Prelab: Experiment #5 – Collisions ***Fixed 11 March 2004***

Read the lab and find the equations necessary to answer the following questions. Neatly derive the uncertainty formulas for those equations. There are a lot of calculations to be done for this lab. You should prepare a spreadsheet to help you do the calculations in the lab with your experimental data.

1. A small glider has a mass of 200 ± 1 g. The flag on the glider has a width of 4.70 ± 0.10 cm. The glider moves to the right through a photogate in 0.170 s ± 1.5%. What is the momentum and kinetic energy of the small glider in SI units?
   (0.0553 ± 0.0023, 0.00764 ± 0.00059)

2. After the collision the small glider moves backward (to the left) through the photogate in 0.342 s ± 1.5%. What is the momentum and kinetic energy of the small glider in SI units?
   (-0.0275 ± 0.0011, 0.00189 ± 0.00015)

3. After the collision the large glider moves to the right through the photogate in 0.290 s ± 1.5%. The mass of the large glider is 407 ± 1 g. The flag on the large glider is 4.85 ± 0.03 cm. What is the momentum and kinetic energy of the large glider in SI units?
   (0.0681 ± 0.0016, 0.00569 ± 0.00026)

4. What is the total momentum and kinetic energy of the system, the small and large gliders, after the collision?
   (0.0406 ± 0.0027, 0.0076 ± 0.0040)

The experiment is now redone with the large glider hitting and sticking to the small glider.

5. Before the collision the large glider moves to the right through the photogate in 0.250 s ± 1.5%. The flag on the large glider is 4.85 ± 0.03 cm. What is the momentum and kinetic energy of the large glider in SI units?
   (0.0790 ± 0.0019, 0.00766 ± 0.00034)

6. After the collision the large glider and the small glider move to the right together through the photogate in 0.411 s ± 1.5%. What is the total momentum and kinetic energy of the gliders in SI units?
   (0.07163 ± 0.00175, 0.00423 ± 0.00019)

Note, you will not be allowed into the lab until you show that you have done the pre-lab and have properly prepared the introductory portion (Title, Goal, Theory Summary, and Uncertainty Derivations) of the lab in your notebook.

No extra lab time will be allowed for the time you miss because you are unprepared.