AP Physics 1 Name(s):

**PhET 2D Collision Lab**

**Purpose:** To investigate the conservation of momentum and kinetic energy in two-dimensional collisions using a simulation.

**Hypothesis:** *Write a hypothesis statement that addresses* ***how*** *you will determine whether or not momentum and kinetic energy are conserved in a two-dimensional collision.*

**Materials:** computer protractor calculator

**Procedure:**

1. Type your answers directly into this lab, including any necessary screenshots from the simulation, then submit your completed lab to the online dropbox.
2. Open the PhET Collision simulation at <http://phet.colorado.edu/sims/collision-lab/collision-lab_en.html> and click on the Advanced tab.
3. In the simulation menu, select 2 Dimensions, Velocity Vectors, Show Paths, and Show Values.
4. Use your curser to set up the first trial- an elastic collision (Elasticity 100%) between an object moving horizontally and an object at rest. Record the masses and the initial and final velocities (magnitude and direction- use a protractor to measure angles) in a data table. If you’re able, insert a screen shot of your completed collision simulation.
5. Set up two more elastic collision trials by varying the masses and/or initial velocities of the objects. Insert screen shots of your completed collision simulations.
6. Repeat steps 4 and 5 for an inelastic collision (Elasticity 0%), recording your data in another table.

**Data:** *Create your own data tables, one for the three elastic collisions and one for the three inelastic collisions.*

**Analysis:**

Using the data you gathered to calculate initial and final momenta, initial and final kinetic energies, and determine whether or not each was conserved for all of your trials (both elastic and inelastic). Summarize your calculations in two data tables and show at least one example of each type of calculation below the tables.

**Conclusion:** *Write a full conclusion paragraph that restates your hypothesis, explains whether each part is correct or incorrect, supports with actual results from your lab, identifies any sources of error, and suggests ways to improve the lab*