Introduction to Momentum and Impulse Activity

**First Video:**

1. Watch the first video of two students on carts pushing off each other. Looking at their masses, predict how their velocities will compare to each other. Explain your thinking
2. Get the data for the masses, times and distances for each student (Hailey and Connor) and calculate their final momentums.
3. How do their momentums compare? Why is this?

**Second Video:**

1. Watch the video. Collect the amount of frames it takes them to move 20 cm. Using the data given, calculate the final momentums of the girls and Connor.

|  |  |  |
| --- | --- | --- |
|  | Girls | Connor |
| Total mass |  |  |
| Frames to move 20 cm |  |  |

1. Calculate the final kinetic energies of the girls and Connor.
2. How do the Energies compare to the Momentums? Which one should we focus on when analyzing collisions or explosions?

**Third Video:**

1. Collect the mass of Christine and the amount of frames it takes Christine and David to travel the 20 cm. With these numbers, use the conservation of momentum to calculate David’s mass.

**Impulse Egg Toss**

Momentum is used when analyzing collisions and explosions. When the momentum of an object changes, we say that it has been given an impulse. This is the product of the time of interaction and the force exerted on the object. $\vec{J}=\vec{F}\left(∆t\right)=∆\vec{p}$

1. Starting with Newton’s 2nd Law, use the definition of acceleration to arrive at the equation above.
2. An egg will be tossed into the wall. A different egg will be tossed into a sheet. Both eggs will have some initial velocity and both will come to a stop. Will there be a different result of the two eggs? Make a prediction and give an explanation using the idea of Impulse.
3. Watch the demo. What happened? Explain how the forces the 2 eggs experienced compare to each other.