

Name		LA ( )
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**B. Results and data analysis (50 pts)**

**Data Sheet 1, inelastic collision (25 pts)**

Mass of Glider 1,  $m_1 =$  \_\_\_\_\_  $\pm$  \_\_\_\_\_

Mass of Glider 2,  $m_2 =$  \_\_\_\_\_  $\pm$  \_\_\_\_\_

Observations:

	Trial #	1	2	
Before Collision	$\vec{V}_1$ ( )			
	$\vec{V}_2$ ( )			
	Total Momentum $\vec{P}$ , $m_1\vec{v}_1 + m_2\vec{v}_2$ ( )			
After Collision	$\vec{V}_1$ ( )			
	$\vec{V}_2$ ( )			
	Total Momentum $\vec{P}'$ , $m_1\vec{v}_1' + m_2\vec{v}_2'$ ( )			
	$\Delta P =  \vec{P}' - \vec{P} $ ( )			
	$\% \Delta P = \Delta P /  \vec{P} $ x100%			

**Data Sheet 1 (continue), inelastic collision**

Paste velocity-time graphs here:

Figure 1. Velocity versus time of Glider 1

Figure 2. \_\_\_\_\_

**Data Sheet 2, elastic collision (25 pts)**

Mass of Glider 1,  $m_1 =$  \_\_\_\_\_  $\pm$  \_\_\_\_\_

Mass of Glider 2,  $m_2 =$  \_\_\_\_\_  $\pm$  \_\_\_\_\_

Observations:

	Trial #	1	2	
Before Collision	$\vec{V}_1$ (     )			
	$\vec{V}_2$ (     )			
	Total Momentum $\vec{P}$ , $m_1\mathbf{v}_1 + m_2\mathbf{v}_2$ (     )			
After Collision	$\vec{V}_1$ (     )			
	$\vec{V}_2$ (     )			
	Total Momentum $\vec{P}'$ , $m_1\mathbf{v}_1' + m_2\mathbf{v}_2'$ (     )			
	$\Delta P =  \vec{P}' - \vec{P} $ (     )			
	$\% \Delta P = \Delta P /  \vec{P} $ x100%			

**Data Sheet 2 (continue), elastic collision**

Paste velocity-time graphs here:

Figure 3. \_\_\_\_\_

\_\_\_\_\_

TA signature:

**C. Answer the following questions after the experiment (8 pts each)**

4. Do the velocities of the gliders remain constant before the collision? Explain your observations.
5. Do the measured  $\Delta P$  and  $\% \Delta P$  change with the initial value of the total momentum? In the other words, is there any difference between trials with different initial momentum? Explain your results.

6. (i) Calculate the total momentum and its uncertainty before and after the collision from Trial 2 of both elastic and inelastic collisions. (**Hint:** Refer to “The Analysis of Errors – a practical guide” in the lab manual about the combining errors starting from page 7)
- (ii) Based on the answers of 6(i), conclude whether the total momentum is conserved in your Trial 2 of both the elastic and inelastic collisions?

7. (i) Calculate the total kinetic energy and its uncertainty before and after the collision from Trial 2 of both elastic and inelastic collisions. (**Hint:** Refer to “The Analysis of Errors – a practical guide” in the lab manual about the combining errors starting from page 7)
- (ii) Based on the answers of 7(i), conclude whether the kinetic energy is conserved in your Trial 2 of the elastic and inelastic collisions?