WRITING SCIENTIFIC REPORTS.

A scientific report, whether a journal article describing some original research, a company report, or a write-up of a student experiment should conform to a high standard of writing. It should be well organized and present the essential ideas and important details in a concise and readable manner. Good grammar, including proper spelling, punctuation, and use of abbreviations, should be taken for granted. While all reports need not follow the same format, most good scientific reports include a number of basic elements. These are discussed below.

Title page
This page must contain the title of the experiment, the name of the student (and the name of your partner if you collaborated in the collection of the data), the date of submittal, and the date the experiment was performed;
Example:

Title: Much A do About Nothing
Name: Bill Shakespeare
Collaborator: Frank Bacon
Date of Submittal: 15 April 1602

Abstract
This should be able to stand alone without reference to the rest of the paper and can usually be included on the title page. It should state very concisely (in one paragraph) the scope and nature of the subject discussed, the basic method or approach, and a summary of the major findings. Note that it is more valuable to the reader to learn, e. g., that "the dispersion of the grating was found to be $3.01 \pm 0.04 \times 10^5$" than to read that "the dispersion of the grating was measured.

Introduction
The introduction should layout for the reader exactly what is to be discussed in the paper, the purpose of the work, and (whenever appropriate) a brief history of previous work relevant to the investigation. Here the authors of an original research paper can describe what is new in their work and how it contributes to the field. While this is not usually appropriate in a student report, even here there are cases where deviations from instructions are made, and these should be pointed out.

Theory
In most student laboratory exercises there is a theoretical structure on which the measurements and conclusions are based. Generally this is presented in textbooks or in class and needs only to be referred to and the basic results or pertinent equations given. If so, this can be included in the introduction in most cases. But sometimes a little known or
new equation is to be used, or a student may come up with an original point of view or novel method of approach. In this case the ideas can be presented in a separate section.

Description of experiment
In this section one describes, briefly, the methods used in making the measurements and the apparatus used. Diagrams are often helpful here. Serial numbers of every battery and optical bench are not necessary, but it is often helpful in evaluating your experiment if you have identified the major pieces of apparatus used. This is also the place to describe experimental difficulties and how (or whether !) they were overcome and any corrections or calibrations that were used.

Data
This may be a separate section or, if small, can be included in the previous section. Data should usually be presented in tabular form with headings and units clearly and unambiguously labeled. Graphs are also appropriate and should be used when trends in data or variations of variables are to be pointed out. In this section you should also indicate how the relevant calculations are made. For cases in which graphs and data are printed or plotted from the computer, the originals may be used, or photocopies of them.

Results and conclusions
In some cases the purpose of the experiment is the measurement of specific quantities. In this case the final measured values should be given along with the experimental uncertainties. Your result should be compared, whenever possible, with previously measured values, handbook or textbook values, or a theoretically calculated result. A statement should be included describing the extent of agreement or disagreement, and any discrepancies should be discussed. This is also the place for a discussion of your experimental uncertainties.
In other experiments {e.g., the Franck-Hertz experiment} an important aspect of the investigation is to illustrate an effect or to distinguish between rival models or theories. Here is where you should draw conclusions based on your data. This may also involve a discussion of uncertainties. In some cases you may have to say that no conclusions can be drawn from your data. In this section you might also point out possible improvements in the experiment.

Appendices
Supplementary material that would not be appropriate to put in the main body of the paper can be given in an appendix. Examples are lengthy derivations or extensive tables of data.