

# Science Criterion for the Scientific Method

## 1. Science is logical and rational: (Examples:)

- a. There is no logical, rational line of thought that leads to the conclusion that invisible animals provide the power of an automobile rather than the burning of gasoline.
- b. The argument that aliens in spaceships are abducting people from inner city apartments without being seen by witnesses.
- c. The argument that scientists only think that the earth is millions of years old because an evil spirit put old rocks on the Earth to fool them and destroy their faith can be accepted only by taking a giant leap away from a logical examination of the evidence.

## 2. Science makes well-defined claims:

- a. Good scientific researchers are specific in describing their fields and in making predictions.
- b. Be suspicious of those who will not put themselves in a position where they can be proven wrong.
- c. Scientists use precise terms so that there can be no mistake about what they are saying.

## 3. Scientific Hypotheses are Falsifiable:

- a. Educated guesses made by scientists can be tested to see whether or not they are true.
- b. Any hypothesis that cannot be tested is only conjecture and cannot be included among scientific knowledge.
- c. The claim that a certain phenomenon is not detectable by any scientific instrument but only by those with a special gift is an example of a nonfalsifiable hypothesis.

## 4. Scientific experiments are repeatable:

- a. Proper scientific experiments are designed so they can be duplicated by others.
- b. Science experiments should yield consistent results regardless of who performs the experiment.

## 5. Science requires that claims be examined by peers:

- a. Scientific reports are written in precise and intricate detail so that other scientists can see exactly what has been done. (Nothing to hide)
- b. Beware of reports that are vague and secretive in describing their methods.

## 6. Science views unexplained gaps in theories with suspicion:

- a. Scientists will make clear the difference between thoroughly researched scientific claims and speculation about the unknown.
- b. Beware of strong claims on the basis of incomplete results.

## 7. Science requires caution in examining the evidence:

- a. Most scientific knowledge becomes established fact after painstaking research and verification, which may take several decades.
- b. Extraordinary claims must be supported by extraordinary evidence before they can be taken seriously.
- c. Scientists are not required to disprove claims that lie well outside the accepted norms of science. The burden of proof rests with those making the extraordinary claims.

## **8. Science requires objectivity:**

- a. Opinion and established “facts” must be corrected when faced with solid evidence to the contrary.
- b. Beliefs may be so strong that no conceivable evidence would cause a change of mind.
- c. When the facts start to go against beliefs, bad scientists may change the procedure or the data rather than their minds, or select only the data that support their position.

## **9. Science does not accept coincidence as proof:**

- a. Scientists understand the nature of coincidence and take steps to minimize its effects.
- b. Scientists take the laws of probability into account.

## **10. Science does not accept anecdotal evidence as proof:**

- a. Beware of claims that rely almost completely on stories and testimonials as proof.
- b. Anecdotal stories are isolated reports that usually cannot be confirmed or reviewed. The details are sketchy and leave many variables unaccounted for.
- c. People’s senses can be misled into making them think something happened that did not.