Student practicals and laboratory experiments are often written up in the format of the traditional scientific report (introduction, method, results, discussion). This format has evolved to fill the need of the scientific community to critically evaluate research. As with an essay, the most important factor in getting a good grade (besides using the format correctly) is to give the examiner evidence of your ability to interpret evidence (in this case, data) and relate the interpretation to the theory of the academic discipline.

Your audience is the examiner, ie, the lecturer, tutor or demonstrator. They know more than you do about the subject, but this is irrelevant because your aim is to demonstrate your understanding of the content area and your skill in explaining observations and thinking about their implications.

**Aims and hypotheses**

You may have been asked in the past to state the aim of the experiment at the beginning of the report, eg: "To show where transpiration occurs." The hypothesis, however, would be stated as "transpiration occurs mainly through the leaves." Hypotheses are always testable, aims are not. You should always work out a statement of the hypothesis for an experiment, preferably during your lab preparation - it's a good test of whether you understand what the experiment is about.

The hypothesis is usually stated at the end of the introduction. Hypotheses can be rejected (disproved) but can never be proved (because no experiment can ever look at all possible occurrences of a phenomenon, you can never be sure that there are no exceptions), so they may be stated in the negative form, eg: "Temperature has no effect on enzyme activity". In this way a statistically significant result will allow you to make a definite statement in the discussion, eg: "Increases in temperature above 37°C result in lower enzyme activity".

**The introduction**

In the introduction you explain to the reader why you have reached the hypothesis which is to be tested. The reasons will be in the published scientific literature. For first year subjects, this could be the textbook, but for later years it will likely be journal papers. The introduction is really a justification (an argument) as to why the hypothesis was formulated and is plausible, and maybe also why the method was designed and should work. Use the Harvard system to cite the references.
Materials and methods

This section is probably the easiest to write and you may wish to do it first. If the method is given in detail in the lab manual you may be allowed to simply refer to that, thereby saving yourself and the examiner trouble. However, if you do need to write it in your report, you can often improve on the manual, including information from pre-lab talks, or reducing the amount of detail. Any changes to the method should certainly be recorded.

Results

The results section will rarely consist of your raw data. Often readings of chemical or other indicators will be confined to an appendix and the results section will present more meaningful data in terms of the hypothesis, eg the enzyme activity levels calculated from colorimeter readings, not the actual colorimeter readings. The usual formats for results are means and standard deviations, and tables or graphs which summarise masses of individual readings in an easily comprehensible way.

Your ability to convert data sensibly is itself a test of understanding of the experiment. Make sure that you give tables and graphs a legend explaining what is shown and that you label graph axes and table row and column headers. Refer to what is shown in them in the text, eg "Table 1 summarises the effect of temperature on enzyme activity." The results section will contain statistical tests, but should not contain any interpretation of what the results mean. This enables the reader to separate your observations (which may be accurate) from your interpretation of them (which may be more problematic).

Discussion

This is where you get to explain what it all means, so usually a major proportion of the marks will be allocated for this section. It will probably also be the longest section and should take the most thought. This is where you argue that the results do (or do not) support the hypotheses. You may also explain (through new hypotheses) any results or observations which were unexpected, or the fact that no results were obtained. You may refer to other literature to do this. Try to think beyond blaming poor experimental technique to the scientific implications of your results.

It is still possible to get a good mark for an experiment which did not "work" as expected if you can think of convincing explanations and demonstrate knowledge and understanding of the theory.
<table>
<thead>
<tr>
<th>Report section</th>
<th>Writing tactic</th>
<th>Purpose - what you’re trying to achieve/what examiners want</th>
<th>Writing techniques</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Literature review / introduction / aims (WHY?)</strong></td>
<td>Survey, synthesise, and critique relevant literature. Formulate hypothesis in relation to literature (if it is not given).</td>
<td>Establish your knowledge of others’ work. Demonstrate understanding of this experiment. Relate experiment to theory. State hypothesis of experiment (not the same as the aim). It is your initial best guess as to the outcome.</td>
<td>Report, describe, define, explain, argue, predict, criticise, evaluate, justify, refer, hypothesise.</td>
</tr>
<tr>
<td><strong>Discussion / conclusion (SO WHAT?)</strong></td>
<td>Inference from results. Relating inferences to current theory. Suggest further hypotheses and experiments.</td>
<td>Demonstrate interpretation skills. State relationship of results to existing theory. Demonstrate ability to see future lines of research. Criticise methodology. Evidence of thinking.</td>
<td>Infer, explain, argue, predict, criticise (self and others), evaluate, justify, refer.</td>
</tr>
</tbody>
</table>

Adapted from "Writing a research paper" Murison and Webb 1991.