



Turn in the unit 1 pages from your lab notebook.

Pendulum Lab

Purpose: In today's lab, we will complete the pendulum lab.

Lab notebook set-up: Set up your lab notebook. Use the "Lab Notebook Format Handout" to help you. You should write the standard heading (date, unit, experiment name), a materials list, and a data collection section. In the data collection section, copy the three tables and their corresponding labels found below into your lab notebook. We will complete the rest of the sections in class.

Materials

- String
- Meter stick or other ruler
- paper clip
- 9-12 large washers
- masking tape or other tape

Procedure

Part 1: String Length Variable

1. Tape your ruler/meter stick to the table so that it hangs off the edge.
2. Tie the paper clip to one end of a string.
Tie the string to the end of the ruler so that it is 12 inches long.
3. Pick a number of washers to add to the paper clip for the weight. Record this number in the data collection section under the "String Length Variable" section.
4. Pick an angle at which to swing your pendulum. (Ex. 30° , 45°) Record this in the data collection section.
5. Have your parent/teacher/co-op leader time you for 10 seconds. Count the period (how many times the pendulum swings) in 10 seconds to the nearest quarter of a swing.
 - a. A full swing is when the pendulum returns to the original position.
 - b. A half swing is when the pendulum reaches the other side.
 - c. At $\frac{1}{4}$ and $\frac{3}{4}$, the pendulum is straight down.
6. Record the period in your data table.
7. Repeat 5-6 two more times.
8. Adjust the length of your string to 8 inches. Record the length in the data table. Repeat steps 5-7 at the new length.



- Adjust the length of your string to 4 inches. Record the length in the data table.
Repeats steps 6-9 at the new length.

Part 2: Angle Variable

- Pick a string length and a weight (the number of washers) to hold constant. Record these under "Angle Variable."
- Raise your pendulum to a 90° angle. This means it is parallel to the table. Record this in the data collection section.
- Have your timer time you for 10 seconds as you count the swings of the pendulum.
- Record the period in your data table.
- Repeat steps 2-3 two more times.
- Repeat steps 2-5 at a 60° angle. (You can be approximate. You do not need to use a protractor.)
- Repeat steps 2-5 at a 30° angle.

Part 3: Weight Variable

- Pick a string length and an angle to hold constant. Record these under "Weight Variable."
- Add 9-12 washers to your paper clip. Record the number in your data table.
- Have your timer time you for 10 seconds as you count the swings of the pendulum.
- Record the period in your data table.
- Repeat steps 2-3 two more times.
- Repeat steps 2-5 with 5-7 washers.
- Repeat steps 2-5 with 1-3 washers.

Data Collection

Copy the tables and the labels into your lab notebook.

String Length Variable

Angle constant at: _____ Weight constant at: _____

Variable	Period (Swings/10s)	Period (Swings/10s)	Period (Swings/10s)	Average



Angle Variable

String length constant at: _____ Weight constant at: _____

Variable	Period (Swings/10s)	Period (Swings/10s)	Period (Swings/10s)	Average

Weight Variable

String length constant at: _____ Angle constant at: _____

Variable	Period (Swings/10s)	Period (Swings/10s)	Period (Swings/10s)	Average

Results

1. Calculate the average for all three variables in each table.
2. For which trial(s) was the period approximately the same? (This means the average is the same.)
3. For which trial(s) did the variable result in a change in the period? What was the trend?

Conclusions

1. Did the results support any of your hypotheses? If so, which ones?
2. Did the results contradict any of your hypotheses? If so, which ones?

Citations

John D. Mays. *Introductory Physics*. Third Edition. Seguin, Texas: Novare, 2019.



Formal Lab Report

Use this information to help guide you when writing your lab report. Do not bring your report until you have completed the second lecture in unit 2. It should include: heading, purpose, procedure, and results.

Specific section notes

- **Heading**
 - Title, Name, Date of experiment, Date lab report is due, Instructor's name, Name of class
- **Purpose**
 - In 1-2 sentences summarize the lab. Your hypothesis should state the hypothesis and the key result.
- **Procedure**
 - 2 paragraphs and a materials list (vertical list without bullets)
 - Use past tense!!!
 - Procedure Description: Describe how we made the pendulum and how we timed the swings.
 - Variable Description: Describe the explanatory variables and the conditions for each variables.
 - Explain why we completed 3 trials for each condition.
- **Results**
 - 1 paragraph and 3 tables.
 - Paragraph: State the data collection with no analysis
 - Refer to each of the tables in the paragraph
 - Tables: Copy the tables from your lab notebook
 - Label each table with a figure number and a description