

## Raw Data Sheet

Student Name: \_\_\_\_\_

Team members:

1.- \_\_\_\_\_ 2.- \_\_\_\_\_

3.- \_\_\_\_\_ 4.- \_\_\_\_\_

Instructor: \_\_\_\_\_

### One Dimensional Collisions

Length of the sail: \_\_\_\_\_ (cm)

Table 1.- Columns left to right indicate collision type, car's mass and the time required to travel the length of the sail. The subindices 1 and 2 indicate car number, while  $i$  and  $f$  refer to the initial and final states. X stands for "not required".

Collision Type	$m_1$ (g)	$m_2$ (g)	$t_{1i}$ (s)	$t_{1f}$ (s)	$t_{2f}$ (s)	$t_{2f} + t_{1f}$ (s)
Perfectly Elastic				X		X
Partially Elastic						
Totally Inelastic					X	X

### Two Dimensional Elastic Collisions

Frequency of the sparks : \_\_\_\_\_ (Hz)

Puck's mass : \_\_\_\_\_ (g)

Table 2.- Raw data:  $\Delta l_1$  and  $\Delta l_2$  are the distances between selected points along each track;  $\theta_1$  and  $\theta_2$  are the angles between the coordinate axes and the velocity vectors. **Note: time is the elapsed time between the selected points.**

State	$ \vec{\Delta}l_1 $ (cm)	$\theta_1$ (degrees)	$ \vec{\Delta}l_2 $ (cm)	$\theta_2$ (degrees)
Initial		zero		
Final				





**One-Dimensional Totally Inelastic Collision:**

1. Calculate the initial velocity,  $v_i$ , and the final velocity,  $v_f$ , of the system.
2. Calculate the percent error, where  $v_i$  is the theoretical value. Is your percent error close to 50%? Why or why not?
3. Calculate initial,  $p_i$ , and final,  $p_f$ , momenta of the system as done previously.
4. Calculate the percent error where  $p_i$  is the theoretical value and  $p_f$  the experimental value.
5. Calculate the fraction of kinetic energy lost, i.e.  $\frac{Q}{K_i}$ . Use Equation 2 from the lab manual.

6. **Show in general** that the theoretical value of  $\frac{Q}{K_i}$  is equal to  $\frac{1}{2}$ . Compare this theoretical value to your experimental value by percent error and explain your result.

### Two-Dimensional Elastic Collision:

1. Calculate the initial and final momenta in each x, y direction using Equations 3 and 4 from the lab manual. Label them accordingly!

2. Calculate the percent error for each component. Note that you should get two percentages.

## Conclusion