**Lab – Pendulum Lab**

**Purpose:** To determine the relationship between period and length of a pendulum.

**Materials:**

- Meter Stick
- String with stopper
- Stop watch
- Pendulum lab clamp
- Ring stand

**Instructions:**

1. Slip the string through the clamp so that it does not wrap around and change the pivot point.
2. You will need to count twenty full revolutions for each pendulum swing (full swing = the bob swings out and then returns to original position).
3. Time twenty full revolutions for ten different lengths. Complete two trials for each length. Skew the trials so that there are more data points when the length is small. The lengths can be spread out more as the length approaches one meter.
4. Complete the following data table:

| **Length (m)** | **Square Root of Length (m)** | **Time 1 (s)** | **Time 2 (s)** | **Average Time (s)** | **Period (s)** | **Period Squared ($s^2$)** | **g ($m/s^2$)** |
|---|---|---|---|---|---|---|---|
| | | | | | Average Time/ 20 | | $4\pi^2(\ell/T^2)$ |

5. Create three graphs based on the data:
    - The first graph is of period (y-axis) versus length (x-axis) – root relationship. This graph will help to determine the length of a 1-second pendulum.
    - The second graph is of the period squared (y-axis) versus the length (x-axis). This will show a direct relationship. Find the slope of this graph.
    - The third graph is of the period (y-axis) versus the square root of the length (x-axis). This should also be a direct relationship.
6. Conclusion needs to include the following:
    - A discussion of the lab experience and the types of relationships shown in the graphs.
    - The length of a 1-second pendulum (from Graph 1).
    - The calculation of g using the equation:

$$T = 2\pi\sqrt{(l/g)}$$

        - Solve for g: $g = 4\pi^2(\ell/T^2) \rightarrow (\ell/T^2)$ is the reciprocal of the slope of Graph 2.