

Scientific Method Definitions

Analysis – The breakdown of something that is complex into smaller parts in such a way that leads to a better understanding of the whole.

Classify – Grouping things together based on specific characteristics.

Compare – To examine the different and/or similar characteristics of things or events.

Control – The group or subject that is used as a standard for comparison in an experiment.

Critical thinking – Thinking that uses specific sets of skills to carefully analyze problems step-by-step; scientific methods are one type of critical thinking.

Data – Information, measurements and materials gathered from observations that are used to help answer questions.

Experimental error – Incorrect data in an experiment that may result from a variety of causes.

Experiment – A test using observations and controlled variables to discover answers to questions, and/or to check a hypothesis.

Hypothesis – A testable explanation for observations and questions about the physical universe.

(Note: “hypothesis” is very similar to “prediction,” and the two words are often used interchangeably.)

Inference – A logical explanation or conclusion based on observations and/or facts.

Measure – To compare the characteristics of something (such as mass, length, volume) with a standard (such as grams, meters, liters).

Methods – An ordered series of steps followed to help answer a question.

Nature – The entire physical universe.

Observation – (1) Noticing objects or events using the five senses. (2) The data collected by using the five senses to learn about objects and events.

Prediction – A statement made about the future outcome of an experiment based on past experiences or observations.

Procedure – An ordered series of steps followed to help answer a question.

Qualitative data – Data that is based on observable characteristics of things or events that can be collected using the five senses. *Example:* “The juice tastes sweet to me.”

Quantitative data – Data that is based on measurable characteristics of things or events such as mass, volume, length, and quantity. *Example:* “There is one liter of juice in the carton.”

Repeated trials – Experimental tests done more than once.

Replication – Repeated trials on more than one subject, as well as controls, in experimental tests.

Science – The study of nature and the physical world using the methods of science, or a “special method of finding things out.”

Scientist – A person who “does” science and uses the methods of science.

Scientific law – A generalized pattern in nature.

Scientific method(s) – A process of critical thinking that uses observations and experiments to investigate testable predictions about the physical universe.

Scientific theory – A causal explanation for generalized patterns in nature that is supported by much scientific evidence based on data collected using scientific methods.

Variation – Slight differences among objects, organisms or events that are all of the same basic type.

Variable – Something that can affect a system being examined, and is therefore a factor that may change in an experiment.

Variable, independent – A factor that can be changed or manipulated in an experiment by the scientist; “you change it” variables.

Variable, dependent – A factor that responds to changes in other variables in an experiment; “it changed” variables.