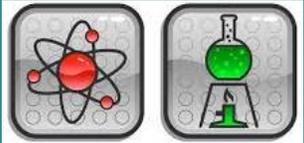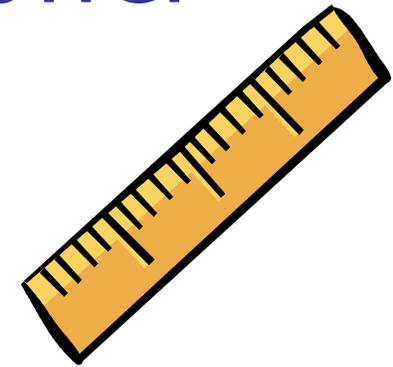# Accuracy

Results are considered accurate if they are close to the true value. We increase accuracy by performing measurements at narrower intervals.

Calibration

Calibration means finding the relationship between a measuring instrument and a known or reference amount.

This gives confidence in the measurement you are performing.

Data and Evidence

Data is information which has been collected – it can be qualitative (descriptions) or quantitative (numbers).

Evidence is data which has been shown to be valid.

Errors

Measurement – the difference between a measured value and the true value.

Anomalies – values in a set of results not thought to be part of the normal variation.

Errors

Random – these cause readings to be spread about the <u>true value</u>, due to variation.

They are present in any measurement and cannot be corrected.

Effects can be reduced by repeating the test.

Errors

Systematic – these cause readings to vary by the same amount each time a measurement is made.

They are caused by the environment, methods or equipment used.

Results should be repeated with a new technique or equipment.

Errors

Zero – These occur when a system displays a false reading when the true value is zero.

Fair Test

An experiment in which only the independent variable has been allowed to affect the dependent variable.
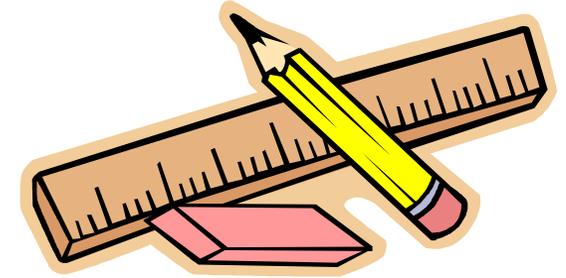
Hypothesis and Prediction

Hypothesis is an idea intended to explain certain facts or observations.

Prediction is a statement suggesting what will happen in the future, based on observations, experience or a hypothesis.

Interval

The quantity or space between readings.

e.g. in a set of readings at 0, 2, 4, 6 and 8, the interval is 2.

Precision

If measurements do not vary much around the mean value, they are said to be precise.

Precision depends on <u>random errors</u> and does not indicate how close the results are to the <u>true value</u>.

Range

The maximum and minimum values of the <u>independent</u> or <u>dependent variables</u>.

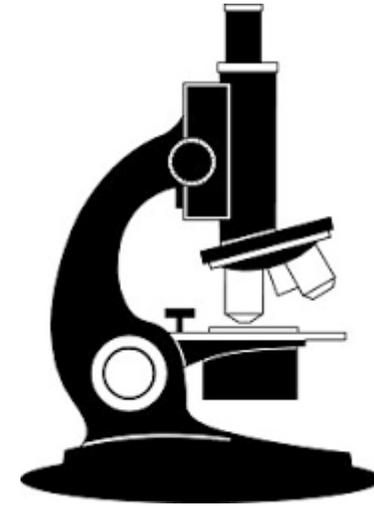e.g. from 2 to 15°C

Repeatable and Reproducible

Repeatability is if the *original* experimenter gains the *same* results with the *same* method and equipment.

Reproducibility is when a *different* person, or *different* method and equipment gains the same results.
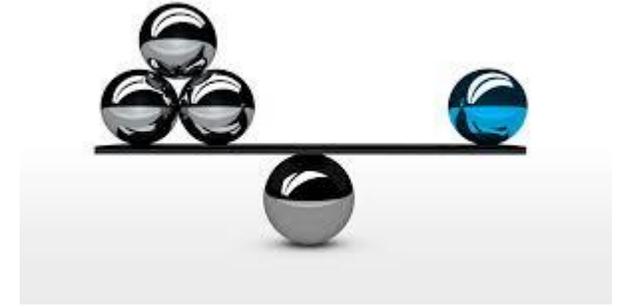
Resolution

The smallest change in the item being measured that gives a detectable change in the reading.

True Value

The value that would be obtained in an ideal measurement.

Uncertainty

The interval within which the true value can be expected to lie. Can be calculated using:
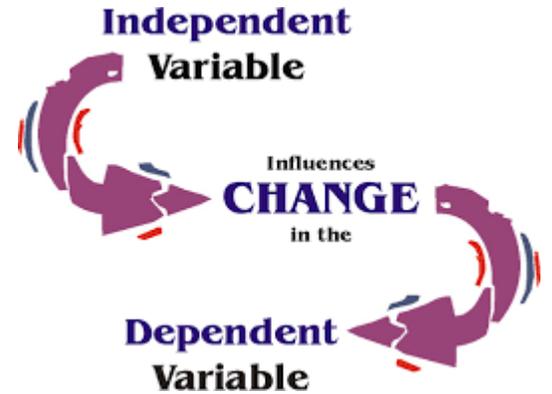
Uncertainty of mean = range ÷ 2

Validity

The suitability of an experiment to answer the question being asked.

Valid Conclusion

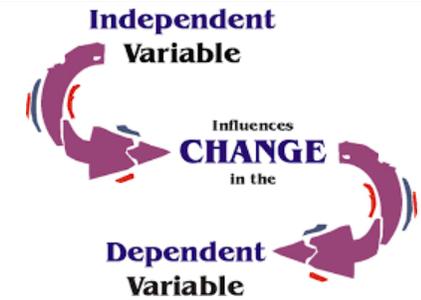A conclusion supported by valid data, obtained from an appropriate experiment.

Variables

Independent Variable
Influences
CHANGE
in the
Dependent Variable

Categoric – these have values that are labels.

Continuous – have values (quantities) which are given a size via counting or measurement.

Scientific Vocabulary

Variables

Control – something which could affect the outcome of an investigation and should be controlled.

Dependent – variable of which the value is measured.

Independent – variable for which values are changed or selected by the investigator.

Hartismere Science