THE SIMPLE PEMDULUM

The   period, T_0, of a simple pendulum of length L , for small angles of oscillation, is given by

$$T_0^2   =   4\pi^2 (L/g),$$

where g is the acceleration of free fall under gravity.

In this experiment use a pendulum with L approximately 30   cm.

1. Determine g using a simple pendulum, and the formula above, when the amplitude of the swing is 4^0 . Estimate the uncertainty of the result.

2. Determine the variation of the period, T, of the pendulum with its angular amplitude, θ, for   values of θ up to 90^0. Estimate the uncertainty of each result. Plot a graph of T against θ.

3. Draw a graph of T against $sin^2(\theta/2)$. Determine the gradient and intercept of the linear portion of the graph.

4. Now draw a graph of

$$[(T/T_0)-1] [sin^2 (\theta/2)]^{-1} \qquad \text{against} \qquad sin^2 (\theta/2)$$

Determine the gradient and intercept of the linear portion of graph.

5. Suggest a formula for the   variation of T with θ based on the results obtained in 4.