

Name: \_\_\_\_\_ Period: \_\_\_\_\_

## Pendulum Lab: Forming Hypotheses & Identifying Variables

**\*\*This is our first lab that will be scored using our proficiency scale! Each part (Part A and Part B) will be scored individual using our 1-4 scale. Each score will be entered individually in Gradebook. You can redo an individual part if you score less than a 4!\*\***

### Instructions:

1. In this lab, you will practice forming a hypothesis and identifying variables. You will also practice controlling the variables in this experiment.
2. Collect the following materials:  
Washer                      40cm string                      Timer                      Masking tape                      Ruler
3. Answer the questions in Part A.
4. From the top of the washer, measure 20cm of string (don't cut it!). Tape this length with the washer end on your bench top so it is hanging over the floor.
5. As a group, decide how you will swing the pendulum and count how many times it swings (however you choose is fine, but make sure it's the same each time! Hint: could this be helpful when determining variables!)
6. You will swing the 20cm pendulum for 1 minute and count the number of times it swings.
7. Repeat this with the 20cm pendulum three times! Then determine the average number of swings.
8. Repeat this entire process for a pendulum that is 10cm long and then 40cm long.
9. When you are done, return the lab materials to their proper places.

### Part A:

1. Given the scientific question below, formulate a testable hypothesis:

**How does the length of string affect the number of swings a pendulum will make?**

**Hypothesis:**

If \_\_\_\_\_

Then \_\_\_\_\_

Because \_\_\_\_\_

2. Identify the three types of variables in this experiment:

**Independent Variable:** \_\_\_\_\_

**Dependent Variable:** \_\_\_\_\_

**Controlled Variables (give at least four):** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3. After discussing with your group exactly how you are going to swing the pendulum and count the swings per minute, write your methods that you and your lab group will follow to complete this lab. Start with measuring the string and continue from there. (Write your methods on the next page.)

**Methods:**

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**4. Data Collection:**

Use the data table below to collect your data that will be used in a graph.

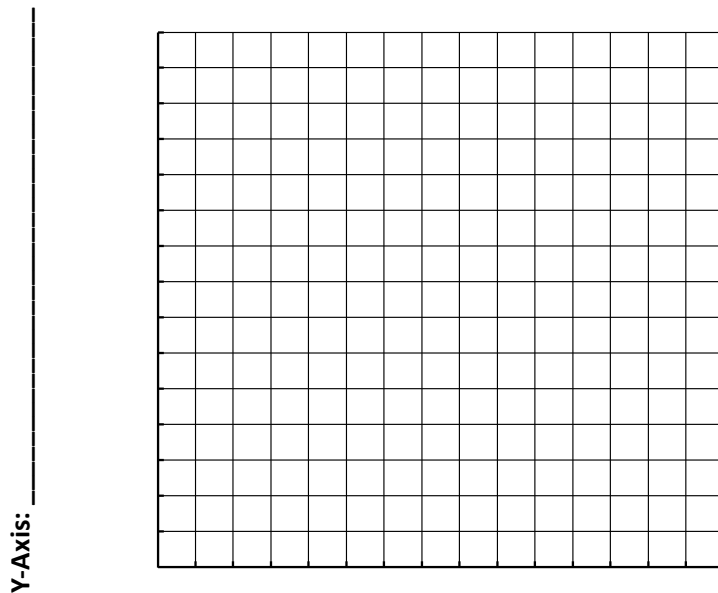
	Length of String		
# of Swings	10cm	20cm	40cm
Rep 1			
Rep 2			
Rep 3			
<b>Average</b>			

Part B:

**1. Data Analysis/Graph:**

Create a graph using the data collected in Part A. **Your graph should be a LINE GRAPH using the average number of swings for each length of string. Give your x-axis and y-axis titles!**

**Affect of String Length on Average Number of Pendulum Swings**



X-Axis: \_\_\_\_\_

**2. Conclusion & Graph Analysis:**

Answer the following questions in FULL and THOUGHTFUL sentences.

- A. Was your hypothesis correct or incorrect? Use your data to describe why it is correct or incorrect.

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- B. Given your graph, infer what you think would happen if you were to test the number of swings with a pendulum that is 50cm long.

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- C. Given your graph, infer what you think would happen if you were to test the number of swings with a pendulum that is 5cm long.

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- D. Lastly, you identified at least four controlled variables and you established a method to follow as you completed this experiment. Describe why establishing controlled variables and a method is important in any experiment. Give an example of how this particular experiment could be executed incorrectly (give an example of how you might have two independent variables).

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Proficiency Scores:

Part A				
Score:	1	2	3	4
<b>Description:</b>	Hypothesis and/or variables do not address question, are not accurate as learned in class. Methods are do not create an easily followed experiment; not written in complete sentences. Data table may not be complete.	Hypothesis and/or variables attempt to address question but are not accurate. Attempt to make methods precise, thorough, and written in complete sentences. Data table is complete.	Hypothesis and variables are thorough and accurate. May require some slight adjustments. Methods are in complete sentences and address most steps needed for experiment. Data table is complete.	Hypothesis and variables are thorough and accurate. Methods are precise, thorough, and written in complete sentences. Methods address all necessary steps for experiment. Data table is complete.

Part B				
Score:	1	2	3	4
<b>Description:</b>	Graph does not depict data from experiment. Analysis answers do not attempt to answer the questions thoroughly. Student demonstrates little to no understanding of this experiment and/or items taught in class.	Graph attempts to depict data but may not be neat, may not be accurate according to data. Analysis answers attempt to answer questions, but are not complete and/or thorough or may be inaccurate. Student demonstrates a basic but developing level of understanding of this experiment and items taught in class.	Graph accurately depicts data from table, but may need small adjustments. Both axes have titles that describe the graph, but may need small improvements. Graph is neat. Analysis answers are complete sentences and address the questions. Student demonstrates a proficient level of understanding of this experiment and items taught in class.	Graph accurately depicts data from table. Both axes have titles that accurately describe the graph. Graph is neat. Analysis answers are thorough and complete sentences. Student demonstrates a high level of understanding of this experiment and items taught in class.