



Science Fair Packet


Name: Kanwarveer.

Teacher: _____

Mrs. Sandhu

*graph needs to be
computer generated!*

Science Fair Project Planning Packet

	Due Dates	Things To Do
✓	16 November, 2023	Choose topic and write project question.
✓	16 November, 2023	Get approval from your teacher.
✓	28 November, 2023	Research your topic and write key words and paragraph.
✓	28 November, 2023	Write a hypothesis.
✓	15 January, 2024	Design an experiment; list variables and write procedure.
✓	15 January, 2024	List and gather your materials (bring after winter break).
✓	15 January, 2024	Conduct experiment and record data and observations.
✓	15 January, 2024	Create a table, chart, or graph of the data.
✓	15 January, 2024	Draw conclusions.
✓	15 January, 2024	Make the project display.
✓	15 January, 2024	Write and Print Abstract
✓	15 January, 2024	Turn in Planning Packet to teacher.
✓	7 February, 2024	Present your project at the science fair.



Resource:

Type of Resource: Sciencing

Website: <http://sciencing.com/effects-swing-rate-pendulum-8113160.html>

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

Date of Publication: _____

Information found in your own words:

(Must be at least one paragraph summary.)

A pendulum is a device which is used to measure time. It is basically a wire, metal or other material that swings back and forth. Pendulums follow the laws of Newton. The swing rate or frequency of the pendulum is affected by its length from the point it pivots from. On old-fashioned clocks some have a long pendulum and some have short ones. It matters on the gears system inside to make it accurate.

Your question will drive your entire project. Use the list of topics provided by your teacher. Make sure that your question is something that can be measured and answered by following the scientific process. Your question will also be the title of your project.

Project Question

Does The lenght of a Pendulum ^{string} affects its swing time?
I will do this experiment by first making two Pendulums. ones string would be longer and the others will be short. Then I will use a timer to note how much time each of the Pendulums will take.

2. Research Your Topic - spend some time with your group learning more about your topic. Use reliable Internet sources, books from the library, your science book, or other resources. Do not forget to write these sources down to include in the bibliography. Not only do you want to be an expert on your topic, but you want to teach others about your topic.
 1. *Key Words* - locate 3 or more key science words related to your topic. Make sure that the words you choose are directly related to your topic. Provide a definition of each key word IN YOUR OWN WORDS.
 2. *A paragraph describing the science behind your project* - after you have completed your research give us (your audience) some background information on your topic in a complete and well-written paragraph (5-7 sentences). Give us specific, rather than general information. Use the space provided to write a draft. You will edit a final copy to place on your display board.

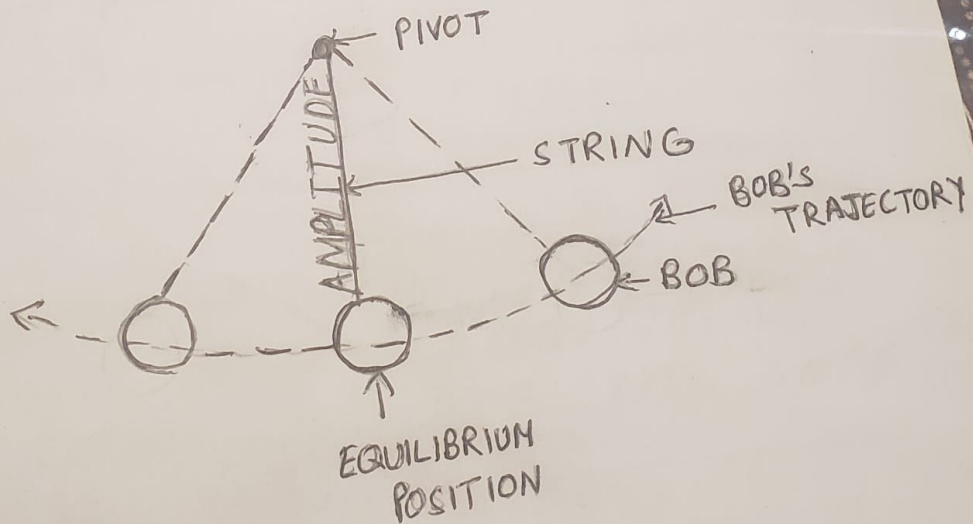
Key Words

Key word	Definition
Pendulum	A Pendulum is a body suspend from fixed Point so that it can swing back and forth under the influence of Gravity.

gravitational force	gravitational force is the force of attraction between all masses in the universe.
wave frequency	is the number of waves that pass a point in a certain period of time.
amplitude	amplitude is the maximum displacement or distance moved by a point on vibration.
laws of newton	law of newton means motion related to an object's motion to the forces acting on it.
gear system	gear systems consists of several gears and are major components of many engineered appliances.
Bob	A bob is a heavy object (also called a "weight or mass") on the end of a pendulum.
oscillation	It is the process of moving back and forth regularly.
Kinetic energy	It is the energy an object has because of its motion.
Equilibrium position.	It is the position where the total force acting on it is zero.

where frequency are affected, it follows
the first law of motion, which is

DIAGRAM OF SIMPLE PENDULUM





Resource:

Type of Resource: University of Kentucky Department of Physics and Astronomy

Website: http://www.pa.uky.edu/sciwork/FME/fme/wibe4.htm

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

Date of Publication: _____

Information found in your own words:

(Must be at least one paragraph summary.)

A Pendulum has weight on the bottom known as the bob it moves in circular arc. The motion of a Pendulum is affected by two energies known as Kinetic energy which acts when the weight is moving and gravitational Potential energy. This happens when the bob is in circular motion. The speed of the Pendulum is affected by the Pull that was given to it, so how much you Pull, is how much it would move. As well this means the amplitude is affected.

Resource #3

You must have 3 Resources



Resource:

Type of Resource: Researchomatic

Website: <http://www.researchomatic.com/how-does-the-length-of-the-pendulum-affect-swing-15592.html>

Author: _____

Title: _____

Publishing Company: _____

Location of the Publishing Company: _____

Date of Publication: _____

Information found in your own words:

(Must be at least one paragraph summary.)

If all factors ^{like} The Pendulum Pivoting at one Point. 2. It ^{can} move back and forth freely with gravitational forces. If these factor are constant and you increase the length of string the swing rate will be affected. Due to low frequency.

Research Description (Final copy to be put on display board or presentation)

A Pendulum is a device which is used to measure time. It is basically a wire connected to metal or other material this bottom part is also known as a bob. The bob swings back and forth. Pendulums follow the laws of Newton. The swing rate or frequency on a Pendulum is affected by its length from the point it pivots from. The motion of a Pendulum is affected by two energies kinetic energy which acts when the weight is moving and gravitational energy when its bob is in circular motion. How much you pull is how much it will move, so the amplitude is affected. When all factors are same like like the Pendulum pivoting at one point and like it moving freely with gravitational force, the Pendulum swing time will be affected so is the amplitude.

3. **State Your Hypothesis** - In your group decide what you think the outcome of the project will be and make a good guess as to what you think the answer to your question will be. **Also explain WHY you think that will be the outcome.** Remember, it is ok if you don't have the right answer; that is how scientists make discoveries. Make sure that your hypothesis is written in a complete sentence.

Hypothesis

Does the length of a Pendulum affect its swing time?
Yes, because amplitude is affected so is the wave frequency so that means when the waves are affected so is the swing time. So what is the hypothesis?

A longer pendulum has?
Swing time?

My hypothesis is that as I increase the length of the Pendulum the time period took for one swing will decrease.

5. Conduct experiment - when you do your experiment you need to collect data and make observations. You need to complete 3 or more trials. You will complete these in your Experiment Log. After you have completed the experiment use your log to write down the data and observations below. In your log you will need to:

1. *Collect Data* - you will need to collect numerical data; that means you need to take measurements during the experiment. It can be temperature, distance, height, etc. You will analyze the data later to determine the results of your experiment.
2. *Make Observations* - as you conduct your experiment you will use your senses (sight, smell, touch, etc.) and write down any observations you make during the process.

4. Design Your Experiment - Clearly write out the procedure you are going to follow. Remember that your experiment needs to follow the scientific process and that you need to have one variable that you are going to change.
1. Materials: List all the materials that will be used in the experiment, including the quantity for each material.
 2. Variables - List the variables that you are going to keep the same and the one variable that you are going to change. You need to have at least one control (normal) variable and at least two to three other variables.
 3. Write your procedure - Think through each step very carefully and list them in numbered order.

MATERIALS: Bulleted list of materials used, including specific sizes, colors, amounts, etc. Be sure to use metric units. (Example: two Celsius thermometers, 5cm of tape)

- String
- Timer
- circle made from wood (Bob)
- measuring tape
- Degree protractor
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____
- _____

Responding Variable
 - One thing that changes as a result of the manipulated variable
 Time measured for one swing.

Constant Variable
 What stays the same
 (Example: location, time out in the sun, thermometers)

Manipulated Variable
 1-ONE thing that is changed/different
 (Example: Aluminum can painted black, aluminum can painted white)

1. Number of swings
2. measuring tape
3. type of string used
4. type of string used
4. type of string used
5. same measuring tape
6. _____

the length of the string on both pendulums

Gather all materials.

1:

Make four Pendulums with string lengths (0.25m, 0.38m, 0.51m, 0.63m).

2:

First I hang the the Pendulum with length (0.25m) on a still object.

3:

measure the Degrees. Pull it up to 45°

4:

let go from one extreme Position to another through mean Position and come back to the first extreme Position (45°)

5:

record time taken for one swing.

6:

repeat the same with Pendulum having string length (0.38m)

7:

I hang Pendulum with length (0.38m) on a still object.

8:

measure Degrees. Pull Pendulum up to object 45°

9:

let it go from one extreme Position to another through mean Position and come back to the first extreme Position 45° .

10:

record the time taken for one swing

11:

repeat above steps two more times with Pendulums of length (0.51m, 0.63m).

12:

find average.

13:

$$0.25m = 0.46 + 0.00 + 1.28 = 3.24 \div 3 = 1.08$$

14:

$$0.38m = 1.51 + 1.20 + 1.60 = 4.31 \div 3 = 1.43$$

Repeat experiment two more times for accuracy.

15:

You're your hypothesis correct or incorrect? If incorrect, why?

My hypothesis was incorrect because
The length of a Pendulum is directly proportional
to its time period. As I increase the
length of the string the time period incre-
-ases.

Title: Period vs Length of a Pendulum.

Label: Length of Pendulum	Label:	Trial 1	Trial 2	Trial 3	Average
1. 10 inch (0.25m)		0 second	1 second	1 second	1.08
		96 millisecond	10 millisecond	28 millisecond	seconds
2. 15 inch (0.38m)		1 second	1 second	1 second	1.43
		51 millisecond	20 millisecond	60 millisecond	seconds
3. 20 in (0.51m)		1 second	1 second	1 second	1.79
		81 millisecond	75 millisecond	81 millisecond	seconds
4. 25 in (0.635m)		1 second	1 second	2 second	2.14
		90 millisecond	98 millisecond	55 millisecond	seconds

Results: Your data written in paragraph form. You may discuss patterns and comparisons found in your data.

Sentence 1: One sentence summarizing what you were testing.

Sentence 2: Briefly explain what the data was for the first trial.

Sentence 3: Briefly explain what the data was for the second trial.

Sentence 4: Briefly explain what the data was for the third trial.

Sentence 5: Briefly explain the average of the data collected. Here is where you would make a statement comparing the data, identifying the most and least quantities observed.

How does length of a Pendulum affects its time period.
For trial 1. Pendulum with length of (0.25m, 0.38m, 0.51m, 0.63m) had a time period of (0.16s, 1.51s, 1.81s, 1.90s) respectively (increases).

For trial 2. Pendulum with length of (0.25m, 0.38m, 0.51m, 0.63m) had a time period of (1.0s, 1.20s, 1.75s, 1.98s) respectively (increases).

For trial 3 Pendulum with length of (0.25m, 0.38m, 0.51m, 0.63m) had a time period of (1.28s, 1.60s, 1.81s, 2.55s) respectively (increases).

Average
Pendulum with a length of (0.25m, 0.38m, 0.51m, 0.63m) had a average time period of (1.08s, 1.43s, 1.79s, 2.14s) respectively (increases). The data shows

As the length of the Pendulum's string increases so does the time period for one swing increases.

This means that length of Pendulum is directly Proportional to its time period.

you include the numerical data (measurements) as well as other important observations that you made.

8. Draw Conclusions - After you have determined the results it is time to decide the answer to your original question. Write your answer in a complete sentence using the question to begin your answer. You also need to tell whether your hypothesis was correct or incorrect. If it was incorrect explain why you think so. End this paragraph by saying how you could change or improve your experiment in the future.

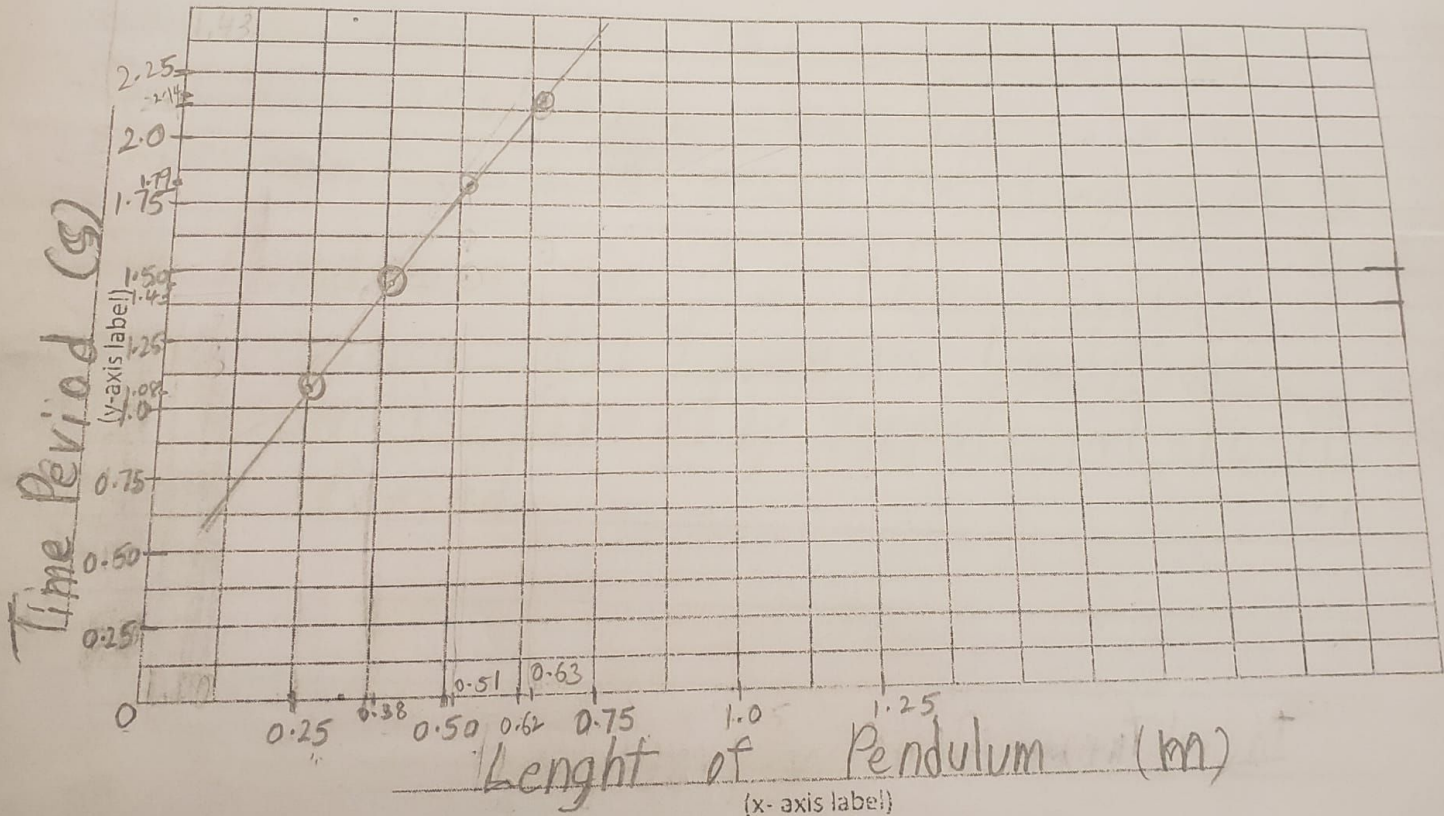
Conclusions

Answer to your original question: yes the length of the Pendulum affects its swing time. In my experiment as I increased the length of the Pendulum so did the swing time increased. It means length of a Pendulum is directly proportional to its time Period.

- Graph: Record **AVERAGE** data from chart into a bar graph.
- Bars must be equal widths and with equal spacing
 - First bar cannot touch "0" line on the y-axis
 - Select appropriate scale for y-axis (by 1's, by 2's, by 5's, or by 10's depending on your data)

Helpful website to create a graph: <http://nces.ed.gov/nceskids/createagraph/>

Time Period vs. Length of a Pendulum (Title of Graph)



If you were to complete this experiment again, what changes would you make? How would you improve this experiment?

If I was going to do this experiment again I would change:

1. the material of string because when I was conducting the experiment the string was slipping from its position.

2. I would change the bob because it was unstable at points so I would make it heavier.

9. Display board - Now that you have completed your experiment you will begin setting up your display board to communicate the results of your experiment to others. Remember, the board is graded on the information not how colorful or pretty it looks. Your display board must have ALL of the following components located in the same places. Other board guidelines:
- Font should be easy to read and at least a size of 16pt or greater.
 - Photos should not include faces of students
 - Information on the board can be typed or written neatly by hand.

Abstract:

Less than 250 words: include
1 sentence purpose,
1-2 sentences about procedure
1 sentence about results
1 sentence conclusion

Purpose: Give the Reason for your study. What made you decide to pick this particular experiment? Why should people want to know about this experiment?

Background Information:
Bullet points to help reader understand the reason for your study and your procedure choices

Procedure Diagram or Flowchart to show the steps of your experiment. You should include a photograph of you actually performing the experiment.

Other Requirements: All text, diagrams, graphs, tables should be computer generated. No handwritten text
Creating full size powerpoint slides and printing them works really well!
All paper must be cut using a paper cutter. No ragged edges. All cuts must be straight.
All headings must be BIG, around 40 font size. All other type should be large enough to read 4 feet away.
All units must be in metric and scientific names italicized and written properly. The genus name is capitalized and the species name is not

Title:

You can use a creative title, but make sure it hints at what type of experiment you did.

Experimental Question:**Hypothesis:****Reasoning for Hypothesis:**

Give a logical reason for your hypothesis

Define all constants, positive and negative control groups (if possible), and experimental groups.

Data Tables:

Must all have titles and units in each column/row. All data tables must be computer generated. Include a short sentence below each data table that explains to the reader what your data table means.

Graphs:

Must all have titles, proper scales, units (all in metric system), and printed in color. The graphs must be computer generated.

Include a short sentence below each data table that explains to the reader what your data table means.

All Graphs and Data Tables should be understood by a reader without spoken explanation.

Sources of Error or

Things you wish had happened differently during your experiment

Conclusion:

Summarize findings of your study in bullet form

Why are they important?
How do your findings help other scientists?

Further Investigations/Plans:

Include at least 2 ideas for future studies that could be done to further your research

Bibliography:

Proper formal format with at least 5 sources.

Make sure you show a source for every image and every bit of background information on your poster!

Procedure * Procedure is clearly outlined and presents a controlled experiment	5 pts	0 1 2 3 4 5
Results * Results are communicated clearly through graph/chart and well written explanation	5 pts	0 1 2 3 4 5
Conclusion * Conclusion includes appropriate evaluation of data and proves or disproves the hypothesis	5 pts	0 1 2 3 4 5
TOTAL /	30 pts	

0 = Not Presented	1 = Below Standard	2 = Minimum Standard	3 = Average Standard	4 = Above Standard	5 = Exceptional/Outstanding
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Period would increase as the length of the Pendulum's string increases. This would help us in everyday life

because if we want to find the length of a Pendulum whose time period is one second we wouldn't have to make gear systems that is complicated. one day if more research is done this statement can come true so I

thought to do this Question Does the length of a Pendulum string affects its swing time? I will do this

experiment by first making four Pendulums with different lengths (0.25, 0.38m, 0.51m, 0.63) respectively then use a timer to note time taken by each oscillation. I observed the Pendulum (2) with length (0.38m)

took more time (1.43s) for one swing than Pendulum (1) with length (0.25m) which took (1.08s). similarly,

Pendulum (3) with length (0.51) took more time (1.79s) than Pendulum (2) with length (0.38m) which (1.43s).

also, Pendulum (4) with length (0.63m) took more time (2.14s) than Pendulum (3) with length (0.51m) which took (1.79s).

from above observations I conclude that as I increase length of string of a Pendulum, the time period also increases. the time period also increases.

Science Fair Grading Rubrics

Group Members: _____

Science Fair Project Components		
Component	Points Possible	Points Received
Science Fair Project Planning Packet	10 pts	
Display Board with: <ul style="list-style-type: none"> • Question/Title • Purpose of experiment • Why was the topic chosen (background information) • Hypothesis • Key Words • Research • Variables • Procedure and Materials • Photos/Drawings • Chart or Diagram • Results • Conclusion • Bibliography • Sources of errors • Further investigation or plans 	30 pts	
Experiment Log	10 pts	
Abstract	10 pts	
Presentation (Both partners should be able to present the project independently)	10 pts	
TOTAL	70 pts	

Science Fair Project Content		
Content	Points Possible	Points Received
Question * Question is relevant and testable through experimentation	5 pts	0 1 2 3 4 5
Hypothesis based on observations	5 pts	0 1 2 3 4 5

This means that the length of a Pendulum is directly proportional to its time period.

Finally, you will type up the abstract, edit and revise it, and then print it. Make sure that your abstract is written in Times New Roman or Arial font at size 12pt.

- copy it over. You must have the following five components in your abstract:
- Introduction
 - Project Question
 - Procedures
 - Results
 - Conclusions

The only new thing you will need to write is the **Introduction**. This is where you describe the purpose for doing this experiment or project. Tell why people should care about the work you did. How does your experiment give us new science information? Can this information be used to improve our lives? If so, how? This is where you want to interest the reader in your project and motivate them to read the rest of it.

Abstract Introduction

The Purpose of doing this experiment is that I wondered how clocks move? because when I saw clocks the Pendulums would be different sizes so I thought that the length of a Pendulum's string would change the time period. I think people should care about the work I did because the information I provided can be used to study the laws of Newton more.

the new science learned by my Project is that how the time