

Table 7.1

L = Length of pendulum

$T^{(10)}$ = Average time for 10 cycles (s)

| L (m) | Trial 1 | Trial 2 | Trial 3 | Trial 4 | $\bar{T}^{(10)}$ (s) | $\bar{T} = \frac{\bar{T}^{(10)}}{10}$ (s) | \bar{T}^2 (s ²) |
|----------------|---------|---------|---------|---------|-------------------------|--|----------------------------------|
| ✓ $L_1 = 0.15$ | | | | | 17.00 | 0.85 | 0.7225 |
| ✓ $L_2 = 0.3$ | | | | | 22.61 | 1.131 | 1.279 |
| ✓ $L_3 = 0.45$ | | | | | 26.84 | 1.342 | 1.801 |
| ✓ $L_4 = 0.6$ | | | | | 31.14 | 1.557 | 2.424 |
| ✓ $L_5 = 0.75$ | | | | | 33.26 | 1.663 | 2.7656 |
| $L_6 =$ | | | | | | | |

V. DATA ANALYSIS

In the following, for simplicity of notation, we will replace \bar{T} and \bar{T}^2 by T and T^2 , respectively.

1. Using the data in Table 7.1, make a plot of T (vertical axis) versus L (horizontal axis).

2. What type of relationship do you observe between T and L ? Is it linear? Is it consistent with Equation 7.14?

.....direct.....non-linear.....square root.....

.....yes.....it is consistent.....

3. Using the data presented in Table 7.1, make a graph of T^2 versus L (horizontal axis).
4. What type of relationship do you observe in the previous graph? Is it consistent with the theoretical predictions of Equation 7.14?
direct linear... yes... it is... consistent
5. Draw the best-fit line for the data presented in the T^2 versus L graph.

6. What is the slope of the best fit line found in 5 obtained above?
Slope = $4.0 \text{ s}^2/\text{m}$

7. What does this slope represent?
Slope = $\frac{4\pi^2}{g}$

8. Using the value of the slope that you obtained in 6, calculate the acceleration due to gravity (g) at the University of Jordan.

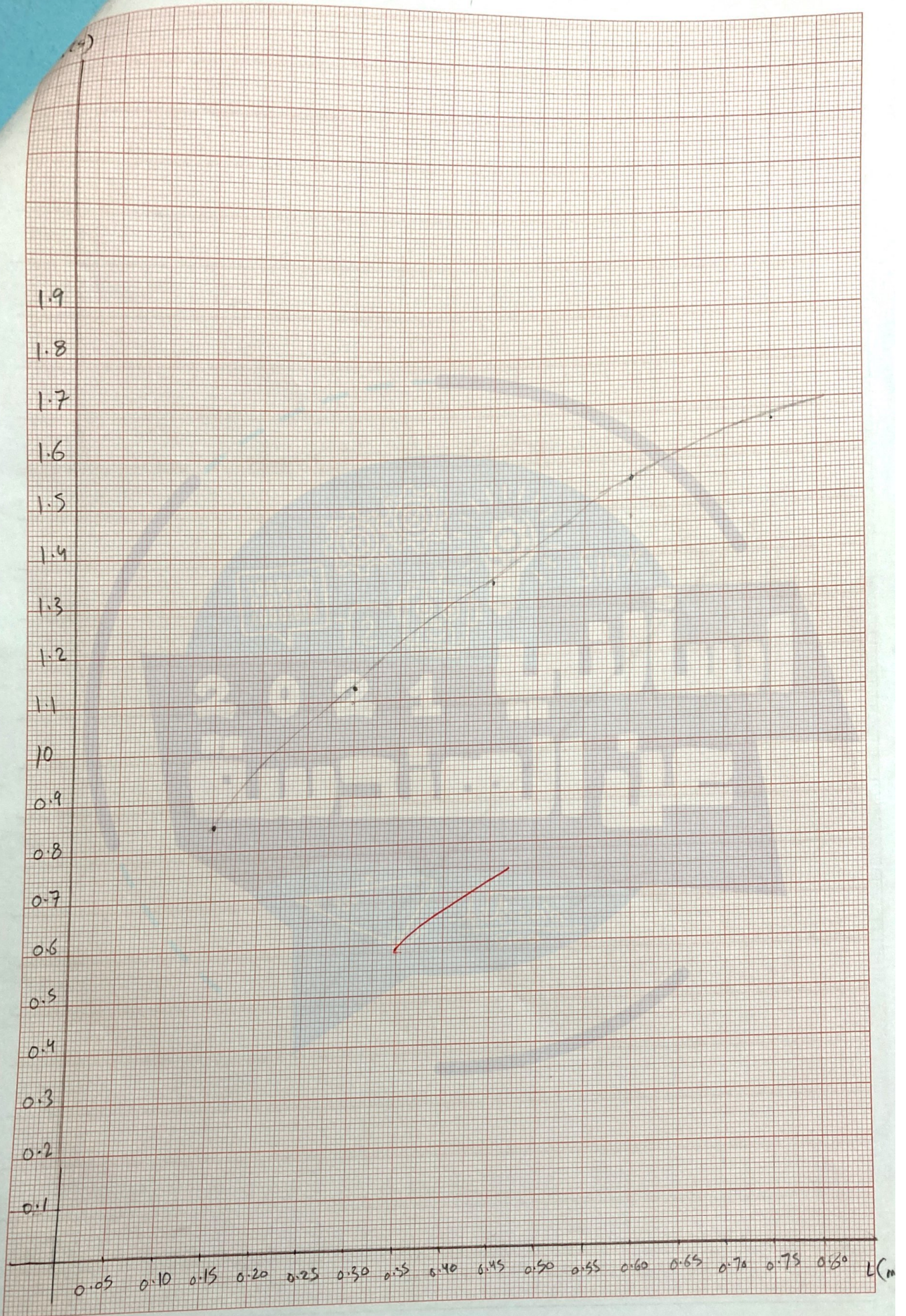
$g = \frac{4\pi^2}{\text{slope}} = \frac{4\pi^2}{4} = 9.87 \text{ m/s}^2$

9. Calculate the percentage error in your experimentally found g .

$\frac{|g_{\text{exp}} - 9.8|}{9.8} \times 100\% = 0.714\%$

10. State and discuss three sources of error in this experiment.

- #Friction*
- error calculation*
- experiment error*
- error in reporting result*
- error in measuring g*



$$\text{slope} = \frac{2.2 - 1.8}{0.55 - 0.45} = 4.0 \text{ s}^2/\text{m}$$

