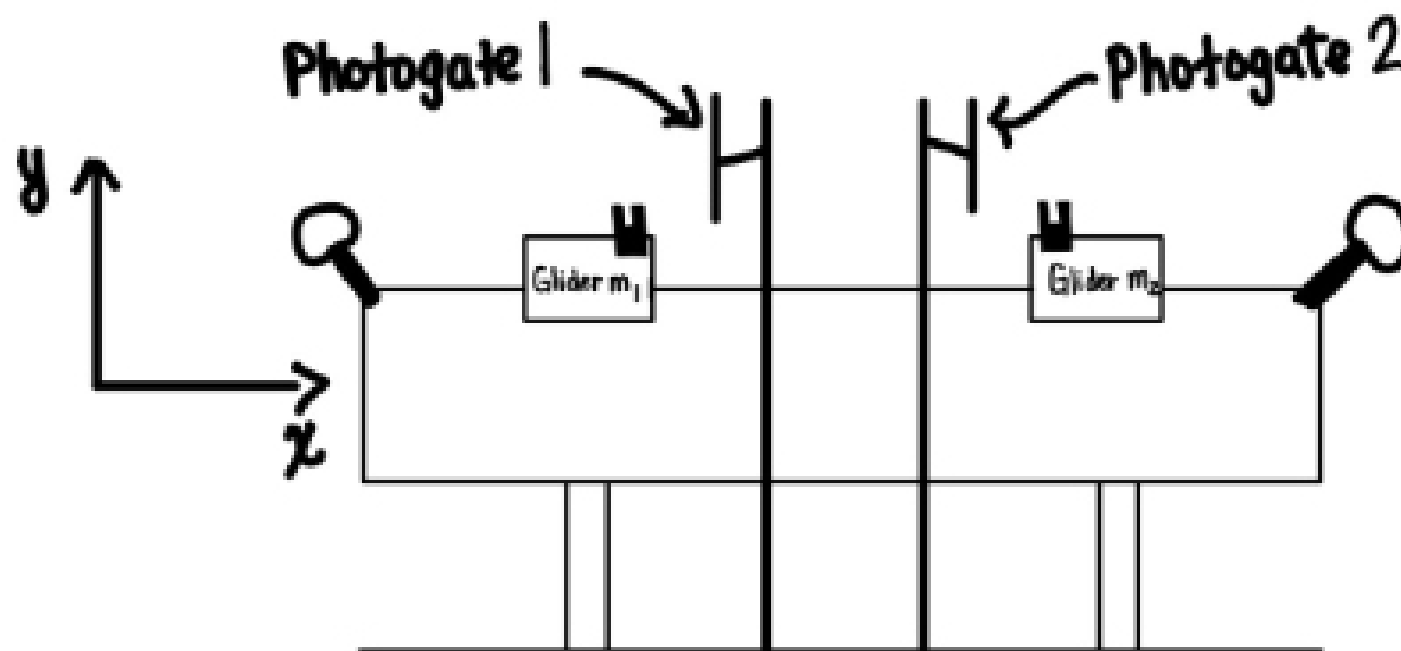


# VI-1



$m_1$ : 156.2 grams

$m_2$ : 155.9 grams

Trial #	Speed, Gate 1 cm/s		Speed, Gate 2 cm/s	
	Initial	Final	Initial	Final
1	15.3	-20	-30.7	0
2	35.7	-29.2	-43.4	24.3
3	27.3	-36.6	-50.7	18.3
4	36.6	-15.5	-29.4	26.5
5	23	-22.7	-32.3	15.1
6	33.8	-26.3	-38.6	24.6
7	31.7	-25.5	-37.8	20.9
8	36.2	-13.5	-25.6	26.7
9	40.6	-22.7	-30.3	32
10	32.3	-42.5	-59.5	22

Trial #	$P_i$ (g * cm/s)	$P_f$ (g * cm/s)	$\Delta P$ (g * cm/s)	$\Delta P/P_i$
1	-2396.27	-3124	-727.73	0.30369282
2	-1189.72	-772.67	417.05	-0.3505447
3	-3639.87	-2863.95	775.92	-0.2131724
4	1133.46	1710.25	576.79	0.50887548
5	-1442.97	-1191.65	251.32	-0.1741686
6	-738.18	-272.92	465.26	-0.6302799
7	-941.48	-724.79	216.69	-0.2301589
8	1663.4	2053.83	390.43	0.23471805
9	1617.95	1443.06	-174.89	-0.1080936
10	-4230.79	-3208.7	1022.09	-0.2415837

Calculations for Trial 1:

**Initial Momentum:**

We use the equation  $p_i = m_1 v_{1i} + m_2 v_{2i}$

Thus, we have:  $p_i = (156.2)(15.3) + (155.9)(-30.7) = -2396.27 \text{ g*cm/s}$

**Final Momentum:**

We use the same equation as in the previous step to find this value but this time, use the final velocity values for each gate instead of the initial velocity values. So, we have:

$$p_f = m_1 v_{1f} + m_2 v_{2f}$$

$$p_f = (156.2)(-20) + (155.9)(0) = -3124 \text{ g*cm/s}$$

**Change in Momentum:**

To find the value for the change in momentum, we must use the equation  $\Delta P = P_f - P_i$ .

Thus, we have the following calculation for trial 1 on the next page:

$$\Delta P = P_f - P_i \Rightarrow \Delta P = -3124 - (-2396.27) = -727.73 \text{ g*cm/s}$$

**Ratio of  $\Delta P/P_i$ :**

We use the equation  $\frac{\Delta P}{\Delta P_i}$ .

Thus, we have the following calculation:

$$\frac{\Delta P}{\Delta P_i} = \frac{-727.73}{-2396.27} = 0.30369$$

All the other trials were calculated using the same methods as shown above for initial momentum, final momentum, change in momentum, and the ratio of  $\Delta P/P_i$ .

Trial #	KE <sub>i</sub> (J)	KE <sub>f</sub> (J)	ΔKE (J)	ΔKE/KE <sub>i</sub>
1	91749.5245	31240	-60509.5245	-0.6595078
2	246361.171	112619.88	-133741.2915	-0.5428668
3	258576.845	130724.312	-127852.533	-0.494447
4	171996.498	73503.9125	-98492.5855	-0.572643
5	122639.356	58017.5285	-64621.827	-0.5269257
6	205366.946	101193.211	-104173.735	-0.5072566
7	189859.987	84833.8645	-105026.1225	-0.5531767
8	153430.676	69803.5005	-83627.1755	-0.5450486
9	200302.032	120064.949	-80237.0825	-0.4005805
10	357443.437	178795.925	-178647.5115	-0.4997924

Calculations for Trial 1:

**Initial Kinetic Energy:**

We use the equation  $KE_i = \frac{1}{2}m_1v_{1i}^2 + \frac{1}{2}m_2v_{2i}^2$ .

Thus, we have the following:

$$KE_i = \frac{1}{2}m_1v_{1i}^2 + \frac{1}{2}m_2v_{2i}^2 \Rightarrow \frac{1}{2}(156.2)(15.3)^2 + \frac{1}{2}(155.9)(-30.7)^2 = 91,749.52 J$$