Simple Pendulum

Objective:

To find the acceleration due to gravity **g**.

Theory:

A simple pendulum consists of a small bob of mass **m** suspended by a light (massless) string of length **L** fixed at its upper end. if the pendulum is pulled to one side with **small angle** from its equilibrium position and released, it then swings back and forth in simple harmonic motion. The period **T** of an object in simple harmonic motion is defined as **the time for one complete cycle**. For the simple pendulum, this is specifically given by:

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

Where

T is the period **(s)**
L is length of the pendulum **(m)**
g is acceleration due to gravity **(m/s^2)**

Squaring both sides of this equation yields

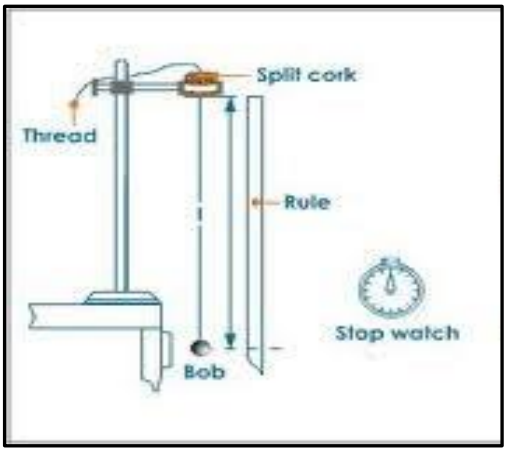
$$T^2 = \frac{4\pi^2}{g} L$$

Then **g** is given by:

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

Apparatus:

Bob	Thread
Stop watch	Ruler
The vernier caliper	



Procedure:

1. Measure the length of the pendulum **L** by **adding** the **radius of the bob** and the **length of the thread**.
2. Release the pendulum to swing at an angle of **no more than 10 degrees** while activating the timer. Record the time for **20 swings**.
3. Decrease the pendulum length, and in each case record the time for 20 swings. Tabulate the data.
4. Graph the relation between the length **L** on the **x-axis** and the square of the time $\mathbf{T^2}$ on the **y-axis** and **calculate the slope**.
5. Use the graph to calculate the **acceleration of gravity g.**