How to Write a Formal Report

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General Writing Tips

1. You have a deadline to meet
2. So you have to plan the writing carefully
3. The writing will be the most difficult part – so concentrate on this the most
4. Avoid slang, abbreviations (unless your formerly define these) etc
5. Do not waffle in the write up – be concise
6. Try to use good English or Welsh grammar
7. Avoid unscientific words like: I "got" this result and it seemed "weird" as yesterday the results looked more "awesome"
8. Write in the past tense – you did the experiment before you did the write up!
9. Use section numbers and sub section numbers
10. Always label graphs, figures, tables
11. Always include units
12. Try to make the report look presentable and tidy
13. Each section should start with an introduction paragraph and have a summary paragraph at the end
14. Avoid personalizing the report e.g. "I did this" or "Fred messed up the equipment by…."
15. Avoid split infinitives e.g. "To boldly go where no man has gone before" should read: "To go boldly where no man has gone before"

Contents

This is what constitutes a general laboratory report…

Title and Author and Date

- This is rather obvious
- But you will lose marks if you forget
- Do not forget to add the year onto the date
- Also include the module name/code

Abstract - 1

•Most students consider writing an abstract a pain!

•What is the difference between an abstract and an introduction?

•Well an abstract is a 1 or 2 paragraph summary of what the experiment was about, why it is important, how you went about it, what results you got and your analysis and conclusion.

•In other words write about everything, but summarised into 1-2 paragraphs

•It is like if you went into a pub (full of other physics students) and had a short conversation about what your experiment was about

•The abstract must be formal and concise and contain no slang

•Take pride in your abstract – it will give you some extra marks

Abstract - 2

Here is an example abstract….

"This report presents the design of a temperature measurement and display system that uses the Motorolla HC11 microcontroller. This design makes use of the HC11 analog-to-digital converter and the serial subsystems. Temperature measurement and display circuits were built and control software was written to use the added hardware. In this design, the overall objectives were met. By keeping track of the measured temperature, the HC11 is able to control a temperature display that uses light emitting diodes. Also, if the temperature becomes very cold or hot, an alarm message is sent to a host PC terminal. This design has many potential applications, including temperature control and factory automation."

www.writing.eng.vt.edu/workbooks/designreport.html

1.0 Introduction

OK this is like the abstract but leaves off the results, method, discussion, conclusion etc

It is the "lead in" to your report.

Try to write a good introduction – if a book had a bad introduction – this will leave a bad impression for the rest of the report.

The way you structure your introduction can vary but here are some ideas of questions you may wish to answer:

1) What is the experiment about?
2) What is the relevance of the experiment?
3) What do you (and the reader) need to know in order to embark on this experiment or understand it's significance e.g. underlying concepts in physics, theory, equations/maths needed.

2.0 Method

You basically want to describe your experiment in sufficient enough detail that it can be repeated i.e. to check up on any anomalous results

A step by step guide is needed – but not too much excessive irrelevant detail

However it is good practice to emphasize care and precautions taken in the experimental procedures e.g. calibration, checking on repeatability of results etc

For each type of measurement that was made, that contributed to the final result, you need to state how this was performed

If you have had to design an experiment from scratch then you need to explain the theory behind your design and experimental procedures

Please make an effort to include diagrams – the sole purpose of these should be to help the reader understand the experiment

Some say that "A picture is worth a thousand words" and can reduce much text – but make sure though that the diagram it is clearly annotated

Please clearly designate/identify each piece of equipment used, even serial numbers (if applicable).

Specify measurement precision e.g. grid divisions etc

3.0 Results -1

- Include your relevant results here
- If you have “masses” of experimental data then please consider putting the raw data into an appendix and even potentially onto a CD-ROM
- You must include units of measurements and errors!!!!!!
- Show your results as a graph if there is an obvious trend (mathematically defined curve or line) to be seen
- Show your results as a table if there is no obvious curve or line
- Try to avoid showing the results both as a graph and a table – an alternative is to put the table into the appendix
- Always label your graphs i.e. caption, axes, numbers, etc
- Always have clear boxes for tables and include column headings, units, captions etc
- Please indicate on graphs error limits of fitted lines/curves and/or error bars on individual points
- Summarise briefly the results that you obtained but DO NOT ANALYSE just yet….

3.0 Results - 2

….. Summarise briefly the results that you obtained but DO NOT ANALYSE just yet

- UNLESS they require a lengthy analysis before discussing them e.g. mathematical curve fitting, hypothesis testing, derivation of higher level results, propagation of errors etc.
- Most of you can ignore the “analysis of results”

4.0 Discussion

- In this section you must "interpret" your results and the reader will learn new information from your experiment

- As a guide here are some questions that you may wish to answer (though you do not need to answer all of these):
  - How do you interpret the results with respect to you original hypotheses mentioned in the introduction and/or published papers/books
  - What are the main sources of errors in the results?
  - How reliable are your results?
  - Do your results support existing theories and ideas?
  - How could the experiment be performed differently in order to improve the results - or to check or disprove theories

- If the experiment failed then you should discuss why or how, your experimental procedure, could be improved.

5.0 Summary

- Many students leave the "summary" as an after thought
- The summary is the final part of your report that we read, so please make a good impression
- Please try to put some effort into this – think what would happen if all the Hairy Potter novels had poor endings!

- So you should repeat what the goals of the experiment were and the experimental method adopted – this should be about a paragraph (and not more than 2) long
- Then you should draw all the strands of the experimental results together and summarise e.g.
  - How successful was the experiment?
  - What have you learnt?
  - What went wrong?
  - How could the experiment be improved?

Acknowledgement, References and Appendices

- No need to "go over board" with the acknowledgement
- However it is sometimes a good idea to acknowledge whom you have had helpful discussions with

- For references [1] – if you have used[1] a reference book, journal (Cook *et al.*, 2006), data tables or the internet then please reference your source material or any diagrams that you used from elsewhere
- References can be quoted in two ways:
  - [1] Cook, A.C. (2008) "How to write a lab report", *Journal of Obscure Advice to Students*, 29(4), p129-134. – note that this style, the references do have to be in order in which they are encountered
  - Cook , A.C., Who, D.R, and Smith, S.J. (2006) "How not to write a lab report", *Conference on Un-Intelligence*, Apr 1st 2006, Colchester, Essex, p7821-7830. – note that this styles DOES have to be in alphabetical order

- Finally if there is any raw data that was too big to go into the results section then it can be listed in tabular form in an appendix or appendices. Each appendix should have its own appendix number to help identification
- You can include even the derivation of an equation in an appendix - if it looks suitable there

The End

Thank you for your attention

Any Questions???