Experimental General Physics for Engineers I

Laboratory Report PHYS 192 spring 2022

Section: __L06___

Experiment name: # Simple pendulum

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Date submitted:	12/2/2022

Table of results (1.25 pts)	
Graph (1.25 pts)	
Data analysis (2 pts)	
Discussion (0.5 pt)	
References	
Others	
Report Grade (5 pts)	

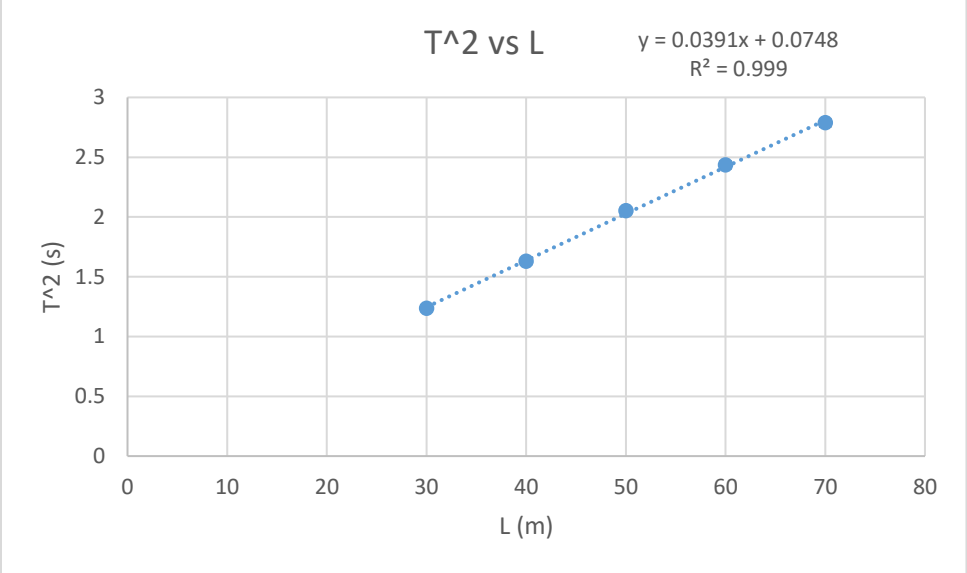
1. Table of Results

(put the correct units in the table)

L (cm)	u(L) (cm)	t_1 (s)	t2 (s)	t_3 (s)	tavg (s)	u(tavg) (s)	T (s)	U (T) (s)	T^2 (s)	$U(T^2)$ (s)
30	±0.1	5.63	5.60	5.45	5.56	±0.01	1.112	±0.001	1.236	±0.02224
40	±0.1	6.47	6.35	6.33	6.383	±0.01	1.276	±0.001	1.629	±0.025533
50	±0.1	7.22	7.00	7.26	7.16	±0.01	1.432	±0.001	2.050	±0.02864
60	±0.1	7.90	7.93	7.58	7.803	±0.01	1.560	±0.001	2.435	±0.031213
70	±0.1	8.14	8.41	8.49	8.346	±0.01	1.669	±0.001	2.786	±0.033387

2. Graph

Plot T^2 (y-axis) vs L (x-axis). Don't forget the error bars



Error values are very small as even the error bars are not seen by eye

L	u(L) (Horizontal Error Bar)	T^2	$u(T^2)$ (Vertical Error Bar)
30	0.1	1.236544	0.02224
40	0.1	1.629878	0.025533
50	0.1	2.050624	0.02864
60	0.1	2.43568	0.031213
70	0.1	2.786674	0.033387

3. Data analysis

3.1.Error of tavg.

Show how you calculated u(tavg) for the first row.

Tavg=5.56

Tavg is directly measured from average of Ts

U(tavg)= ± 0.01 seconds

3.2.Error of T.

Show how you calculated u(T) for the first row.

T=tvag/5

=5.56/5

=1.112

U(T)=U(tavg)/10=0.01/10=±0.001 seconds

3.3. Error of T^2

Show how you calculated u(T^2) for the first row

T^2=T*T

U(T^2) = 2T*U(T)

= 2*1.112*0.001= ±0.02224 seconds

3.4. Slope and intercept of the graph, and their uncertainties

Give the values for the slope intercept

Don't forget units.

Slope: 0.039060622 sec/cm Intercept: 0.074848889 sec

Error (Slope): ±0.000700646 sec/cm Error Intercept: ±0.036406636 sec

3.5. Value of g and its error

From your result above – the slope of the graph- calculate your experimental value of the acceleration of gravity g and its error.

$T^2=(4\pi^2/g)\,L$

Slope = 3.9060622 sec/m

Slope=$4\pi^2/g$

g=$4\pi^2$/slope

g=10.11 m/s^2

U(g)= $\sqrt{\left(\left(d\frac{(4\pi^2)}{M}\right)/d(M)\right)}$*U(M)^2= $\left((-4\pi^2)*U(M)\right)/M^2$

= ((-$4\pi^2$) * 0.0700646) / $(3.906)^2$

= ±0.181 m/s^2

g=10.11 ± 0.181 m/s^2

3.6. Comparison

Compare your value for g to the know value g=9.81 m/s^2.

Comparing the value with the actual value of g=9.81 m/s^2 and the obtained value by experiment g=10.11 m/s^2

|Known value-obtained value/known value| = |9.81-10.11/9.81| = 3.05 %

4. Comment on the results

(Give a brief comment on whether your results are in agreement with what was expected or not and mention all the possible sources of error that you may have faced during the experiment).

The results are in agreement with the expected outcome of g with a small % error of 3.05% due to some reasons of systematic or human error.

The pendulum movement can cause some errors. Due the flow of wind and room temperature, the movement of the simple pendulum is not perfectly simple hormonic motion, which causes some error. The angle of the release of pendulum is also inaccurate and uncertain, which also causes some error. Overall, the results are satisfied with a 3.05% error.

5. References