Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period: \_\_\_\_\_\_\_\_

**Chapter 5 – Momentum and Impulse**

**Lab – Collisions (25 pts)**

**Instructions:** Go to <https://phet.colorado.edu/en/simulation/legacy/collision-lab> and click the Play symbol. (Flash is required to run this simulation.)

Click on Advanced at the top of the screen. In the green box on the right side of the screen, select the following settings: 1 Dimension, Velocity Vectors ON, Momenta Diagram ON, Show Values ON. Uncheck the box that says Reflecting Border.

Look at the red and green balls on the screen and the vectors that represent their velocity. In the Momentum Diagram in the lower right corner of your screen, you will see a vector that represents the red ball’s momentum, a vector that represents the green ball’s momentum, and a vector that represents the total momentum of both the red and green ball together.

Your task is to set up three scenarios with initial velocities, masses, and elasticities of your choice. **Predict the outcome of the collision before clicking Play!** Your scenarios must include a sketch, a conceptual prediction of the outcome of the collision (use the patterns we developed in Lesson 1), data that describes the outcome of the collision, and a mathematical representation of the collision using the concept of momentum.

You will be graded on the completeness of your solutions, the creativity of your scenarios, and neatness. If your initial prediction for the outcome of the scenario is incorrect, leave it and then explain after your data and mathematical representation why the outcome is what it is and what may have been incorrect about your initial prediction.

Collision 1:

Sketch with initial velocities, masses, and elasticity:

Prediction:

Outcome:

Equation:

Evaluate:

Collision 2:

Sketch with initial velocities, masses, and elasticity:

Prediction:

Outcome:

Equation:

Evaluate:

Collision 3:

Sketch with initial velocities, masses, and elasticity:

Prediction:

Outcome:

Equation:

Evaluate: