

Definitions of Terms: the Scientific Method

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

Scientific method(s) – A process of critical thinking that uses observations and experiments to investigate testable predictions and develop natural explanations of the 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.

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.)

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

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

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

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

Repeated trials – Experimental tests done more than once.

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

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.”

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

Classify – Grouping things together based on specific characteristics.

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

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

Independent Variable– The variable of interest. This is the factor that you are interested in learning more about. Often it can be changed or manipulated in an experiment. Also known as the predictor variable, the manipulated or controlled variable, and the explanatory variable.

Dependent Variable– The response. This is a factor that responds to changes in other (y) variables in an experiment. Also known as the response variable or the outcome variable.

Independent and dependent variables: “If X is given, then y occurs” (X is independent and y is dependent)

Results- the outcome of your experiment or observations. Reported strictly without reference to interpretation or prior hypotheses.

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

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

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

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

Scientific law – A generalized pattern in nature that has been supported by numerous tests.