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Group:	8	Date of Experiment:	Nov. 30th, 2021

Experiment 7. Conservation of Energy (Ballistic Pendulum)

1. Fill in the table below from the pendulum experiment:

No. of Measurements	Angle θ (rad)	h (m)	v_0 (m/s)
1	0.289	0.0156	5.62
2	0.287	0.0154	5.58
3	0.286	0.0153	5.56
4	0.286	0.0153	5.56
5	0.289	0.0156	5.62
Avg with SE	0.287±0.003	0.0154±0.0003	5.59±0.03

2. Fill in the table below with v_0 measured by photogate:

No. of Measurements	v_0 (m/s)
1	5.50
2	5.53
3	5.52
4	5.53
5	5.52
Avg with SE	5.52±0.01

3. How well does the initial speed, v_0, calculated from Equation 4 agree with the value measured directly using the photogates? What does this show? Why is error analysis important?

From the previous tables, we can get their difference is only about 1.3%. It is proved that the initial speed calculated from Equation 4 agrees with the value directly using the photogates. Then we could make a deduction that the subtle relations of Equation 4, that is the Equation 3, the sum of kinetic energy and potential energy, named mechanical energy, is conserved during the transformation between them in this experiment.

We need to attach significance to error analysis for two reasons. One is that we need to ensure all raw data we used is accurate and precise. Error analysis is helpful to point out and eliminate some data arouse with wrong manipulation and so on. In this way, we are able to conclude a rigorous theory. The other is that error analysis could pinpoint the difference between theories and the facts intuitively. With this procedure, we can improve our experiment design. Also, we can make an estimation on the multitude of result error caused by various attributes.

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--- End of Laboratory Report ---

Notes:

- **Submit soft copies online.**
- **No further modification allowed after deadline.**
- **Please don't exceed 2 pages, with normal margin and 1.0 line space.**
- **No figure is required if not specified.**