AP Physics Lab Handout 13 "Conservation of Momentum in Explosions"

Your Name:_____ Lab Partner(s):_____

Purpose: To demonstrate conservation of momentum for two carts pushing away from each other.

Materials:	2 dynamics carts	balance
linear motion track	three 100 g masses	meter stick

Procedure:

1. Set up the linear motion track and make sure that it is well clamped to the lab table. Try to place the track end bumpers so that their interior sides are in line with 1.0 cm and 226.0 cm.
2. Check to see that the track is level. Adjust the leveling feet if necessary.
3. Find the mass of both carts and record in your data table.
4. Push the plungers of both carts completely in and slightly upward so they are latched into position.
5. Place both carts in the center of the track with the plunger sides in the same direction (not toward each other). Trigger the plunger that is in between the two carts by lightly hitting it with a meter stick.
6. Experiment so that you determine at what exact spot on the track the two carts need to start such that they both reach their respective ends of the track at the same time. Do a few trials so you are confident you have determined the exact spot.
7. Measure and record the displacement of each cart to the nearest 0.1 cm. This starts at the point of the explosion and ends where the track bumper is placed. These two numbers should add to 225.0 cm.
8. Repeat steps 4 – 7 for three additional cases:
   CASE 2: Place 100 g in cart 1
   CASE 3: Place 200 g in cart 1
   CASE 4: Place 200 g in cart 1 and 100 g in cart 2
9. Calculate the ratio of the displacements (d_1/d_2) and record in the data table.
10. Calculate the ratio of the masses (m_2/m_1) and record in the data table. (Note: for displacement you should divide cart one by cart two but for masses you should divide cart two by cart one)

Results:

Observations:

Data:

Mass of Cart 1	Mass of Cart 2	Position of Explosion	d_1	d_2	d_1/d_2	m_2/m_1

Diagram:

Error Analysis:

Conclusion:

Using complete sentences, address these four questions in your first paragraph of your conclusion.

1. Does the ratio of the displacements equal the ratio of the masses in each case? In other words, is momentum conserved?
2. When carts of unequal masses push away from each other, which cart has more momentum?
3. When the carts of unequal masses push away from each other, which cart experiences a greater force?
4. When the carts of unequal masses push away from each other, which cart experiences the greatest change in velocity?