**Cart Crash Simulation**  Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Go to the website: [www.physicsclassroom.com](http://www.physicsclassroom.com) and click on Physics Interactives. Click on Momentum and Collisions Interactives. Click on Collision Carts.

**Directions**:

*Click on the top left corner to make the simulation fullscreen.*

*Select Inelastic Collision*

*Set the values for each cart as shown in the data table and record Post Collision Velocities. You must also record your observations of the motion of the carts after the collision.*

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Red Cart** | | | **Blue Cart** | | | **Observations**  *Describe the change in motion of the carts after the collision* |
| Velocity (m/s) | Mass  (kg) | Post Collision Velocity  (m/s) | Velocity  (m/s) | Mass  (kg) | Post Collision Velocity  (m/s) |
| 5 | 1 |  | 0 | 1 |  |  |
| 8 | 1 |  | 0 | 1 |  |  |
| 10 | 1 |  | 0 | 1 |  |  |
| 5 | 2 |  | 0 | 1 |  |  |
| 10 | 2 |  | 0 | 1 |  |  |
| 5 | 3 |  | 0 | 1 |  |  |
| 10 | 3 |  | 0 | 1 |  |  |
| 5 | 2 |  | 0 | 2 |  |  |
| 10 | 2 |  | 0 | 2 |  |  |
| 5 | 3 |  | 0 | 2 |  |  |
| 10 | 3 |  | 0 | 2 |  |  |
| 5 | 2 |  | 0 | 3 |  |  |
| 10 | 2 |  | 0 | 3 |  |  |
| 5 | 3 |  | 0 | 3 |  |  |
| 10 | 3 |  | 0 | 3 |  |  |
| 5 | 1 |  | -5 | 1 |  |  |
| 10 | 1 |  | -5 | 1 |  |  |
| 5 | 1 |  | -10 | 1 |  |  |
| 10 | 1 |  | -10 | 1 |  |  |
| 10 | 1 |  | 1 | 1 |  |  |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Red Cart** | | | **Blue Cart** | | | **Observations**  *Describe the mass and velocity each cart prior to the collision* |
| Velocity (m/s) | Mass  (kg) | Post Collision Velocity  (m/s) | Velocity  (m/s) | Mass  (kg) | Post Collision Velocity  (m/s) |
|  |  | -8 |  |  | 4 |  |
|  |  | -17 |  |  | 1 |  |
|  |  | -6 |  |  | 4 |  |

**Post Lab Questions**:

1. When the mass of the red cart is increased and the velocity remains the same, what happens to the blue cart’s velocity after collision?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. When the velocity of the red cart increases and the mass remains the same, what happens to the blue cart’s velocity after collision?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. When the masses of both carts are equal and the velocities are equal and opposite, what happens to the motion of both carts after collision?

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Newton's 3rd Law is, “For every action there is an equal and opposite reaction”. Give evidence from your data table to support this law.

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_