**What to include in your write up for Course Work B**

There are 5 main sections in your coursework B write up. These are

1. The introduction
2. Preparation and planning,
3. Procedure, apparatus, safety, data collection/observations,
4. Analysis and conclusions
5. Refinements and comments.

We will go through each section looking at ideas of what you can include to maximise your results.

**The Selected Investigation**

Simply write out the investigation that you have chosen to do from the list prescribed by the SEC.

**Period in which the investigation was carried out**

Write down the dates that you started and finished this investigation

**Introduction**

The introduction is where you define the problem that you are going to investigate. You form a hypothesis – this is where you predict what you think might happen.

This section is slightly different if you decide to carry out your own investigation.

Your introduction should have the following:

1. You need to make a clear and simple statement in your own words about what you are trying to find out in this investigation. You should include your prediction by saying

*I predict that ......................... will happen*

It does not matter if you find out that your prediction was wrong when you conduct your investigation that is what science is about – testing your ideas!

 For example if you are testing which metals are better conductors of heat you can pose the question “Does the type of metal affect how quickly it will conduct heat?”

1. What research have you done for this investigation? You can get information from a number of sources such as
	* 1. A person including you teacher
		2. A book including your text book
		3. The internet
		4. What do you remember about this topic from what you learned in class?

Make sure to write down the names of these books and websites as well as the information that you found out from them. For example

*I asked ................................ and they told me that ..........................................*

*I looked up www...................................... and found out that .........................*

*I read ............................................. and I found out that ..................................*

**Preparation and Planning**

 In this section you must outline how you are going to test your idea. You need to select the appropriate apparatus and write out a detailed method. Remember, whatever method you choose it must be a fair test. A fair test is where you change only one variable each time you do the experiment. There are three types of variables in every experiment.

* The independent variable – one condition that you change
* The dependent variable – what you measure that has changed
* The fixed variable – what stays the same every time you do the investigation

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1. **Identification of Variables/Controls**

You need to identify 4-5 different variables in the experiment. List them under the headings of independent, dependent and fixed to get maximum marks.

Remember the independent variable is the **one** thing that you will change.

For example:

If you are testing the conduction of different metals, then you would change the type of metal, so the **independent variable** is the type of metal.

**The dependant variable** is what will change as a result, if you change the type of metal the conduction will change so the conduction is the dependent variable.

**Controlled or fixed variable** are the things that you will make sure do not change; for example the length of the metal or the amount of wax on the metal.

1. **List of equipment needed for the investigation**.

This simply lists everything you will need in the investigation. You must include all the chemicals and the apparatus that you used for the investigation. You will always need a minimum of 5 pieces of equipment to get maximum marks.

1. **List of tasks to be carried out**.

This is a list of all the things you need to do in the experiment. Use numbers and list step by step what you need to do. Remember you need to list at least four different tasks to get maximum marks. For example

 I will

1. Research how to do the experiment safely

2. Collect the apparatus I need

 3. Set up the apparatus

 4. Test …………………………………………….

5. Record my results and do the calculations etc.

**Procedure**

In this section you will describe how you will safely carry out the investigation using suitable apparatus. The safety measures that you describe must match the conditions in the investigation and equipment being used. You need to explain clearly how you set the experiment up and exactly what measurements you took , what they were and how you are going to use these measurements for data analysis.

This section is divided up into the following sections

* Particular safety precautions required by this investigation
* Labelled diagram (where appropriate)
* Procedure followed in the investigation
* Recorded data / observations
1. **Particular Safety Precautions required by this investigation**

 It is very important that you think of anything that might be dangerous and list the ways you are going to prevent any accidents from occurring. You must try to prevent accidents from spillages, chemical or heat burns, damage to your skin, clothes or eyes. Write down the things that could be dangerous *in your investigation* and what you could do/ use to prevent accidents from happening. You will get no marks for safety precautions that are not relevant to your particular investigation.

For example

Hot water may burn you so you could say to use a tongs to move a test tube or a beaker of hot liquid

Glass equipment might break – do not pick up broken glass with your hands, you could use a dust pan and brush.

Hot wax may splatter – make sure that all test tubes are pointing away from you or anyone else when being heated.

Mention the safety precautions you are taking such as wearing safety glasses, if you are using dangerous chemicals you must be careful not to touch them and if appropriate wear protective gloves.

1. **Labelled Diagram**

 Make sure your diagrams are neat and clear. You diagrams should be large enough so that they can be seen clearly. The diagram should fill most of the space provided.

Use the scientific symbols rather than trying to draw 3D pictures for any apparatus that you are using. **Always** use pencil and where possible colour. **Label everything clearly** and make sure the labels point to the correct thing!

1. **Procedure followed during the investigation.**

You need to write a detailed list of all the steps that you did in the investigation. You should use numbered points

For example

1. I put on my safety glasses

2. I set up the equipment by……………………..

3.Using a........................ I measured ............................................

4. I heated ……………………..

5. I recorded ......................................

6. I repeated the experiment using..................................

Always write the amounts of materials you used such as 4g of powder and 3cm3 of liquid.

1. **Recorded data and observations**

Before starting your experiment, decide what results you are going to take and when you are going to take them. You will need a list of the measurements that you have taken during the experiment to be able to analyse your results in the next section. Measurements should be clearly laid out in a graph and/or table form.

Make up a data table before you start your experiment so you can record your measurements as soon as you observe them. This will ensure that you are consistent in the way that you record your results and it will also make it easier to analyse and draw conclusions.

Record you results carefully. Many students get confused between results and conclusions. Results are what you see happening in the experiment.

You should decide when you are planning what is the best way to present you results. Can you make a neat table? Can you draw a graph or a bar chart? Always present your results neatly and show the units. Make sure that axes on graphs are labelled and that the graph has a title. The graph or chart should fill over half of the grid provided.

Remember also to have space to record your observations as you do you experiment.

Observations to note include:

Did you encounter any problems with the experimental method?

Did you think of a better way or how you could improve this experimental method?

Did you notice any interesting patterns happening?

**Analysis and Conclusion**

This section is very important. It is divided up into two sections:

* Calculations / Data analysis
* Conclusions and Evaluation of Results
1. **Calculations/Data Analysis**

In this sectionyou need to work with your results and decide what they tell you. You also need to outline any calculations or formulae that you used. Did you have to do anything to your data before you plotted your graph or chart?

Some useful sentence starters in this section are:

* I can see from my results that …………………………..
* When I changed ………………….., ………………….. changed by…………………..
* From the graph I can see that …………………………………………….
1. **Conclusions and Evaluation of Results**

For this section you need to answer some of the following questions in your written report.

* Do your results answer the question you were asking at the start?
* Were the results what you were expecting?
* Is there a trend in your results or did anything unusual happen?
* If you got an unusual result why do you think this happened?
* If you drew a graph did you get a straight line or a curve – what does this show?

Some useful sentence starters in this section are:

* My results show that ……………………………………………….
* My graph was a straight line through the origin which shows that ………………… is proportional to ……………………………..
* My graph is not a straight line through the origin, I would have expected to get a straight line and possibly a source of error is ……………………………………..

**Comments**

For this section your report should include answers to the following points:

1. Refer back to the question you were asking in your introduction and say whether your findings answer the answer to what you were trying to find out. Say whether you are surprised by these results or whether they are what you would have predicted. Identify any other things you think may have affected your results, maybe something unexpected emerged when you were doing the experiment. Were there variables you could not control?
2. Are there any changes you would make if you were doing the experiment again? Can you think of a way to make your experiment more accurate? Can you think of anything interesting you could do to find out more about the topic you are investigating?
3. Can you think how what you found out affects the real world? For example if copper is a better conductor of heat would you use it in cooking?
4. Have your conclusions led you to more questions? Is there any other investigation you would like to carry out to develop or test these questions?