

Wherever possible we have used the definitions derived from a booklet created in a joint project of the Association for Science Education and the Nuffield Foundation:

*The Language of Measurement: Terminology used in school science investigations.* Association for Science Education (ASE), 2010. ISBN 978 0 86357 424 5.

Extracts of this book can be downloaded from the Getting Practical website [www.gettingpractical.org.uk](http://www.gettingpractical.org.uk)

Centres should note that this has resulted in a change to the definition of 'continuous variable' from the previous specification. The term 'discrete variable' will no longer be used as this has been subsumed by the definition of 'continuous variable'.

Similarly, the terms 'reliable' and 'reliability' will no longer be used. Instead, the terms 'repeatable' or 'repeatability' and 'reproducible' or 'reproducibility' will be used.

<b>Accuracy</b>	A measurement result is considered accurate if it is judged to be close to the true value.
<b>Calibration</b>	Marking a scale on a measuring instrument. This involves establishing the relationship between indications of a measuring instrument and standard or reference quantity values, which must be applied. For example, placing a thermometer in melting ice to see whether it reads zero, in order to check if it has been calibrated correctly.
<b>Data</b>	Information, either qualitative or quantitative, that has been collected.
<b>Errors</b>	See also uncertainties.
<b>- measurement error</b>	The difference between a measured value and the true value.
<b>- anomalies</b>	These are values in a set of results which are judged not to be part of the variation caused by random uncertainty.
<b>- random error</b>	These cause readings to be spread about the true value, due to results varying in an unpredictable way from one measurement to the next. Random errors are present when any measurement is made, and cannot be corrected. The effect of random errors can be reduced by making more measurements and calculating a new mean.
<b>- systematic error</b>	These cause readings to differ from the true value by a consistent amount each time a measurement is made. Sources of systematic error can include the environment, methods of observation or instruments used. Systematic errors cannot be dealt with by simple repeats. If a systematic error is suspected, the data collection should be repeated using a different technique or a different set of equipment, and the results compared.
<b>- zero error</b>	Any indication that a measuring system gives a false reading when the true value of a measured quantity is zero, eg the needle on an ammeter failing to return to zero when no current flows. A zero error may result in a systematic uncertainty.
<b>Evidence</b>	Data which has been shown to be valid.
<b>Fair test</b>	A fair test is one in which only the independent variable has been allowed to affect the dependent variable.
<b>Hypothesis</b>	A proposal intended to explain certain facts or observations.

<b>Interval</b>	The quantity between readings, eg a set of 11 readings equally spaced over a distance of 1 metre would give an interval of 10 centimetres.
<b>Precision</b>	Precise measurements are ones in which there is very little spread about the mean value. Precision depends only on the extent of random errors – it gives no indication of how close results are to the true value.
<b>Prediction</b>	A prediction is a statement suggesting what will happen in the future, based on observation, experience or a hypothesis.
<b>Range</b>	The maximum and minimum values of the independent or dependent variables; important in ensuring that any pattern is detected. For example a range of distances may be quoted as either: "From 10cm to 50 cm" or "From 50 cm to 10 cm"
<b>Repeatable</b>	A measurement is repeatable if the original experimenter repeats the investigation using same method and equipment and obtains the same results.
<b>Reproducible</b>	A measurement is reproducible if the investigation is repeated by another person, or by using different equipment or techniques, and the same results are obtained.
<b>Resolution</b>	This is the smallest change in the quantity being measured (input) of a measuring instrument that gives a perceptible change in the reading.
<b>Sketch graph</b>	A line graph, not necessarily on a grid, that shows the general shape of the relationship between two variables. It will not have any points plotted and although the axes should be labelled they may not be scaled.
<b>True value</b>	This is the value that would be obtained in an ideal measurement.
<b>Uncertainty</b>	The interval within which the true value can be expected to lie, with a given level of confidence or probability, eg "the temperature is $20\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ , at a level of confidence of 95 %.
<b>Validity</b>	Suitability of the investigative procedure to answer the question being asked. For example, an investigation to find out if the rate of a chemical reaction depended upon the concentration of one of the reactants would not be a valid procedure if the temperature of the reactants was not controlled.
<b>Valid conclusion</b>	A conclusion supported by valid data, obtained from an appropriate experimental design and based on sound reasoning.
<b>Variables</b>	These are physical, chemical or biological quantities or characteristics.
- <b>categoric</b>	Categoric variables have values that are labels. Eg names of plants or types of material.
- <b>continuous</b>	Continuous variables can have values (called a quantity) that can be given a magnitude either by counting (as in the case of the number of shrimp) or by measurement (eg light intensity, flow rate etc).
- <b>control</b>	A control variable is one which may, in addition to the independent variable, affect the outcome of the investigation and therefore has to be kept constant or at least monitored.
- <b>dependent</b>	The dependent variable is the variable of which the value is measured for each and every change in the independent variable.
- <b>independent</b>	The independent variable is the variable for which values are changed or selected by the investigator.