

Name \_\_\_\_\_ Per \_\_\_\_\_

## PhET Collisions and Conservation of Momentum

Visit the website <http://phet.colorado.edu/en/simulation/collision-lab> & complete the following:

- In the green box on the right side of the screen, select the following settings: velocity vectors ON, momentum vectors ON, momenta diagram ON, elasticity 0%. Look at the red and green balls on the screen and the vectors (arrows) that represent their motion.
  - Which ball has the greater velocity (green arrow)?
  - Which has the greater momentum (yellow arrow, also in box at lower right)?
- Push "play" and let the balls collide. After they collide and you see the vectors change, click "pause". Click "restart" and watch the momenta box during the collision. Watch it more than once if needed by using "play", "restart", 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.
  - What happens to the momentum of the red ball after the collision?
  - What about the green ball?
  - What about the total momentum of both the red and green ball?
- Change the mass of the red ball to match that of the green ball.
  - Which ball has greater momentum now?
  - How has the total momentum changed?
  - Predict what will happen to the motion of the balls after they collide.
- Watch the simulation, and then pause it once the vectors have changed.
  - What happens to the momentum of the red ball after the collision?
  - What about the green ball?
  - What about the total momentum of both the red and green ball?
- Now click on more data, under the mass. Change the velocity of the green ball to -1. Predict the motion of the balls after the collision.
- 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?

7. Experiment a little by running additional simulations. Record the following data for 6 additional simulations:

Mass of Red Ball	Mass of Green Ball	Velocity of Red Ball	Velocity of Green Ball	Red and Green Momentum vectors before crash →←	Red and Green Momentum vectors after crash	Change in total momentum? (yes or no)
1.5	1.5					
1.5	1.5					
1.5	1.5					
		1	-1			
		1	-1			
		1	-1			

8. Is there a pattern or relationship between Mass and momentum? If yes, what is it?
9. What is your evidence?
10. Is there a pattern or relationship between Velocity and momentum? If yes, what is it?
11. What is your evidence?
12. Is there a pattern to what changes total momentum? If yes, what is it?
13. What does this tell you about momentum?