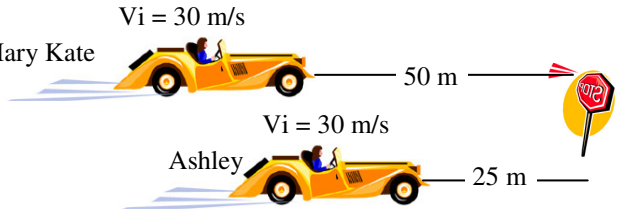
A-Day: Due Tues., Dec 5 (Assigned: 12/1)
B-Day: Due Wed., Dec 6 (Assigned: 12/4)

Momentum 4



1) The Olsen Twins are driving identical 1,000 kg cars (it's a twins thang).
   A) What is each car's $p_{initial}$?

   B) How do their initial momentum's compare?

   C) When they stop, what is their final momentum?
   D) What is Δp for the cars?

   Mary Kate, being a bit more cautious than her sister, starts her deceleration at a greater distance (see picture).
   E) Whose car's brakes applied the greater force?
   F) Whose car stopped in less time?
   G) Whose car experienced the greatest impulse?
   H) Since you know initial and final velocities and stopping distance, find the time it took for each car to stop.

   I) Now that you have the time, find the force that each car's brakes had to apply to stop in the time you found.

   J) If we were using conservation of energy, what would be the equation we would have used to find the force? *(Again, think about what kind of energy there is before, after, etc).*

2) From the lab:
   A) To show an elastic collision, which sides of the carts did you use?
   B) To show a perfectly inelastic collision, which sides of the carts did you use?
   C) If a heavy object moving to the right collides and sticks (elastically or perfectly inelastically?) to a lighter object, will the two keep moving or stop?
   D) If two equal masses moving at equal speed collide and stick, what will happen?
   E) Why?

3) So, using what you've learned from the lab, are the following elastic, inelastic, or perfectly inelastic? (or some combo)
   A) ____A football player catches a ball.
   B) ____Pool balls colliding.
   C) ____A superball bouncing off the ground.
   D) ____Two cars collide, do not stick, and the cars are badly damaged.
   E) ____If there is a lot of sound during a collision.

4) A 12 kg object going 4 m/s to the right collides and sticks to a 6 kg object going 2 m/s. How fast are they going afterwards?
   A) Draw the situation both before and after the collision.

   B) Solve for the final velocity.

   C) How does the total initial momentum and total final momentum compare?
   D) How much kinetic energy did the 12 kg object have before?

5) Does gravity increase or decrease with distance?
6) Does gravity increase or decrease with mass?
7) If you double the distance, how much does the gravity change?
8) If you triple the mass, how much does the gravity change?
9) What is G in the gravity equation?

10) What is g (little g)?

11) If you were on a more massive planet (like Jupiter)
    A) How would G change?
    B) How would g change?
    C) Would you have more or less weight?
    D) Would you have more or less mass?
    E) Would objects fall faster or slower?
    F) How heavy is a 20 kg object on Jupiter ($m_{Jupiter} = 1.9 \times 10^{27}$; $r_{Jupiter} = 7.15 \times 10^{7}$ m)?

    G) How heavy is a 20 kg object on Earth?

12) What is centripetal force?

13) What gives the centripetal force for the following (be sure to use words like friction, tension, or normal force when appropriate)?
    A) A rock being spun around by a string?
    B) Keeps the moon moving around the earth?
    C) Allows your car to go around a corner?
    D) Allows a motorcycle to drive around the inside of a cage.

Hate to have to do this, but finals are coming all too soon….
Whether with your book (or the Internet or something…) answer the following:

14) About black holes:
    A) How is a black hole created?

    B) Why is it called a black hole?

15) What is terminal velocity?

16) Which will have a greater terminal velocity a feather or a hammer?