Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Period # \_\_\_\_\_\_

Momentum Lab

**Problem:** What happens to the momentum of objects after they collide?

**Directions:**

1. Click on the “**momentum lab**” link on Mr. Hewitt’s website.
2. In the green box at the top right click on “**velocity vectors**” to remove arrows.
3. Make sure the “*elasticity*” is at 100%
4. Change the mass of balls so they are the same.
5. In the yellow box below click on “**more data**”
6. Fill in the data table below with the information from the screen. (note the momentum you see now is the *Momentum before*)

**Data Table:** one moving ball

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Ball #* | *Mass*  *(in kg)* | *Position*  *(m)* | *Velocity*  *(m/s)* | *Momentum before*  *(kg m/s)* | *Momentum after*  *(kg m/s)* |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |

1. Predict what will happen to the momentum as one ball crashes into the other.

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1. Click the “**play**” button and allow the balls to collide.
2. Just after they collide click the “**pause**” button and record for *Momentum after* in the data in the data table above.
3. What was the total *momentum before* (add the momentum of ball 1 and ball 2)?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *kg m/s*

1. What was the total *momentum after* (add the momentum of ball 1 and ball 2)?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *kg m/s*

1. Describe what happened to the total momentum of the two balls before and after the collision.

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1. Click “**restart**” and set ball 2’s velocity to 1.00m/s
2. Click the “**momentum vector**” and with your mouse move the arrow on ball 2 so that it is facing ball 1 and has the same velocity. You can then click off the “**momentum vector**”
3. Fill in the data table below.

**Data table 2**: two balls moving

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| *Ball #* | *Mass*  *(in kg)* | *Position*  *(m)* | *Velocity*  *(m/s)* | *Momentum before*  *(kg m/s)* | *Momentum after*  *(kg m/sec)* |
| 1 |  |  |  |  |  |
| 2 |  |  |  |  |  |

1. Predict what will happen when the balls collide.

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1. Click “**play**” and watch as the balls collide.
2. Just after they collide click the “**pause**” button and record the values of the momentum in the data table above.
3. What is the total momentum before (add the momentum of ball 1 and ball 2)?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *kg m/s*

1. What is the total momentum after (add the momentum of ball 1 and ball 2?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *kg m/s*

1. What can you say about the total momentum of both balls before and after the collision?

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1. Describe the relationship you have discovered.

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1. What would happen to the *total momentum* if you changed the size of the balls so one has more mass than the other?

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Extra Credit: make a data table below and prove the claim you made in step 23.