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Phys111 Report

Experiment #7: Measurement of g at BZU

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(1) Abstract:

- **Aim of the experiment:**

To find the value of gravity (g) at BZU.

- **The main result is:**

- The acceleration due to gravity at BZU is $g = 9.96 \pm 0.13\ m/sec^2$

(2) Data:

	$L\ (cm)$	t_1 (sec)	t_2 (sec)	t_3 (sec)	t_{avg} (sec)	$T\ (sec)$ $T = \frac{t_{avg}}{10}$	$T^2\ (sec^2)$
1	30.0	10.84	10.82	10.80	10.82	1.082	1.171
2	40.0	12.62	12.57	12.64	12.61	1.261	1.590
3	50.0	14.19	14.16	14.17	14.17	1.417	2.008
4	60.0	15.52	15.48	15.50	15.50	1.550	2.402
5	70.0	16.66	16.67	16.69	16.67	1.667	2.779
6	80.0	17.79	17.76	17.72	17.76	1.776	3.154

(3)Calculations:

Use linear least square as implemented in **Excel** to calculate the slope & uncertainty of the line representing T^2 vs. L.

$g = \frac{4\pi^2}{slope}$

$slope = 0.0396 \pm 0.0005\ sec^2/cm$

$g = 9.957785255\ m/sec^2$

$\Delta g = 0.1277314687\ m/sec^2 \approx 0.13$

(4)Results:

- The acceleration due to gravity at BZU is $g = 9.96 \pm 0.13\ m/sec^2$

(5)Conclusions:

Discrepancy test→ | True value - Exp.value | ≤ 2ΔR
→ | 9.80-9.96 | ≤ 2×0.13 → 0.16≤0.26 → so, the result is accepted.

The result is accepted, the value I measured is very close to the true value. The actual value of Earth's gravitational acceleration is 9.8 m/sec^2, which is very close to the experimental result of 9.96 m/sec^2, We measured the gravitational acceleration (g) at a distance above sea level, and it is normal to deviate from the standard of 9.8m due to the difference in conditions. Its due to many possible reasons:

- **The way that the measurements was took is accurate**
- **I focused on taking measurements perfectly.**
- **Attempting to start the timer when the pendulum is released**

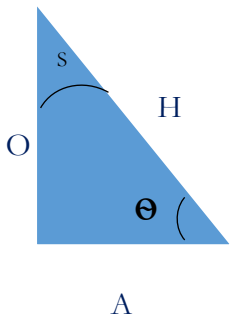
There are many mistakes that I could have made if I had not measured properly.

-But my results not identical this difference can be attributed to various reasons, the biggest source of errors is measuring the period of time, so when we use the timer, we should be very careful and harry to get less errors, external forces such as the air resistance, the force that we took into account were the gravities and tensions forces, so the air will affect.

to prove that sinθ =θ for small angles (less or equal 10):

$sin\theta = \frac{O}{H} = \frac{O}{A}$

$tan\theta = \frac{O}{A} \approx \frac{S}{A} = \frac{A\theta}{A} = \theta \qquad \rightarrow tan\theta = \theta$



m=	0.039645714	0.00348571	=b
Δm=	0.000508547	0.0292875	=Δb

g=	995.7785255	cm/sec^2
Δg=	12.77314687	cm/sec^2

L (cm)	T^2 (sec^2)
30	1.171
40	1.59
50	2.008
60	2.402
70	2.779
80	3.154