## Writing Up a Practical

Title:

The title of a practical write up should be detailed enough to also act as the Aim of the Practical, e.g. “Measurements to Test How the Resistance of Nichrome Wire changes when its Length is Changed” or “Testing How the Length of a Spring Changes as Weights are Added until the Spring Fails”

Diagram:

A write up should always have a diagram of the equipment. A good diagram removes the need for a long description in the method.

It is not a complete diagram unless it is labelled. The equipment must be drawn assembled for use and not as individual pieces. A ruler must be used. Where there are standard symbols - such as a crossed circle for a lamp – these should be used.

As a general rule the simpler the diagram the better, for example, supports like retort stands and clamps may be left out if their inclusion just complicates things. Any equipment left out of the diagram should be mentioned in the Method.

If preparing your report on computer it is permissible to have photographed your experiment with your phone, try to avoid including your classmates in the photo, and to include that photo in place of a diagram. BUT the photo will still need to have labels added to it. The only exception is for electricity, where a standard circuit diagram is much more useful than a photograph.

Method**:**

A Method and Diagram are there for two reasons; to allow another scientist to repeat your work, and so that it is clear to your teacher or examiner that you have thought about the difficulties of your experiment. A method must include:

1. Which variable you deliberately changed (independent variable), and how you did so.
2. The number of steps the independent variable was altered by and how large each step was. If you could not carry out more than six steps you should explain why. If the steps were not of equal size you should explain why.
3. Which variable you measured (dependent variable) and which instruments you used to measure it, e.g. a metre ruler for large lengths, a digital calliper for small lengths, a micrometer for tiny lengths.
4. The steps needed to record results if some of the results were recorded on computer via a datalogger. For example “We used the Graph function in the Easylog software to display a graph of voltage and time. We then measured the peak voltage by pointing the mouse at the peak after clicking the *Values* button”
5. Any variables you needed to be particularly careful to keep the same (control variables). There is no need to list obvious things like “we made sure we used the same spring”.
6. Whether you took repeats, and if you did how many.
7. Any calculations, for example “I divided the potential difference by current to get resistance” or “I worked out the average of my repeats”.
8. A class risk assessment will have been carried out for the practical. You may have photographed this assessment to remind you of its key points. Any important safety considerations must be included in your Method, but you do not have to write the whole risk assessment out again.

Results:

Before you draw a results table make sure that you write down measuring instruments used, and their resolutions (or sensitivities) , written as an uncertainty, e.g.:

 Electronic scales resolution ±1g

You will have often laid out you results table before the rest of your write up. If your first table was neat just write something like “see results table on previous page”, if not, redraw it.

The heading and the columns should be separated by lines drawn with a ruler.

A table should contain columns for all the things that you recorded, with your independent variable in the leftmost column. The column headings must contain titles and the units. The values in the columns themselves should not have units.

Graph:

If possible a physics experiment is designed to produce a line graph which can be analysed in the conclusion.

Usually in Physics you will hand plot the graph and not use a computer program like Excel.

Care should be taken to make sure that the axes fill the graph paper provided, the paper should not be cut down to fit the axes. It does not matter whether the paper is used landscape or portrait – turn the paper the way that allows the axes to fit best. Graph paper can be asked for in any lab or, if necessary, printed from the internet.

The independent variable is always horizontal. A graph is not complete unless it has labels and units on both axes and a title. A line of best fit (curving smoothly if necessary) is always required on a line graph – joining the dots is *NOT* allowed.

Analysis/Conclusion:

For a long report Analysis and Conclusion are separate sections, for a simple write up a Conclusion can be both.

Where you have drawn a graph your conclusion should include:

1. What the graph told you about the relationship between independent and dependent variables. “As the length increased so did the resistance, there is a straight line that passes through the origin on my graph.”
2. Problems visible on the graph, “From my graph it is likely that the result at 120N was an anomaly because it is not near the line of best fit” or “although there is a general trend my results are scattered around the line of best fit and may not have been very reliable”.
3. Any extra measurements you might have done or results you could have checked having looked at your graph. “It looks like my graph peaked around 20cm and so some extra measurements around 20cm would have been a good idea to check this”
4. What your results might tell you about the physics. “The largest differences in PD were for metals a long way apart on the reactivity series, so there is a connection between difference in reactivity and potential difference”.
5. Whether your results matched your expectations, or the physics that you might have looked up (which you should explain and give a reference for).
6. Any other problems you noticed, “My repeats were quite different – the experiment was not very reproducible”.
7. What physics you learnt.

Without a graph a conclusion is harder but should include as much of the above as possible.

Note:

You are encouraged to write up practicals using a word processor on a computer. If you have not taken a photograph and you are not adept at drawing on a computer leave a space and draw the diagram in afterwards.

BUT the work must be printed out before the lesson by you, and printed out pages must be stuck into your exercise book so they do not get lost. DO NOT start your work on computer if you know you do not have access to a printer.

Physics graph paper is available from all three labs, and you should remember to pick up a sheet when you have homework. Similar quality paper is sold in 50 page books by most stationers. Failing that there are some websites that allow you to print graph paper for free, search for something like “graph paper A4 2mm”. We have found that good graph paper with a coloured grid produces much the best results, so avoid cheap, grey graph paper.

See also:

**Experimental Glossary**

This is also available for download from the VLE, and will help with the technical terms in these instructions.