**Momentum Mini Labs** Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

For each of these mini labs, complete the task provided and show all work.

**Equations and Constants**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |

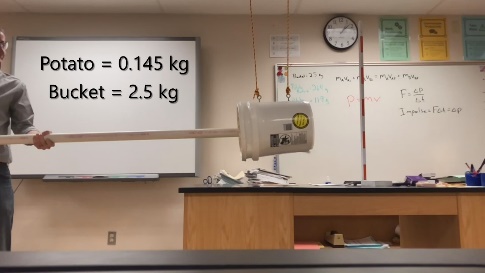
**Part 1: Bowling Ball Collision – What’s the Mass?**

If there are no external forces causing an impulse on a system, we can assume that the total momentum of the system will be conserved. Use the overlay to measure and the included stopwatch on the slo mo video to measure a change in time in order to calculate velocity

Use the conservation of momentum to **calculate the mass of the bowling ball on the left** if the one on the right has a mass of 5.6 kg

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | | | | [**Click Here for Video**](https://youtu.be/R-DSfgpJ7a4) |
| Mass L |  |  | Mass R | 5.6 kg |
|  | |  |  | |
|  | |  |  | |
| **Initial** | |  | **Final** | |
| Velocity L | 0 m/s |  | Velocity L |  |
| Velocity R |  |  | Velocity R |  |

**Part 2: Potato Gun Ballistic Pendulum – What’s the Velocity?**

A clever way to measure the velocity of a very fast projectile (like a potato out of a potato gun) is to fire it into a more massive pendulum and measure the highest point in the swing.

[**Click Here for Video**](https://youtu.be/NVQHxz9beVU)

Step 1: Conservation of Energy

|  |  |
| --- | --- |
| **Initial** | **Final** |
|  |  |

Use the conservation of energy and the maximum height of the bucket’s swing to **calculate the top velocity of the bucket and potato** when it starts swinging after the collision.

Step 2: Conservation of Momentum

|  |  |
| --- | --- |
| **Initial** | **Final** |
|  |  |

Use the conservation of momentum and the velocity of the potato/bucket system from part 1 to **calculate the initial velocity of the potato**

|  |  |
| --- | --- |
| **Potato Velocity** |  |

Step 3: Impulse and Momentum

Use the impulse and momentum with the potato velocity from part 2 and the time the potato was in the barrel to **calculate the force of the potato gun**

|  |  |
| --- | --- |
| **Potato Gun Force** |  |