

It was a Momentous Moment when I did this Momentum Lab!



Name: _____

Date: _____

Period: _____

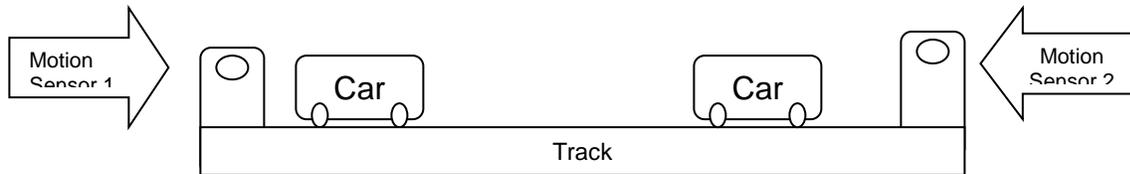
Objective: Students will...

- analyze the total momentum of a system of two cars as they undergo a collision in which the cars stick together.
- repeat for a collision in which the cars bounce apart.

Safety: Be sure not to allow car plungers to strike the motion sensors or people.

Procedure:

1. Set up a PASCO track with a motion sensor on either end. Level the track and place two cars on the track so that their Velcro sides face each other. Make sure the plungers are pushed all the way into the cars. You won't be using them during this experiment. (Darn!)



2. Consider the car that's closer to the motion sensor that's plugged into USB port 1 to be car #1. The other car is car #2.
3. Measure the mass of each car and record it in Data Table Uno.
4. Position each car 0.15m from their respective motion sensor and click the "Start" button. Then gently push the cars toward each other at the same time. (Push gently enough that they do not collide with the motion sensors when they rebound.)
5. Click "Stop" after the cars stop moving.
6. Zoom in on the region of the graph that shows the collision.
7. Select the data curve for Car 1. Activate the Smart Tool and move it to a point on Car 1's curve that is immediately before the collision occurred. Record the car's velocity in Data Table Uno. (The velocity is the y-axis value of the ordered pair.)
8. Select the data curve for Car 2 and repeat step seven.
9. Sweet job.
10. Use the Smart Tool to find the final combined velocity of the two cars after they collide and stick together. Since the cars are attached to each other, it doesn't matter which car's curve you measure off of, because they have the same velocity. Record this velocity in Data Table Uno.
11. Perform calculations to fill out the rest of the first data table.
12. Repeat steps one through eleven, but this time turn the cars around with their magnetic sides facing each other so that the cars bounce off each other during the collision. Record data and perform calculations using the second data table.

Data Tables & Graphs: Recreate these data tables in a spreadsheet to include in your report. Also include a screenshot of each run's graph.

Data Table One	Car 1	Car 2	Total
Mass (kg)			
Velocity before Collision (m/s)			
Velocity after Collision (m/s)			
Momentum before Collision (kg·m/s)			
Momentum after Collision (kg·m/s)			

Data Table Two	Car 1	Car 2	Total
Mass (kg)			
Velocity before Collision (m/s)			
Velocity after Collision (m/s)			
Momentum before Collision (kg·m/s)			
Momentum after Collision (kg·m/s)			

Data Analysis: Please type out the following calculations in your lab report. Be sure to label them so that they make sense to a reader.

- ✎ Percent difference for run 1: Compare total system momentum before the collision to total system momentum after the collision;
- ✎ Repeat for run 2

Conclusion: Draw conclusions addressing each objective. Be sure to use the percent difference analyses.