PhET Collision Lab

Directions: Select the **Collisions Lab** link in the **Momentum and Impulse** section of the course website.

Part 1

Select the **Introduction** tab.
Select the options:

- **Velocity vectors**
- **Momentum vectors**
- **Momenta Diagram**
- **Show Values**

Scenario #1:
Elastic collision between balls of *equal mass*

- Make a hypothesis about initial and final momentums *before* playing with the sim.
- Make a data table for the following: mass, velocity and momentum of each ball before and after.
- What is the relationship between the initial and final *total* momentums?
- Describe the motion of the balls before and after the collision?

Scenario #2:
Elastic collision between balls of *unequal mass.*

- Make a hypothesis about initial and final momentums *before* playing with the sim.
- Make a data table for the following: mass, velocity and momentum of each ball before and after.
- What is the relationship between the initial and final *total* momentums?
- Describe the motion of the balls before and after the collision?

Part 2

Select the **Advanced** tab.
Select **2 Dimensions**.
Select the options:

- **Velocity vectors**
- **Momentum vectors**
- **Momenta Diagram**
- **Show Paths**
- **Show Values**

Scenario #1
Set the mass of ball 1 to be 0.5 kg and ball 2 to be 1.5 kg.
Press the **More Data** button.
Calculate the total momentum in both the x-direction and the y-direction by adding the Px values together and the Py values together.
Run the simulation.
After the collision, calculate the total momentum in both directions again.
What do you notice?

Scenario #2
Add a third ball and see if the total momentum in each direction is still conserved.

Summary: Describe the main ideas learned in this activity regarding initial and final total momentum collisions.