

Common Shortcomings of PHAS1240 Student Notebooks

Introduction

This must present all of the equations from the underlying theory that will be used in the analysis of your data and justify their use. Don't use lots of sub-headings, which is confusing: write it as one consistent continuous section.

Method

This should not be too detailed since it is just an outline of what you intend to do (or think you will do) before you actually start. It provides an opportunity for you to set down a coherent plan of action. This is different to the Method section of a formal report where you will be summarising what you actually did (but again without excessive detail).

Results

This should be much more than just lots of graphs and tables. It's the detailed moment-by-moment account of what you do, why you do it, and what the results were. Don't rely on what you wrote in the Method section or what is in the script. Another student should be able to read what you write in your Results section and without difficulty and without reference to the script, carry out the procedures *just the way you did*.

Graphical Analysis

Without the use of sophisticated software the recommended way to analyse data graphically is by making a straight line fit. So if you are fitting your data to some function that is not in a straight line form, see if there is a way to transform the function and the data so that it does have this form. The reasons for this are: (1) the human eye is very good at judging whether points lie well along a straight line; (2) the Data Analysis Tool in Excel can perform a good straight line fit and provide you with the gradient and the intercept *and their uncertainties*. The Excel "trend lines" that come with the charting tool are good only "as a guide for the eye", so if you use these, put this phrase on the graph and do not use the numerical values of the trend line coefficients.

Conclusion

The Conclusion section is a summary of everything that went before. It should make sense when read alone without reference to the other sections of your record or the script. So it must begin with a brief description of what the experiment is about: one or two sentences should be sufficient. The second essential thing that must be in the Conclusion is a statement of the main results of the experiment *as numbers*, with correct units and uncertainties. Vague qualitative assessments do not belong in a physics report. Then there is the requirement to comment on errors and make suggestions for improvements to the experiment. Be very brief here. It is obviously possible to ramble on forever about such things. If the experiment went perfectly as expected and thoroughly bore out the expectations from theory then that's all you need to say. But if you think that one or two sources of error, particularly suspected systematic error, significantly affected the quality of your result, and you can justify this, then say so. The suggestions for possible improvement should then focus on those errors you have just highlighted. It is of no interest to anyone to propose that high precision optics, fast video cameras, computer control, or better made equipment would probably improve the experiment!