In Class Review — Momentum

1. Cart A is 100 kg and going 20 m/s. It stops in 10 seconds.
   A. Find the change of momentum of the car.

   B. What amount of impulse caused the car to stop?

   C. Find the force of Cart A's brakes.

2. Cart B is also 100 kg and going 20 m/s. If stops in 2 seconds.
   A. Find the change of momentum of the car.

   B What amount of impulse caused the car to stop?

   C. Find the force of Cart B's brakes.

3. Which of the above carts had a bigger Δp?
   Which of the above carts felt a larger impulse?
   Which of the above carts had a bigger stop time?
   Which of the above carts needed a larger force to stop?

   SOOOOOO—to give the same Δp you have choices:

4. Why does an egg dropped on a pillow survive and an egg dropped on a countertop crack? (Use your new found knowledge from #1-3 above to answer.)

5. Does a large force always cause a large change of momentum?

6. Does a small force always cause a small change of momentum?

7. Elastic, Inelastic, Perfectly Inelastic Collisions (could be more than one):

   _____ $\Sigma p_{before} = \Sigma p_{after}$, $\Sigma E_{kbefore} \neq \Sigma E_{kafter}$
   _____ $\Sigma p_{before} = \Sigma p_{after}$, $\Sigma E_{kbefore} = \Sigma E_{kafter}$
   _____ $\Sigma p_{before} = \Sigma p_{after}$, and $m_{after} = m_{1+2}$

   _____ There is little or no sound.
   _____ There is a lot of noise.
   _____ The objects are mangled, or crushed.

8. A 50 kg ice skater on frictionless ice throws a 0.25 kg ball to the right. If the ball ends up going 8 m/s to the right:
   A. Which way will the ice skater go?
   B. Will the ice skater be going faster or slower than the ball?
   C. Which will have more momentum afterwards: the ice skate or the ball?
   D. Find the velocity of the skater afterward: (VEO!)

9. There is field full of insects.
   A. How could their net momentum (Σp) be zero?
   B. How could their net kinetic energy be zero?
   C. What is true if both Ek and Σp are zero?

10. A 20 kg object is moving forward (up) at 6 m/s. It explodes into two pieces: one piece is 15 kg and is moving at 25 m/s to the left. Find the mass and velocity of the piece going to the right.

11. A 25 kg bumper car moving at 5 m/s to the right overtakes and collides with a 35 kg bumper car also moving to the right. If afterward the collision, the 25 kg car is going 1.5 m/s (still to the right) and the 35 kg bumper car is moving at 4.5 m/s to the right:
    A. Find the initial velocity of the 35 kg car.

    B. Determine if the collision was elastic or inelastic.

12. A 2005 kg rocket (including fuel) originally going 20 m/s shoots out 5 kg of fuel going 200 m/s. Find the final velocity of the rocket. (Note how much fuel is gone from the rocket. (VEO!).