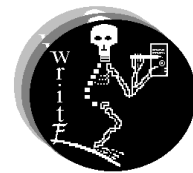
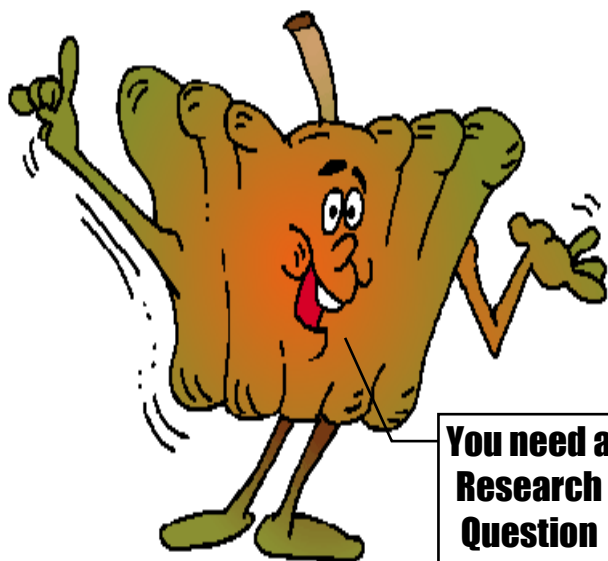


Copper Sulfate Experiment



Your NameDate.....



Today you need to think of an interesting **research question** about copper sulfate. This type of question makes it very clear what you want to research. To come up with a good research question, begin by brainstorming about observations on CuSO_4 that have interested you. A good research question is interesting, specific, and helps you decide how to design your experiment. For example, you may think:

'Copper sulfate would probable react strongly with some acids and not other.'

You should write this as a question:

'How strongly does copper sulfate react strongly with different acids?'

Next you must decide which is the one **manipulated variable**. This is the variable you decide to change and is related to your research question. In the earlier example, you would manipulate the type of acid used.

Then you must identify all the controlled variables. Remember, these could vary, but you must control them so they don't. Controlled variables would include things like:

- amount of copper sulfate
- temperature
- amount of each acid
- amount of stirring.

If these vary from **trial** to **trial**, it will not be a fair test.

You must also state your dependent variable. This is the thing that happens in response to your experiment. For example, it could be the speed of a chemical reaction. Importantly, you must design your experiment so you can measure the dependent variable and so be able to answer your research question This is very important as it determines whether you conduct a fair test. So, what would you like to research?

Part 1. **Purpose** of the text

Find the key ideas from the text, and their meaning in the context of the experiment. **Organise** below.

a. Title (purpose)

Key word(s)

Meaning in context

Part 2. **Analyse** the text again, then **synthesise** answers to these two questions:

a. Why must all the 'controlled variables' be kept the same through your experiment?

b. What would happen if you had two different 'manipulated' variables at once?

Part 3. **Generate** a table of results.

Experiment Checklist

- a. Discuss with your group what things interest you about copper sulfate. Spend five minutes brainstorming, and write a list of at least ten things you could investigate.
- b. Decide what your research question will be. It must be specific.
- c. Write down a list of variables in a table like this:

Manipulated variable	Dependent variable	Controlled variables
		(write as many as you can think of)

- d. Write down the equipment you need, and draw your experimental design.
- e. Write down what you predict will happen, and why.
- f. Draw up a results table. **Have all this checked by your teacher before commencing.**

When your experiment is finished, include points a to f in your report and make a title page.

- g. Discuss what happened.
- h. Is this the same or different from your prediction?
- i. What have you found out that you didn't know?
- j. How could you improve your experiment?
- k. What hypothesis can you come up with, based on your results?
- l. What can you do to test your hypothesis?

Part 4. **Communicate** and **apply** your understanding of the key words by completing the following exercise.



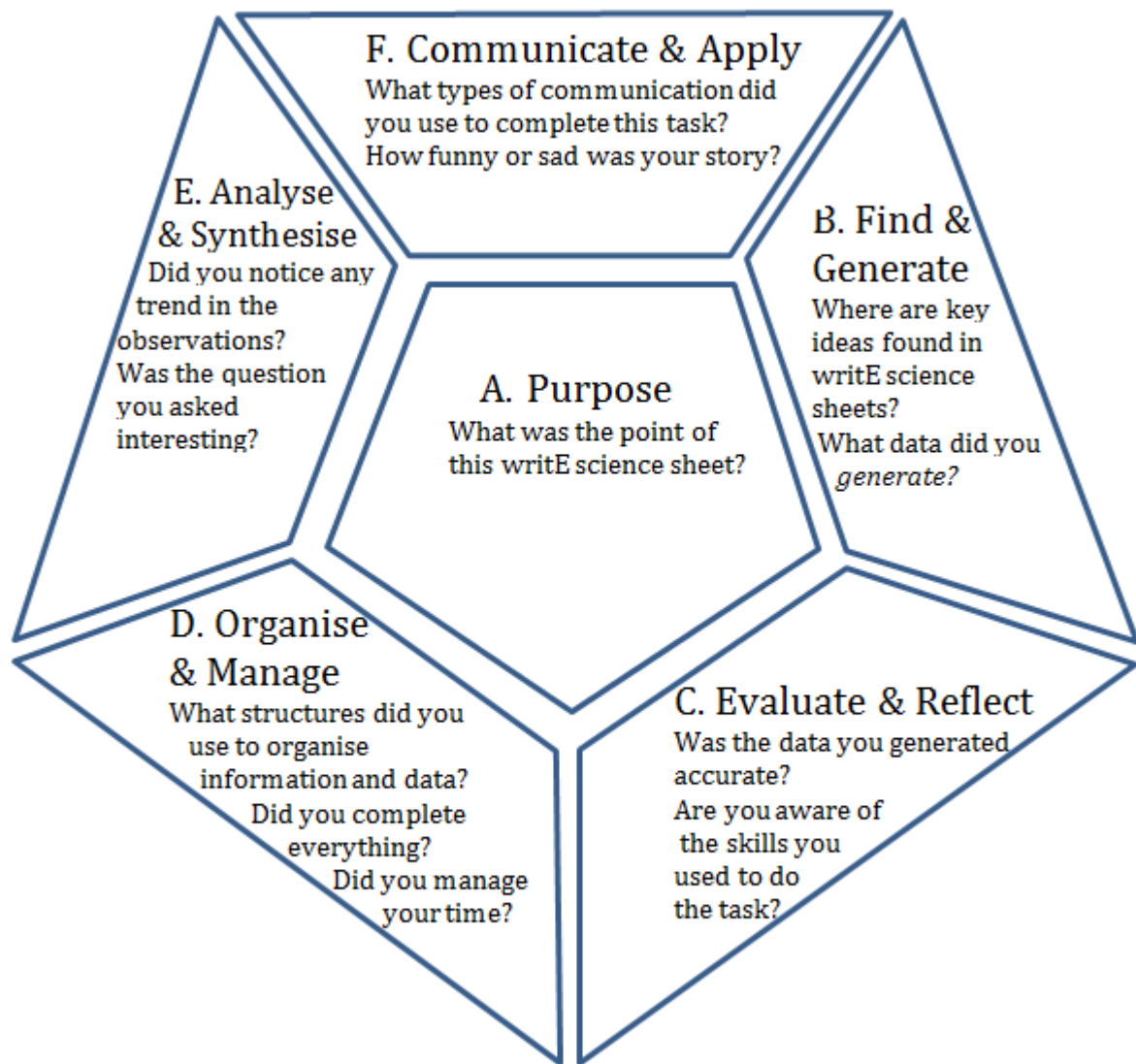
- a. Correctly label the graph below. Write the name of the manipulated variable underneath the graph (i.e., on the x-axis), and the name of the dependent variable to the left of the graph (i.e., on the y-axis). The title should be “[Name of dependent variable] vs. [name of manipulated variable]”.

- b. When you have finished labelling the graph, look at your data from the experiment, and plot the data points onto the graph below.

Title:



- c. Analyse the pattern, and try to explain it in your own words.



Part 5. **Evaluate and reflect.**

Evaluate this activity and reflect by suggesting ways to improve it.



Teacher's notes:

1. Great extensions can be conducted using budgie seed mix – it has about five different types of seed, and many experiments can be considered.
2. The story is written so that the key words we are concentrating on are in bold type. These are always the leading idea of a paragraph, and so are in the first sentence of that paragraph. These keywords are to be placed in the small bubbles in the structured overview. The second sentence contains a definition of the key word. Students should be assisted with as much effort as you can afford, to write this definition in point form, leaving out joining words at least. I think constant modelling is necessary, especially from other students when they show good note-taking skills. The rest of the paragraph contains supporting details about the keyword. Again, point-form notes are to be taken.
3. Remember, this is part of a year-long strategy to assist students in developing note-taking skills. The idea is to make their writing an activity that requires their brain. Converting text to notes means they have to actively engage with the text. They struggle to make meaning of it, and so it can assist their understanding. For them to be able to use their notes and write good sentences/paragraphs from them is also something we will develop. This is all very difficult for many students. But these skills are common to other work across the learning areas. Set the kids a high standard for this piece, so all other work can be compared to it. Any questions you have, please feel free to ask.

John W.