum IV

1. A 670 N student stands in the middle of a frozen pond having a radius of 10.0 m. He cannot move because of a lack of friction between his shoes and the ice. To overcome this difficulty, he throws his 3.0 kg backpack away from him at a speed of 9.0 m/s. Assuming friction is negligible, and he slides with a constant velocity, how long does it take him to slide to shore? *(Hint: This is similar to the astronaut problem. Your answer should be between 22 – 28 seconds.)*

2. A 9.0 g coin moving to the right at 26.0 cm/s makes an elastic head-on collision with a 14.0 g coin that is initially at rest. After the collision, the 9.0 g coin moves to the left at 12.5 cm/s.
    a. Find the final velocity of the other coin. *(Your answer should be between 23 – 25 cm/s)*

    b. Find the amount of kinetic energy transferred to the 14.0 g coin. *(Hint: This is an elastic collision, so kinetic energy is conserved. Your answer should be between 3.0 – 4.5 x 10^{-4} Joules)*

3. A moving object has a kinetic energy of 140 J and a momentum with a magnitude of 33.0 kg·m/s. Determine the mass and speed of the object. *(Your mass should be between 3 – 4 kg, and your speed should be between 8 – 10 m/s.)*

4. A 99 kg fullback moving east with a speed of 8.2 m/s is tackled by a 104 kg opponent running west at 3.6 m/s, and the collision is perfectly inelastic.
    a. Calculate the velocity of the players just after the tackle. *(Your answer should be between 2 and 3 m/s)*

    b. Calculate the decrease in kinetic energy during the collision. *(Your answer should be between 3,500 and 4,000 Joules)*