Name_____ Date:_____ Period: _____ Score: _____/__

Collisions and Conservation of Momentum

From my website http://msbrownclass.weebly.com Go to "Physics," Motion and Forces, Assignments and Notes, PhET Momentum Simulator. Double click on the simulator to open it.

Or

Visit the website http://phet.colorado.edu/en/simulation/collision-lab

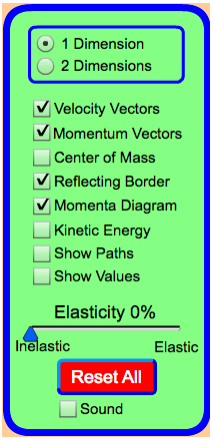
1. Select the tab on the top titled "Advanced"
2. In the green box on the right side of the screen, select the following settings: 1 dimension, velocity vectors ON. Before you push "Play" make a prediction:
   a. Which ball has the greater velocity? Why?

   b. Which has the greater momentum? Why?

3. Explain why the green ball has more momentum but less velocity than the red ball (HINT: what is the definition of momentum?).

4. Push "Play" to see how the balls collide, how the speed changes, and how the vectors change… After there are a few collisions, push the pause, play, back and restart buttons, to get a feel for what they do.

5. One at a time, turn on the other options in the green box on the right to see what each does.



6. In the green box on the right side of the screen, select the following settings: 1 dimension, velocity vectors ON, momentum vectors ON, reflecting borders ON, momenta diagram ON, elasticity 0%.

7. Push "play" and let the balls collide. After they collide and you see the vectors change, click "pause". Click "rewind" and watch the momenta box during the collision. Watch it more than once if needed by using "play", "rewind", and "pause". Zoom in on the vectors in the momenta box with the control on the right of the box to make it easier to see if necessary.
   a. What happens to the momentum of the red ball after the collision?

   b. What about the green ball?

   c. What about the total momentum of both the red and green ball?

8. Change the mass of the red ball to match that of the green ball.
   a. Which ball has greater momentum now?

   b. How has the total momentum changed?

   c. Predict what will happen to the motion of the balls after they collide.

Name_____ Date:_____ Period: _____ Score: _____/__

9. Watch the simulation, and then pause it once the vectors have changed.
    a. What happens to the momentum of the red ball after the collision?

    b. What about the green ball?

    c. What about the total momentum of both the red and green ball?

10. Now change the elasticity to 100%. Predict the motion of the balls after the collision.

11. Watch the simulation, and then pause it once the vectors have changed.
    a. What happens to the momentum of the red ball after the collision?

    b. What about the green ball?

    c. What about the total momentum of both the red and green ball?

12. Experiment a little by running additional simulations. Record the following data for at least 2 additional simulations (more simulations = extra learning):

Mass of Red Ball	Mass of Green Ball	% elasticity	Red and Green Momentum vectors before crash	Red and Green Momentum vectors after crash	Change in total momentum during simulation? (yes or no)