A Guide to Laboratory Report Writing

(based on a similar guide prepared at the Illinois Institute of Technology,
http://agni.phys.iit.edu/~bcps/labs/resources/lab_guide.pdf)

The laboratory report should always be written for the convenience of the reader. Thus, for example, each section of the report should be headlined and the sections should be arranged in an appropriate, easily-understood sequence. In the context of the course for which it is written, the laboratory report serves to describe what you did during the laboratory session, how you manipulated the raw data, and what you conclude as a result.

The sections required in a typical laboratory report are listed below:
1. Title Page
2. Statement of Objective
3. Theory
4. Description of Experimental Setup/List of Equipment Used
5. Procedure
6. Data
7. Analysis of Data
8. Discussion of Results
9. Conclusions
10. References

The content of each of the sections in a laboratory report is described in the following pages. Most of the descriptions are general enough to be valid for all reports.

1. Title page
The following information should appear on the title page:
A name and number of the experiment
Your name
Date(s) the experiment was performed

2. Statement of Objective
State the objective(s) of the experiment concisely, in paragraph form. The laboratory manual or instruction sheet will help here. The fact that experiments in laboratory courses are being used to educate students is a secondary objective, and should not be stated in the report. In other words, the objective written in your report should never be to "familiarize students with the use of equipment." Rather, the objective should state the problem that your procedure and data attempts to answer. Some key verbs that you will use in the objective might include "to investigate," "to plot," "to measure," or "to compare." The section should inform the reader precisely why the project was undertaken.

3. Theory
A concise description of the relevant theory should be provided when the theory is needed to understand other parts of the report, such as the data analysis or discussion sections. This section is sometimes combined with the introduction and background section, if this results in a more readable report. The relevant equations should be introduced and all the terms to be used in the report should be defined. Equations must be presented as parts of complete sentences.

4. Description of Experimental Setup / List of Equipment Used
List all the equipment and materials used in the experiment. The reader must be able to connect each item in this section to the item in the Description of Experimental Setup section.

5. Procedure
Detail the procedure used to carry out the experiment step-by-step. Sufficient information should be provided to allow the reader to repeat the experiment in an identical manner. Special procedures used to ensure specific experimental conditions, or to maintain a desired accuracy in the information obtained should be described. As with all sections of the report, the procedure describes what *was* done in the lab and should, therefore, be written in the *past tense*. Copying the procedure from a lab manual would be an inaccurate reflection of the work completed in the lab and is not acceptable.

6. Data
All the pertinent raw data obtained during the experiment are presented in this section. This section should contain only raw information, not results from manipulation of data. If the latter need to be included in the same table as the raw data in the interests of space or presentation style, the raw data should be identified clearly as such. All numerical data should be tabulated carefully. Each table, figure and graph in the report must have a caption or label and a number that is referenced in the written text. Variables tabulated or plotted should be clearly identified by a symbol or name. Units, if any, should always be clearly noted.

7. Analysis of Data
This section describes in textual form how the formulaic manipulation of the data was carried out and gives the equations and procedures used. If more than one equation is used, all equations must carry sequential identifying numbers that can be referenced elsewhere in the text. The final results of the data analysis are reported in this section, using figures, graphs, tables or other convenient forms. The end result of the data analysis should be information, usually in the form of tables, charts, graphs or other figures that can be used to discuss the outcome of the experiment. This section must include statements about the accuracy of the data, supported where necessary by an error analysis. Sample calculations, details of calculations, and error analyses should also be included.

8. Discussion of Results
This section is devoted to your interpretation of the outcome of the experiment or project. The information from the data analysis is examined and explained. You should describe, analyze and explain (not just restate) all your results. This section should answer the question “What do the data tell me?” Describe any logical projections from the outcome, for instance, the need to repeat the experiments or to measure certain variables differently. Assess the quality and accuracy of your procedure. Compare your results with expected behavior, if such a comparison is useful or necessary, and explain any unexpected behavior.

9. Conclusions
Base all conclusions on your actual results. Explain the meaning of the experiment and the implications of your results. Examine the outcome in the light of the stated objectives. This section should answer the question “So what?” Seek to make conclusions in a broader context in the light of the results.

10. References
Using standard bibliographic format, cite all the published sources you consulted during the conduct of the experiment and the preparation of your laboratory report. List the author(s), title of paper or book, name of journal, or publisher as appropriate, page number(s) if appropriate and the date.