

# Scientific Method

## What is a scientific method?

**Scientific method** is commonly used by researchers to investigate answers to their questions. Such approach uses a combination of **reasoning** and **observation**. At first, researchers formulate a **hypothesis** about how a certain process works. Then their hypotheses are tested or expanded based on **experiments**, from which measurements obtained, **inferences** are made and **theories** are derived.

## Scientific problem solving

In **scientific problem solving**, there is a certain sequence of techniques that people use for troubleshooting and forming theories. The first step is to define the **problem** that you are trying to solve. Then the current situation is evaluated using **observations**. Once the problem is defined and all the information regarding the problem is gathered, it is time to form hypotheses. Hypothesis generally state what the possible explanations are to the relative problem. Based on the different causes of the problem, possible outcomes are formulated. If A is the cause, B will happen, or if C is the cause, then D will happen. Then, experiments are set up to test the hypotheses and the solution to our original problem is discovered, based on the results obtained from the experimental outcome. Once the solution to the problem is established, it is good practice to repeat the experiments to make sure there are no mistakes. According to the scientific method, it is crucial that other people are able to repeat your experiment and get the same results.

Let's apply our scientific problem solving skills to an example problem. Olivia has a new plant that needs sunlight to grow. After a few weeks of getting the plant, the leaves start turning brown and Olivia is concerned that the plant might be getting too much light. We can follow the scientific problem solving rules to understand what is happening to Olivia's plant.

- 1. Define the problem:** The leaves of the plant are turning brown
- 2. Make observations & formulate a hypothesis:** The leaves are turning yellow in the sun, so maybe they are getting too much sunlight.
- 3. Set up experiment to test hypothesis:** Need an experiment to test if the yellow leaves are due to too much sunlight. Let's take three pots of the same plant (pot A, pot B and pot C) and keep them in the following conditions for two weeks.  
  
Pot A → put in sunlight for the whole day, and treat the same way as Olivia has been already doing  
Pot B → put in complete shade for the whole day  
Pot C → put in partial sun light, where it gets sun for only half of the day
- 4. Make observations & collect data from experiment:** After two weeks, observe the leaves of each plant and see if they are yellow or green.  
  
Pot A → the leaves are brown and dry and the plant seems unhealthy  
Pot B → the leaves are droopy, looking wilted and the plant seems unhealthy  
Pot C → the leaves are green and the plant looks healthy
- 5. Repeat the experiment several times:** Repeat steps 3 and 4 to make sure you get the same result each time. This ensures that the results are reproducible, there are no other external factors affecting the results and your theory has a solid basis.
- 6. Formulate a theory and conclude.** Based on the experiments and the observations, it seems like the initial hypothesis was correct and that the leaves of Olivia's plants are turning brown due to too much sun.

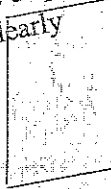
# The Display

Summarise your data with graphs or charts, don't display pages of numbers. Put them in your Log Book



Eye Catching Title Here

Ensure all necessary project content is displayed accurately and clearly

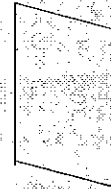


Use bold colours and set out photographs, maps, tables and graphs, in the most attractive way



Display parts of your project here. Make sure you have checked what can and can't be displayed on your project

- \* Give brief summaries only
- \* Your project should be dramatic to catch attention
- \* Keep to a central theme



Safety and Certification Form must be attached to the back of your project

Log Book

The way your work is presented is an important part of your project. After you have spent your time making sure your work is completed to the best of your ability, you need to make sure it is displayed to show its full potential.

# SCIENTIFIC METHOD SHEET

Complete the Parallel Flow Map for this lab. Write your ideas on the right side.

