

# The Scientific Method

The simplest accurate definition of **Science** is: [Science is a Process](#).

**The Scientific Method is the heart of Science.** The goal of this method (process) is to discover the relationships between cause and effect with technical issues. The roots of the Scientific Method go back some 4000 years (e.g., see [here](#), [here](#), and [here](#))!

The roots of the words *Scientific* and *Method* are *knowledge* and *road*, so the phrase “Scientific Method” literally means **road to knowledge**. Webster’s dictionary [defines](#) it as:

Principles and procedures for the systematic pursuit of knowledge involving —

- 1) the recognition and articulation of a problem,
- 2) the collection of data through observation and experiment, *and*
- 3) the formulation and testing of hypotheses.

In other words, the **Scientific Method** is a **step-by-step problem-solving process**.

Below is an outline. It is not a rigid, linear method, but rather one that is as flexible and creative as the user is. The typical steps (e.g., from [here](#), [here](#), [here](#), and [here](#)) are:

1. **Ask a question.** Form relevant and testable queries based on the individual’s observations.
2. **Make observations.** This involves monitoring and gathering information from a certain aspect of the natural world.
3. **Gather background information.** Do reasonable research into what is claimed to be known about the topic.
4. **Create a hypothesis.** A [hypothesis](#) is a possible answer to a question. If proven later, it can become a fact or theory.
5. **Make a prediction.** Create a testable prediction based on the hypothesis.
6. **Perform a test.** The test should establish a change that can be measured or observed using empirical analysis. It is important to control for other [variables](#) during the test. [Note: for more complex matters, a simple test may not be appropriate. In that case a **Scientific Analysis** is done, which is: **Comprehensive, Objective, Empirical and Transparent.**]
7. **Analyze the results and draw a conclusion.** Use the [metrics](#) established before the test see if the results match the prediction. Determine if the hypothesis was validated.
8. **Share the conclusion and decide what to do next:** Document the results of the experiment. By sharing the results with others, the total body of knowledge available is increased. This experiment may have led to other questions, or if the hypothesis is disproven, a new one may need to be created and tested.