Third year Lab Book/Log Book/Lab Report

Please also check

http://thirdyearlabs.ph.unimelb.edu.au/wiki/General_Writing_Tips

What your lab report is:

Students often have difficulties working out what they should write in their lab reports. The reason for this is that student experimental lab reports are somewhat unique; they are neither a polished scientific report, nor are they just a laboratory log book: they are a **hybrid of both!** Below specifies what both a report and a logbook is, then talks about how we're in the middle ground.

A report is:

A report is a polished, spell checked, concise, ordered document that is written about an experiment, after it is completed. It tells the story of the experiment, but only in sufficient detail so that another scientifically literate reader can understand basically what and why something was done, how it was done, and what was the result.

In a report everything is known in advance, so sections will flow cleanly from one to the next, introducing a concept before presenting analysed and processed results that relate to that concept. In journal articles, there will even be an abstract at the start of the report, which summarises aim, method and conclusions.

Reports will typically have the structure: Abstract, aim, introduction, theory, methods, results, discussion, and conclusion. Although often theses sections are not labelled as such, and multiple sections may be mashed together. Eg Introduction/theory/methods or results/discussion.

Since we haven't done our experiment yet, we are evidently **not writing a traditional report**.

A logbook is:

A logbook is the book that you write everything down in as you are doing science, so you can remember what you have done, and how you have done it. It is the document that you refer back to when you come to write up a report at a later date. It is also for when you have to something similar again and you need to remember what settings you used/how you did an integral/what exactly the numerical result was. Incidentally, it is also a quasi-legal document, which you can present as proof that you actually did an experiment if somebody questions your work in the future.

It is not completely devoid of structure, as it will have many subheadings (the size of which often indicate the importance of whatever is on the page), but clearly you cannot know in advance what you are going to discover, so a log book will structurally jump around quite a bit. Logbooks may well have pages of calculations or raw results, but they will always have labels as well as small summaries at the end. Remember: a logbook

is only useful if you can work out what the hell was going on when you come back to it, possibly years later.

<u>What your hybrid – lets call it a Log report – should contain:</u>

Aim

It will have an aim at the start. And this won't just be "to learn about stuff" (even though that is ultimately what you are here to do), but something concrete like "to learn about stuff AND to find the value of [insert name of physical constant] using [inset name rad physical phenomena that you are going to exploit to find the value]".

Introduction and theory (and possibly the general method)

It will have an introduction and theory section toward the start (possibly separate, possibly combined). This can be tricky. Even though you have already read the lab script for your experiment thoroughly (I'm not even joking), you will learn more about the concepts in your experiment as you do it, so you might be tempted to leave the theory until the end: THIS IS A MISTAKE. Write as much of the theory as you can before you really get into the experiment too much. Trying to write it will help you understand it, which will let you get much more out of the experiment. You also have a demonstrator on hand to help: milk them for information, and don't be afraid to grab an introductory book from the library, or even have a glance at Wikipedia.

Leave a few pages at the end of the theory so you can come back and add more when you have a better understanding of what is going on.

Method/ Observations/ Results/ Calculations/ Summaries/ Analysis/ Discussions

This is the logbook section of the Log report, and will take up by far the largest part. Remember, this is a record of everything you do, written down more or less as you do it. You will have to find a balance of exactly how much detail to put in, but generally the more the better. There will be many different sections of the logbook for each of the above mentions sections. Therefore, the logbook can easily become unreadably disordered and useless, so here are some pointers on how to keep it useful.

Number pages – so you can refer back when you are writing new stuff, and to refer foreword if you go back to make notes about new findings.

Label and number figures – to easily refer to them. Give them enough white space around them so they stand out.

Write subheadings (VERY IMPORTANT)– whenever you start something new. Eg, "Observations about computational speed", "Uncertainty calculations for T1 time from multi – pulse method".

Write summaries (VERY IMPORTANT) – particularly after some long analysis, state the main result clearly AND BOLDLY, so it is easy to find later.

Write bigger headings and bigger summaries where you are progressing from one main part of the experiment to another.

Discussion
You will have a decent amount of discussion in the logbook section, but a nice concise discussion of the important parts of the experiment at the end of the logreport will start to tie the whole experiment together in a coherent way. This is where you start to go back into report mode, and it gives you a chance to use the knowledge you have gained about the experiment to tease out the finer details, which you might otherwise have glossed over without realising. Remember, uncertainties are a rich source of discussion, and an extremely important part of physics experiments.

Conclusion
This is just like in a report. Write down what you found, how you found it, possibly what the uncertainties were and anything of particular interest. Basically, answer if you fulfilled your aim, and give some details. Do NOT introduce new information in the conclusion. Error discussion goes in discussion.

Mistakes
If you make mistakes and acknowledge them (and learn from them), you are doing good science. If you make mistakes and don't acknowledge them, you're doing bad science. If you're not making mistakes, you're not doing science.
Do not use white out – this is asking to be accused of scientific fraud. If you have to cross things out, to it clearly but so you can still see what was underneath. Write a note next to the cross out. Eg "This theory was wrong. See page 52 for correct theory".

Marks
Each experiment is out of 30 marks: 10 for lab work, 20 for the logreport.
To get a good mark for lab work, be pro-active. Ask your demonstrator about the experiment, question the lab script: it might not be right. Fiddle with the equipment, a lot of physics is about playing (it might be a good idea to white down what was plugged into what before you do too much fiddling though :P). Have fun!

Due date
Log reports are due the Friday of the last week of the experiment, at 5pm. Penalties apply for lateness. It is not worth copping the penalty so you can work on the log report over the weekend. You will ultimately get more marks by using that time to learn the material for other subjects, and doing well in the exams. You should write your log report in the lab, you have 24 hours to do it, and demonstrators on hand to milk for information if you need it!

Remember:

Subheadings
Summaries
Observations
Write as you go
Have fun!