ElCoM
ELECTRICAL COMPUTER MECHATRONICS

تقدم لجنة ElCoM الاكاديمية

ريبورتات لمختبر :

الفيزياء العامة العملية

Simple Harmonic Motion Experiment
"The Simple Pendulum"

Purpose

To verify that the simple pendulum periodic time depend only upon the length of the pendulum and the acceleration due to gravity.

Data and Data Analysis

l. Compute the average of the period for each length of the pendulum and record them in **Table 1**.

2. Fill in the average periods and the lengths **L** in **table 2**.

3. Compute the square of the average period for each length and record it in **Table 2**.

Table 1			
Fill in the table with data from the experiment			
L (cm)	$T_1 = t_5/5$ (s) Trial 1	$T_2 = t_5/5$ (s) Trial 2	$\bar{T}$ (s)
95	$\frac{9.67}{5} = 1.934$	$\frac{9.77}{5} = 1.954$	1.944
80	$\frac{9.00}{5} = 1.800$	$\frac{8.93}{5} = 1.786$	1.793
70	$\frac{8.30}{5} = 1.660$	$\frac{8.30}{5} = 1.660$	1.660
60	$\frac{7.67}{5} = 1.534$	$\frac{7.73}{5} = 1.546$	1.540
50	$\frac{7.03}{5} = 1.406$	$\frac{7.07}{5} = 1.414$	1.410
25	$\frac{4.93}{5} = 0.986$	$\frac{4.97}{5} = 0.994$	0.990
15	$\frac{3.87}{5} = 0.774$	$\frac{3.97}{5} = 0.794$	0.784

Table 2		
Use data from table 1 to fill table 2		
L (cm)	$\bar{T}$ (s)	$\bar{T}^2$ (s^2)
95	1.944	3.779136
80	1.793	3.214849
70	1.660	2.755600
60	1.540	2.371600
50	1.410	1.988100
25	0.990	0.980100
15	0.784	0.614656

4. Use the data in **Table 2** to plot **T** versus **L**. What conclusions can you make from your graph?

When (L) increasing the time (T) increasing.

5. Now plot $\overline{\mathbf{T}}^{\mathbf{2}}$ versus **L** using **Table 2**, what kind of relationship do you obtain?

Liner and directly.

6. Compute the slope of your graph plotted in **5** above.

Slope = $\frac{\Delta y}{\Delta x} = \frac{0.61-3.7}{15-95} = 0.038625$ (s^2/cm)

7. Using the value of the slope you obtained calculate **g**, the acceleration due to gravity.

Slope = $\frac{4\pi}{g} \rightarrow g = \frac{4\pi}{Slope} = \frac{4\times(3.14)^2}{0.038625} = 1021.05$ (cm/s^2)

8. Estimate the error in **g**.

Percent error = $\frac{|1021.05-980|}{980} = 4.1\%$

Mohammed Abadi ♡

$$T = 2\pi\sqrt{\frac{L}{g}}$$

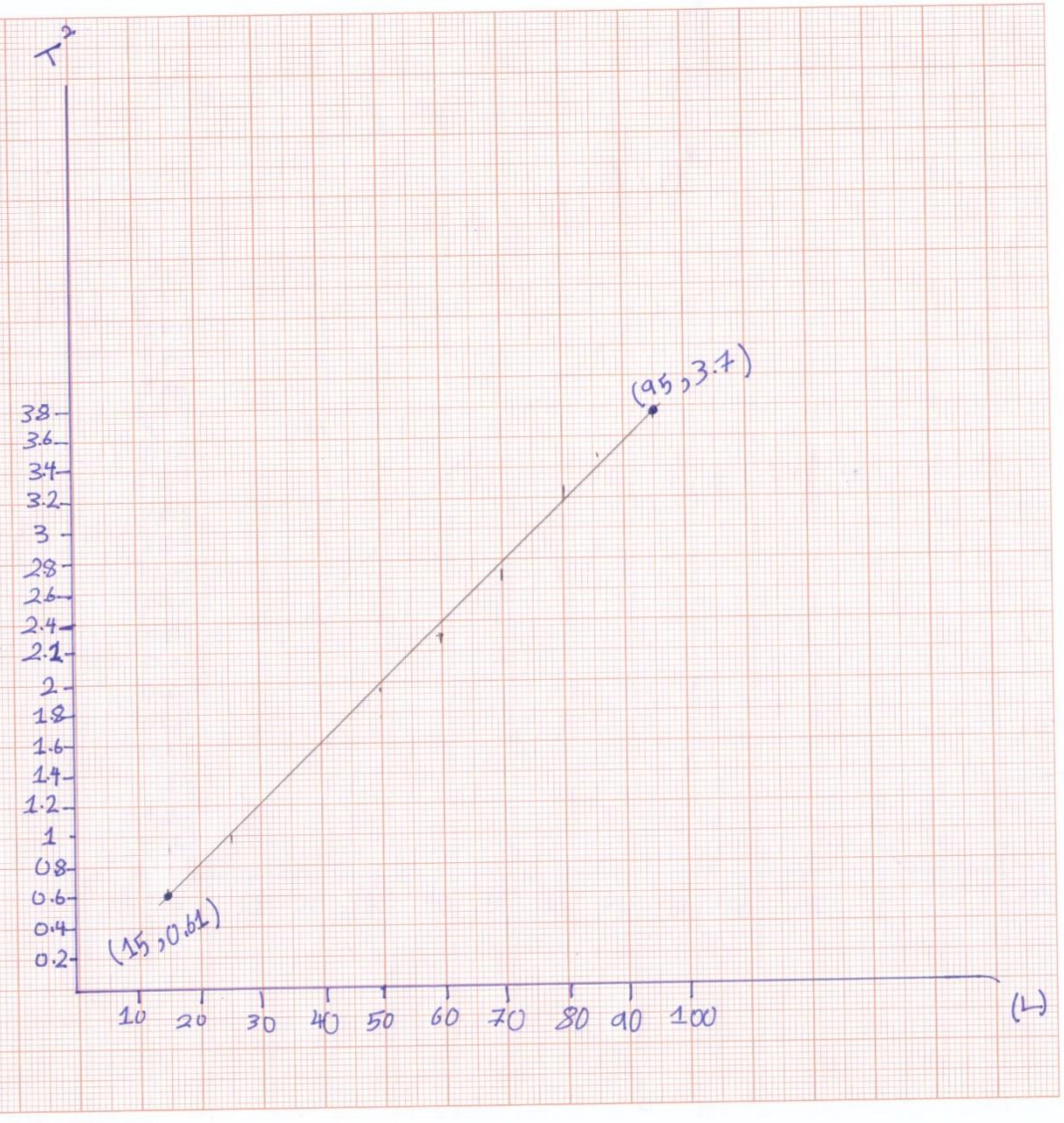
$$T^2 = 4\pi^2 \frac{L}{g}$$

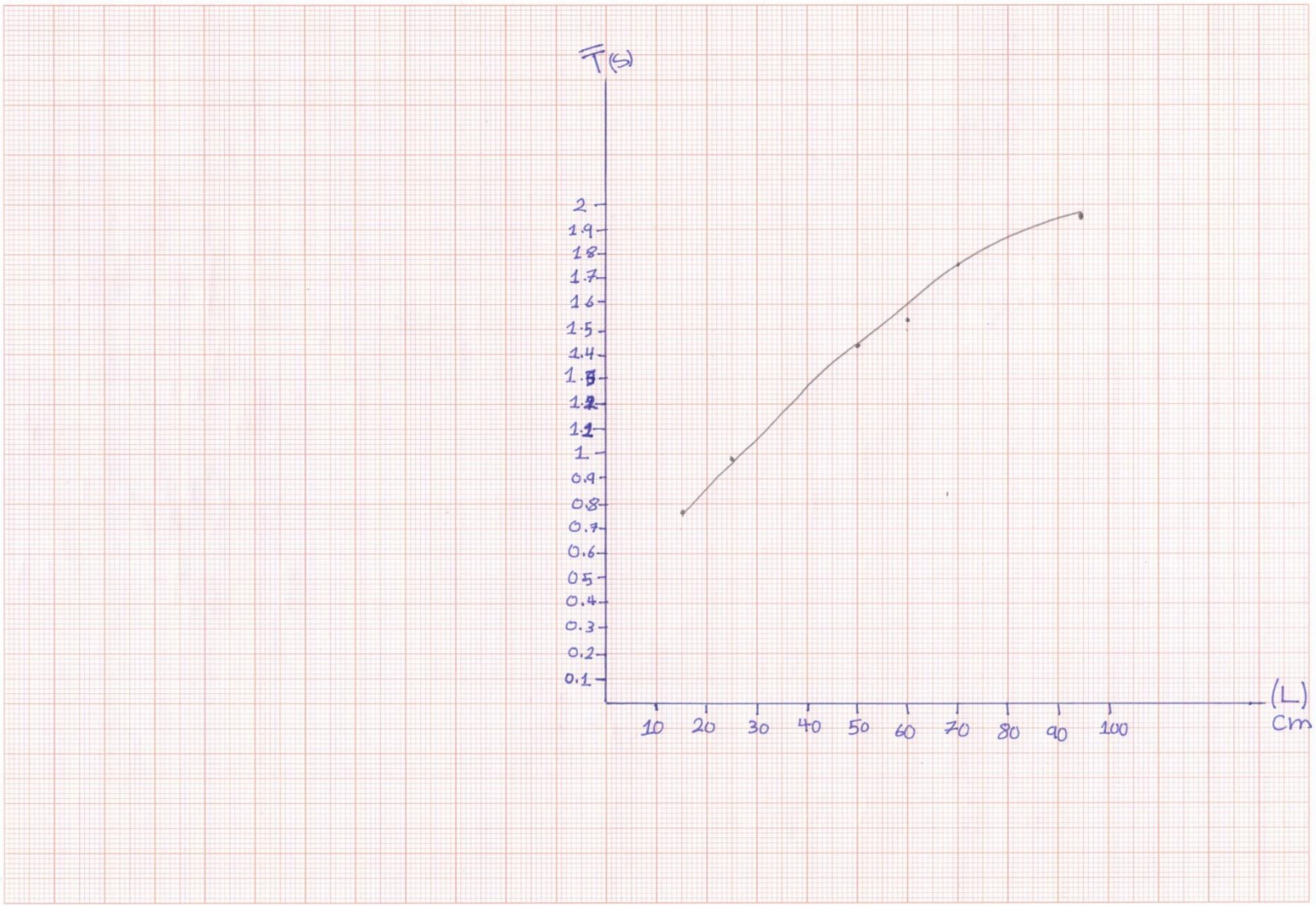
$$T^2 = \left(\frac{4\pi^2}{g}\right) L$$

T^2 → Y

$\left(\frac{4\pi^2}{g}\right)$ → Slope

L → X




T(s)
2
1.9
1.8
1.7
1.6
1.5
1.4
1.3
1.2
1.1
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
10
20
30
40
50
60
70
80
90
100
(L)
Cm