

Anything in italics is commentary – think about it, and then remove it!

Title

(make it informative)

by

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Date: _____ *(you'd be surprised how many forget this!)*

ABSTRACT

Write an abstract of about 100 words that states succinctly what you investigated and THE RESULTS of your experiment. (You are not writing a novel, but if you were, the abstract would tell you who the thief was.) You should include words that colleagues might use in a search.

The abstract goes here

** When you put your name on a piece of scientific work, you are implicitly making the following affirmation:*

I promise that what is reported here is a true account of the results obtained in my experiment. I have upheld the highest standards of scientific integrity in recording and reporting the truth. I further promise that this is my own work, except as explicitly stated in the acknowledgment section. I have not included the work of any others without proper attribution. Any sources such as texts or internet articles are explicitly quoted in the reference/bibliography section. Any information I have gained from these acknowledged sources has been studied carefully and internalized and reported in my own words so that it reflects my own understanding and interpretation.

This is just as important an issue as it ever has been, and the scientific community has recently been plagued with instances of serious fraud, and many more of plagiarism, piracy, and unintended theft of intellectual property. As scientists, you must be aware of this issue and think about it constantly in your own work.

What information would be useful to have in the header?

MOTIVATION FOR THE EXPERIMENT

One should always explain why the experiment was done. This motivation might be an explicit hypothesis that is to be tested, or the formulation of models whose accuracy is to be assessed, or an exploratory study. It is generally best not to go into mathematical details at this juncture, but to give the reader a good indication of what is to be tested or discovered. Here's an example – finish it, edit it, make it better!

A simple model of small-amplitude motion for the pendulum makes a striking prediction: the period of a pendulum's oscillation is independent of its amplitude. We measured the oscillation period of a plane pendulum at different amplitudes to see what amplitudes qualified as "small". We also learned a technique to calculate the pendulum period analytically assuming a particular model for the potential energy so we wanted to test whether the model was a good representation of this physical system.

This report describes *What is in your report?* The report also presents an analysis of the data that clearly shows that the period of the pendulum

EXPERIMENT

(about half a page of text?)

DESCRIPTION OF THE APPARATUS

A brief description of the apparatus is essential, including any written comments that don't fit well into a diagram. You'll have to make judgements about how much detail to include. You have to convince people that you are aware of experimental issues that could influence your results. Don't be long-winded though.

No report is complete without a detailed, clear drawing. Decide what information is best delivered in this diagram. Consider including dimensions, detailed labels and close-ups. Would a photograph be better, worse, or complementary? Would it clarify, or just be decorative? Would a sophomore in Physics understand it?

Figure goes here.

Figure 1. Diagram of the pendulum apparatus. *Every figure must have a label and a short caption. Every figure must be referred to in the text.*

What information would be useful to have in the header?

CALIBRATION OF THE APPARATUS

In this particular experiment, calibrating the output is very important. Here, you measured the resistance of a potentiometer and that had to be related to the angular displacement. You had to decide how to make the connection. Describe the calibration procedure, and tabulate and graph your results. Be sure table columns are clearly labeled, and graphs are large, clear, and legible. Label axes and include units.

Hints: the angle that the pendulum makes with the vertical is recorded as a voltage or a resistance on a computer. You need to know how to translate the measured voltage into an angle. A straight-line relationship between the voltage and the angle is likely (but you have to demonstrate linearity, not assume it) and you should record the linear fit parameters as well. Good calibrations include the entire range of data investigated, and they include more than two points!

Half a page is about right.

Figure x.

Table x.

What information would be useful to have in the header?

DATA ACQUISITION PROCEDURE

Describe briefly how the measurements were made. Focus on clarity. You want to convince readers that your method is valid and give them enough information to repeat the experiment, but not long lists of detail. You measured the angular position as a function of time, so be sure to present a graph of typical motion. You'll also need to measure some physical properties of the pendulum in order to predict the amplitude of oscillation predicted by your model.

RESULTS

GRAPH OF PENDULUM DISPLACEMENT:

This is a very important graph. It should be carefully considered. Show on sketch voltage amplitude, period, and any other quantities you think are useful. Pay careful attention to the presentation. - units on axes, large, clear labels, significant figures on labels etc.

You may have a large amount of data – how will you select/manage it? Try not to "dump" it in an appendix.

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ANALYSIS

Check significant figures on recorded and calculated quantities. *It is important show how you analysed your data. Did you measure one period, or a few and take an average? Why? How did you decide on the amplitude? Perhaps you could indicate graphically on your motion graph what you did.*

Both graphical and tabular information about the period/amplitude relationship are necessary.

TABLE OF PERIOD AS A FUNCTION OF AMPLITUDE

Is the information in your table clear and easy to read? Have you checked the number of significant figures? Are the units clear? If you cut and paste from a spreadsheet, pay careful attention to significant figures and formatting. Most spreadsheet programs are not optimized for clarity and ease of reading.

GRAPH OF PERIOD AS A FUNCTION OF AMPLITUDE

Is your graph large and clear? Are the axes in units that the reader will be able to interpret sensibly? Consider expressing the period in units of the small angle period, and/or the amplitude in terms of the small-angle amplitude. You'll need to think about what advantages or disadvantages this offers. Make your labels clear, and choose scales appropriately. Use space well. Will you use lines, or points? Be warned that the default graphics in any software package (especially Excel) are unlikely to be suitable for your purpose. You may have a large amount of data – how will you manage it? Try not to "dump" data in an appendix.

Would it be useful to include the model predictions on this graph?

This is the guts of your report – one or two pages?

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ASSESSMENT

In this section you should describe the results of your experiment and make any preliminary assessment on the agreement with postulated models. In this particular lab, it is particularly powerful to present your assessment graphically as well as verbally. You can comment on the accuracy of the measurements, and so on. For this particular lab, the assessment section can be very brief (1 paragraph). In other assignments, it should be more extensive; in some papers, it is the dominant contribution.

SUMMARY AND CONCLUSIONS

Many statements in the summary will have been made in previous parts of the report, particularly in the assessment. Your job in the summary is to provide an overview and a strong conclusion. We look for consequences of our successes, and note loose ends that may need further work.

This is a good time to reassess your abstract and see whether the results of the experiment are reported in the abstract.

What information would be useful to have in the header?

ACKNOWLEDGEMENTS

The measurements were taken in a group including Jane Smith, José Sanchez, and Dr. Wei-Min Wu. *Note how full names are given. Professional courtesy demands that you identify your colleagues appropriately.*

Helpful comments were provided in conversations with Jane Smith, who suggested the particular style of presenting the data. The photograph on page x was taken by José Sanchez. Prof. Bohr's help improved my understanding of numerical integration.

Other acknowledgements may also be appropriate.

Note that all you present in this report is assumed to be entirely your own work unless you state otherwise here. Be sure to honestly credit others. Your raw data is certain to be identical to that of others in your group, but all analysis MUST be independent, including, and especially including, computer analysis. Discuss your analysis with others, and exchange ideas, but do not work together to produce the same graphs.

BIBLIOGRAPHY

References may contain general sources, including lecture notes and texts, but be specific about the pages you consulted. If very specific information is referenced, make sure that is indicated at the relevant place in the report.

Appendix A: *If you need one*

Appendix B: *If you need one*