Physics 2 Unit 5 – Momentum Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

IB 2.4 Collisions Worksheet **In text, do p110 #80, 82, 83**

1. A 1250 kg car is stopped at a traffic light. A 3550 kg truck moving at 8.33 m/s hits the car from behind. If bumpers lock, how fast will the two vehicles move?
2. The muzzle velocity of a 50.0 g shell leaving a 3.00 kg rifle is 400. m/s. What is the recoil velocity of the rifle?
3. Imagine that you are hovering next to a space shuttle and your buddy of equal mass who is moving a 1.50 m/s with respect to the ship bumps into you. If he holds onto you, how fast do you both move with respect to the ship?
4. Joe and his brother Bo have a combined mass of 200.0 kg and are zooming along in a 100.0 kg amusement park bumper car at 10.0 m/s. They bump into Melinda's car, which is sitting still. Melinda has a mass of 25.0 kg. After the collision, the twins continue ahead with a speed of 4.12 m/s. How fast is Melinda's car bumped across the floor?
5. If an 800. kg sports car slows to 13.0 m/s to check out an accident scene and the 1200. kg pick-up truck behind him continues traveling at 25.0 m/s, with what velocity will the two move if they lock bumpers after a rear-end collision?
6. A railroad diesel engine weighs 4 times as much as a flatcar. If the engine coasts at 5 km/h into a flatcar that is initially at rest, how fast do the two coast after they couple together?
7. A cart with mass 0.340 kg moving on a frictionless linear air track at 1.2 m/s strikes a second cart of unknown mass at rest.  The collision between the two carts is elastic.  After the collision, the first cart continues in its original direction at 0.66 m/s.
8. What is the mass of the second cart?  b) What is the velocity of the second cart after impact?
9. An 82-kg male and a 48-kg female pair figure skating team are gliding across the ice at 7.4 m/s, preparing for a throw jump maneuver. The male skater tosses the female skater forward with a speed of 8.6 m/s. Determine the speed of the male skater immediately after the throw.
10. A 900-kg car traveling east at 15 m/s collides with a 750-kg car traveling north at 20 m/s. The cars stick together. With what velocity does the wreckage move just after the collision?
11. A common pool shot involves hitting a ball into a pocket from an angle. Shown below, the cue ball hits a stationary ball at an angle of 45 o , such that it goes into the corner pocket with a speed of 2 m/s. Both balls have a mass of .5 kg, and the cue ball is traveling at 4 m/s before the collision. Knowing that this collision is elastic, calculate the angle with which the cue is deflected by the collision.

