

What Science is NOT

1. Science is not a process that can solve all kinds of problems and questions.

The realm of science is limited strictly to solving problems about the natural world. Science is not properly equipped to handle the supernatural realm (as such), nor the realm of values and ethics.

2. It's not a process that can ignore rules.

Science must follow certain rules; otherwise, it's not science (just as soccer is not soccer if its rules are not followed).

3. It's not a process that seeks the truth or facts.

The goal of science is to come as close as we can to understanding the cause-effect realities of the natural world. It's never "truth" or "facts". "Truth" and "facts" can mean different things to different people.

4. It's not a process that attempts to prove things.

The process of science, when properly applied, actually attempts to disprove ideas (tentative explanations)... a process called "testing", or "challenging". If the idea survives testing, then it is stronger, and more likely an accurate explanation.

5. It's not a process that can produce any kind of explanation.

Scientific explanations must be potentially disprovable. Therefore, supernatural explanations cannot be used, since they can never be disproved (supernatural forces, by definition, do not predictably follow the laws of nature). Whatever results occur in any test can be attributed to those nebulous forces, effectively ending any further efforts to explain.

6. It's not a process that produces certainties, or absolute facts.

Science is a process that can only produce "possible" to "highly probable" explanations for natural phenomena; these are never certainties. With new information, tools, or approaches, earlier findings (theories, or even facts) can be replaced by new findings.

7. It's not a process that can always be relied upon due to its total objectivity and internal self-correction.

Science can be done poorly, just like any other human endeavor. We are all fallible, some of us make fewer mistakes than others, some observe better than others, but we are still subjective in the end. Internal self-correction mechanisms in science merely increase the reliability of its product.

8. It's not a process that is always properly used.

Unfortunately, science is all too frequently misused. Because it works so well, there are those who apply the name of science to their efforts to "prove" their favorite cause, even if the rules of science were not followed. Such causes are properly labeled "pseudosciences". Also, some scientists have been known to do fraudulent

work, in order to support their pet ideas. Such work is usually exposed sooner or later, due to the peer review system, and the work of other scientists.

9. It's not a process that is free from values, opinions or bias.

Scientists are people, and although they follow certain rules and try to be as objective as possible, both in their observations and their interpretations, their biases are still there. Unconscious racial bias, gender bias, social status, source of funding, or political leanings can and do influence one's perceptions and interpretations.

10. It's not a process in which the product (understanding) is based on faith or belief.

The product of science (probable explanations for natural phenomena) are always based on observations carefully analyzed and tested. The high confidence we have in science comes from the many successful applications to real-life problems (e.g. in medicine, space exploration, chemistry and technology).

11. It's not a process in which one solution is as good as another, or is simply a matter of opinion.

In science, there is a rigorous analysis and fair-test comparison of alternative explanations, using discriminate criteria, e.g., confirmation by multiple independent lines of evidence, leading to one "best" solution.

12. Scientific Theories are not "tentative ideas" or "hunches".

The word "theory" is often used this way in everyday conversation, but a theory in science refers to a highly probable, well-tested comprehensive explanation, usually for a large collection of observations.