# Investigation: The Pendulum

Directions: Answer each of the following questions using complete sentences.

**Objective:** This investigation will give you the opportunity to determine how you can change the period of a pendulum.

#### Pre-Lab-

- 1. Focus question:
  - a. You can change the <u>string length</u>, <u>number of washers (mass)</u>, and the <u>amplitude (angle)</u> of the pendulum. Which of these will change the period of the pendulum?
- 2. Prediction:
  - a. I predict that changing \_\_\_\_\_\_ will change the period of the pendulum.
- 3. Predictive graphs:
  - a. Period vs. String Length:
  - b. Period vs. Number of Washers (Mass):
  - c. Period vs. Amplitude (Angle):
- 4. How do you count the number of cycles?
- 5. Assign roles for each group member:
  - a. Stopwatch : Start and stop the timer-\_\_\_\_\_
  - b. Counter: Count the number of cycles-\_\_\_\_\_

c. Recorder: Records all information in the data table - \_\_\_\_\_

d. Measurer: Measures the string length, changes the # of washers, and amplitude -\_\_\_\_\_

### **During the Lab- Collect Data**

- 6. Set up the experiment using page 2 of the handout.
- 7. Evidence: Changing the Mass of the Pendulum. <u>Constants:</u>
  - a. String Length:\_\_\_\_\_
  - b. Amplitude: \_\_\_\_\_

Table 1:

Number of washers	Time for 10 cycles (s)	Period (s)
0		
2		
4		
6		
8		

#### Name:

8. What do you notice about changing number of washers (mass) and its effect on the period?

Date:

- 9. Evidence: Changing the Amplitude of the Pendulum.
  - Constants:
    - a. Number of Washers:\_\_\_\_\_
    - b. String Length: \_\_\_\_\_

#### Table 2:

Amplitude (degrees)	Time for 10 cycles (s)	Period (s)-
10		
15		
20		
25		
30		

Hour:

1

2

3

4 5

6

10. What do you notice about changing the angle (amplitude) and its effect on the period?

#### 11. Evidence: Changing the String Length of the Pendulum.

Constants:

- a. Amplitude:\_\_\_\_\_
- b. Number of Washers: \_\_\_\_\_

#### Table 3:

String Length (cm)	Time for 10 cycles (s)	Period (s)
17		
20		
23		
26		
29		

12. What do you notice about changing the string length and its effect on the period?

#### Post-Lab-

- 13. Share the recorded data with your lab partners.
- 14. Graph your data using the graph paper below. You should have 3 separate graphs. Remember on each graph the variable that you changed should go on the x-axis (independent variable). The period of the pendulum should go on the y-axis (dependent variable). The scale for the period should be the same for all 3 graphs. Don't forget to add all the parts of a good graph.
- 15. Claim : Looking at your graphs, what affected the period of the pendulum?

#### 16. Reasoning and Reflecting:

Based on my graphs, I kn	ow that my prediction was	The reason that
effects the period of the p	Some things that may have	
caused error during this in	Some things that went well during the	
lab were	If I was to do this lab again, I would	(what would you do
differently).	-	-

Name:

\_\_\_\_\_ Date:\_\_\_\_\_ Hour: 1 2 3 4 6 5

17. Challenge: Using  $T = 2\pi \sqrt{\frac{L}{g}}$  where T=period, L=length, and g=gravity, solve for the period in Table 3 using one of string lengths you measured, and  $g=9.8m/s^2$ . Does it match the period that you observed?

Graph 1:



## Graph 2:



Graph 3:

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