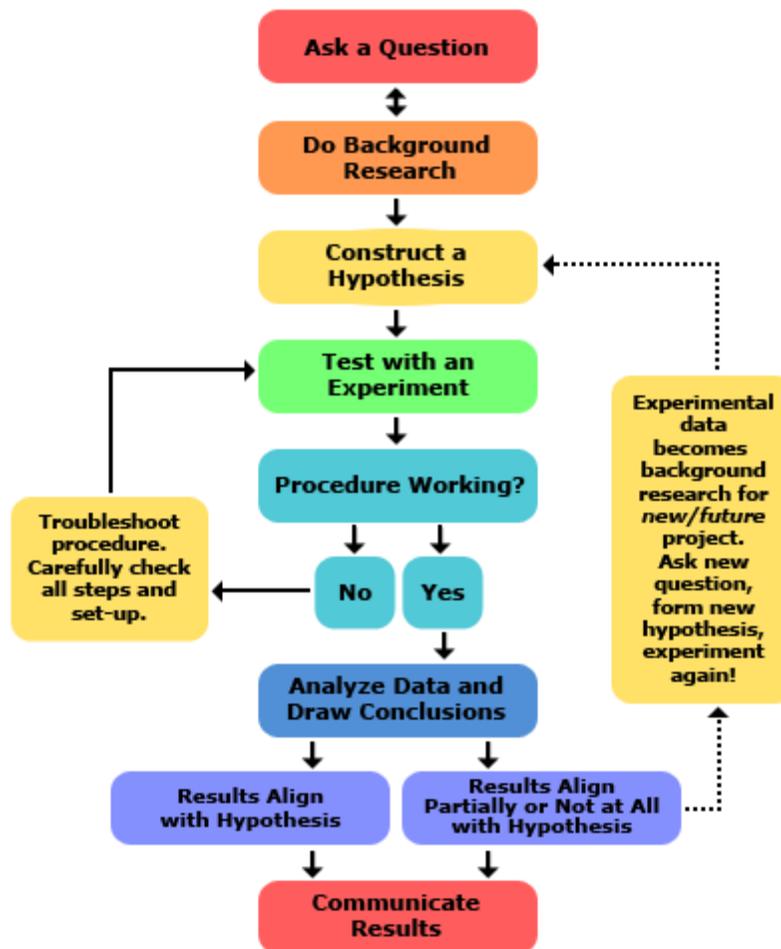


# THE SCIENTIFIC METHOD

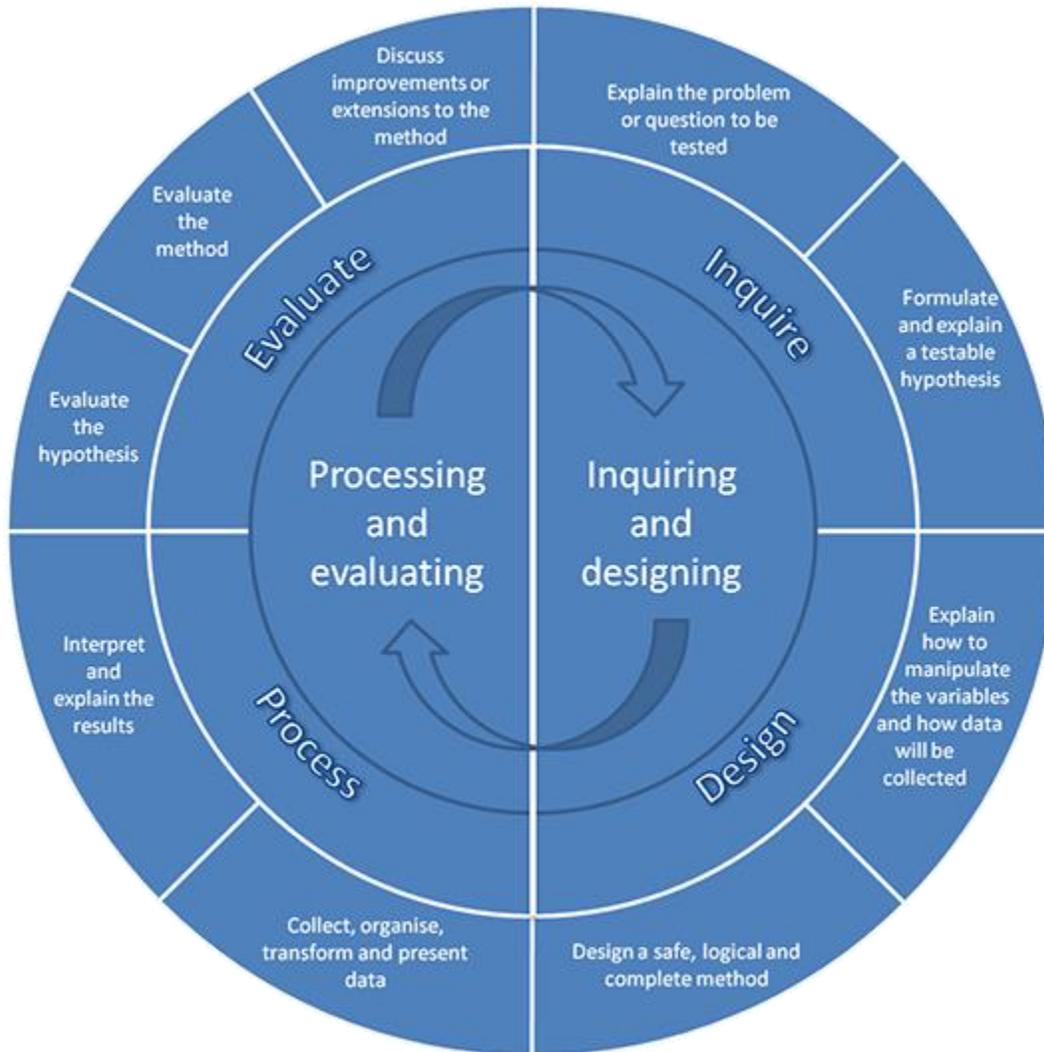
The scientific method is the process that scientists follow when investigating and exploring the world around us. It repeatedly follows these steps to increase our knowledge of how things work:



To make sure the investigation of a scientist is **reliable**, other scientists:

- Must be able to repeat the experiment (*reproducibility*)
- Must try to disprove it (*falsifiability*)

If these can both be done with the same conclusion reached then we can consider the knowledge to be scientifically true!



# WRITING A LABORATORY REPORT

There are two types of lab report that you will need to write this year. The standard lab report will be required for many of the practical sessions that you carry out in the lab:

## Format for a standard lab report

- Title
- Research Question.
- Background Information
- Hypothesis
- Variables (independent, dependent and controlled).
- List of materials.
- Method.
- Results.
- Conclusion.
- Evaluation.
- References

Details of what is needed in each section are found below:

### **Title of investigation**

This title will depend on the topic given to you by your Teacher when you carry out your own investigation.

### **Research question**

The question that you will be trying to answer in your investigation:

*Investigation into how \_\_\_(1)\_\_\_ affects \_\_\_(2)\_\_\_ .*

1. *Independent Variable*
2. *Dependent Variable.*

### **Background information**

Any useful information you can find about your research question. This information is used to help write your hypothesis.

### **Hypothesis**

A statement of what you think will happen in your experiment and a scientific reason why.

*I think that... because...*

### **Variables**

These are the things in your experiment that will change. There are always 3 types of variables in an experiment.

**Independent** - This is the 1 thing in the experiment that you will be changing. You should state the variable and then explain how you will be changing it and any relevant units.

*I will change... by...*

**Dependent** - This is the 1 thing in the experiment that you will be measuring. You should state the variable and then explain how you will measure it and any relevant units.

*I will measure... by...*

**Controlled** - These can be many things in the experiment that we must try to control so that the experiment is a fair test\*. You should state each control variable and how each one will be kept the same.

*I will control... by...*

(\**Fair test* - A fair test contains data that can be compared fairly because the conditions of the experiment (the control variables) are the same for all of the data collected.)

### **List of materials**

A list of the lab equipment and chemicals that you will use.

### **Method**

A list of the steps that you will carry out to perform your experiment and collect all your data.

### **Results**

**Table of data** - This should contain all of the data that has been collected in your experiment. It is also useful to put the average values of your data if you have carried out repeats of each measurement. It must be drawn in pencil with a ruler and should have clear headings for each column with units. It is also good to give the table a title - *Table to show...*

**Calculations** - If you need to carry out calculations with your data then it is good to show at least 1 example of how you did it. You can do this underneath the table of data.

**Graphs** - A bar graph or line graph should be used to display your data (your teacher will tell you which one to use). They must also be drawn in pencil with a ruler. A good graph will contain: a title that starts with "A graph to show..."; labelled axes with units; data points marked accurately with an "x"; and a line of best fit (only with a line graph). *Check the next page to see more detail on drawing graphs.*

### **Conclusion**

To write a good conclusion you must: state what your results show (and describe the shape of the graph if you have one); compare your results to your hypothesis; explain your results with scientific knowledge.

**Evaluation**

Answer and explain these questions: Did you carry out the experiment accurately and how you know? Did you make any errors and how? Did you control the controlled variables well? How could you improve the method so that your experiment was more accurate?

**APA-style reference list**

A list of the sources that you have used to find information that has been used in the report. It should be recorded in a special format called the APA format.

Go to <http://www.sciencesfp.com/unit-0---the-scientific-method.html> For an example lab report.