

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 [metrics](#) established before the test to 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.

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Objections to the Scientific Method — and Responses

After some 4000 years of success, a small group of progressives unilaterally decided that the Scientific Method needed to be scrapped. *Why?* The most obvious reason is that the Scientific Method continually exposed progressive technical ideology (e.g., wind energy) as being unscientific. That made the Scientific Method their enemy.

The most aggressive anti-Scientific Method campaign is in US K-12 Science education. The progressive document [A Framework for K-12 Science Education](#) spelled out the plan, and it was subsequently implemented by the [Next Generation Science Standards](#). This has been a resounding success (failure), as these have been adopted by some [49 states!](#)

When state K-12 education departments that have robotically followed the progressive's lead are questioned as to why they would abandon the Scientific Method, they have a few stock answers. Those (and my response to each) are:

- a) It was dropped from the Science Standards by their predecessors.
 - *Who removed the Scientific Method from the state's Science Standards is not the issue. They are currently in charge of K-12 education, so it's up to them to teach students real Science, **not** political science. The Scientific Method has passed the test of time.*
- b) The Scientific Method is undesirable as it promotes "linear thinking."
 - *The linear thinking claim is just parroted from the progressive [Framework](#), and it is nonsense for two major reasons: **i)** linear thinking is not a bad thing, and **ii)** the Scientific Method is not linear thinking anyway, etc. For more details read [this](#).*
- c) They are attempting to replace the Scientific Method with an "improved" version: the progressive [Science and Engineering Practices](#).
 - *This is **not** an "improvement"! See **Appendix F** of my [Education Report](#) for details.*
- d) Even though the Scientific Method had been deleted from their state's Science Standards, that does not prevent any local teacher from teaching it.
 - *Yes, technically that may be true. However, the deletion of the Scientific Method is reflected in state-approved textbooks and statewide tests — so it is not likely that many teachers will take a path that deviates from the state's.*
- e) Almost no one (teachers, parents, citizens, scientists, conservative organizations, legislators, media, etc.) has formally complained about the Scientific Method removal, so what's the big deal?
 - *Yes, and the most probable answer is that these parties were unaware that the Scientific Method was no longer being taught. Also, teachers are not likely to complain as they don't want to buck the system. Conservative organizations have chosen to focus on other education problems (e.g., school choice). Etc.*