Physics Laboratory Report

Measuring the Acceleration Due to Gravity

Your Name — Course / Section

August 29, 2026

Research question: How does pendulum length affect its period?
Prediction: $T = 2\pi\sqrt{L/g}$ for small angles.

1 Method

Measure the time for ten oscillations at each length, keeping the release angle below 10°. Divide by ten to estimate the period and repeat each condition three times. Record the actual length from the pivot to the bob's centre of mass.

2 Results

Table 1: Raw timing data and derived period.

L (m)	$t_{10,1}$ (s)	$t_{10,2}$ (s)	$t_{10,3}$ (s)	$\bar{T}$ (s)
0.40	12.72	12.65	12.69	1.269
0.60	15.61	15.54	15.58	1.559
0.80	17.94	17.88	17.91	1.791
1.00	20.10	20.03	20.07	2.007

3 Analysis

Linearise the model by plotting T^2 against L. The slope should be $4\pi^2/g$, so calculate

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

Include the fitted slope, uncertainty and a residual check here. Discuss reaction time, pivot friction and finite release angle as limitations.

4 Conclusion

State whether the data support the prediction and report the measured value of g with units and uncertainty: _____

Sources of uncertainty

- Random: timing variation between runs.
- Systematic: ruler zero, pivot position and release angle.
- Improvement: use a light gate or video tracking for each passage.