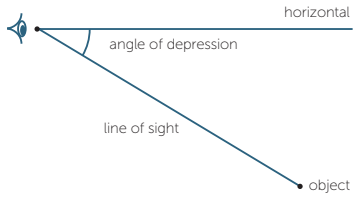
Senior Secondary Australian Curriculum

Essential Mathematics Glossary

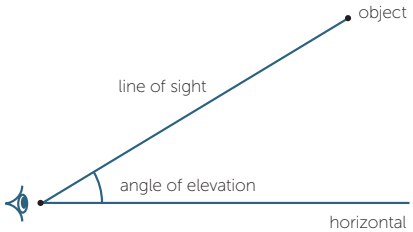
Angle of depression

When an observer looks at an object that is lower than 'the eye of' the observer', the angle between the line of sight and the horizontal is called the angle of depression.



Angle of elevation

When an observer looks at an object that is higher than 'the eye of' the observer', the angle between the line of sight and the horizontal is called the angle of elevation.



Average speed

Average speed is the total distance travelled divided by the total time taken.

Back-to back stem plots

A back-to-back stem-and-leaf plot is a method for comparing two data distributions by attaching two sets of 'leaves' to the same 'stem' in a stem-and-leaf plot.

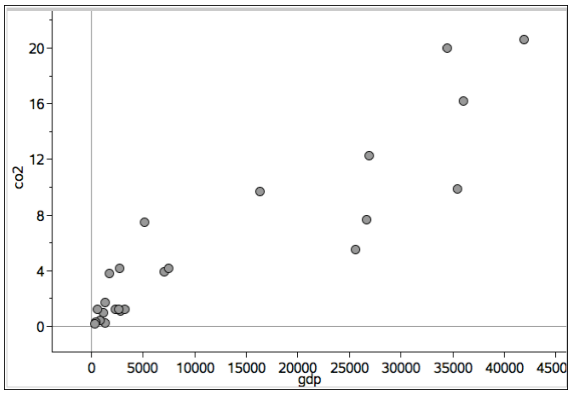
For example, the stem-and-leaf plot below displays the distribution of pulse rates of 19 students before and after gentle exercise.

pulse rate		
before		after
9 8 8 8	6	
8 6 6 4 1 1	7	
8 8 6 2	8	6 7 8 8
6 0	9	0 2 2 4 5 8 9 9
4	10	0 4 4
0	11	8
	12	4 4
	13	

Bivariate data scatter plot

A two-dimensional data plot using Cartesian co-ordinates to display the values of two variables in a bivariate data set.

For example the scatterplot below displays the CO_2 emissions in tonnes per person (CO_2) plotted against Gross Domestic Product per person in $US (*gdp*) for a sample of 24 countries in 2004. In constructing this scatterplot, gdp has been used as the explanatory variable.



Categorical data

Data associated with a categorical variable is called categorical data.

Categorical variable

A categorical variable is a variable whose values are categories.

Examples include blood group (A, B, AB or O) or house construction type (brick, concrete, timber, steel, other).

Categories may have numerical labels, eg. the numbers worn by player in a sporting team, but these labels have no numerical significance, they merely serve as labels.

Census

A population is the complete set of individuals, objects, places, etc, that we want information about.

A census is an attempt to collect information about the whole population.

Compound interest

The interest earned by investing a sum of money (the principal) is compound interest if each successive interest payment is added to the principal for the purpose of calculating the next interest payment.

For example, if the principal P earns compound interest at the rate of i % per period, then after n periods the total amount accrued is $P(1+\frac{i}{100})^n$

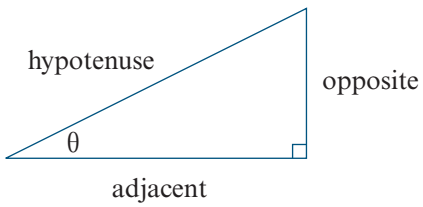
Correlation

Correlation is a measure of the strength of the linear relationship between two variables.

Cosine ratio

In any right-angled triangle,

$\cos\theta = \frac{\text{adjacent}}{\text{hypotenuse}}$ where $0^o < \theta < 90^o$



Correlation coefficient (*r*)

The correlation coefficient (r) is a measure of the strength of the liner relationship between a pair of variables. The formula for calculating r is given below.

For variables x and y, and computed for n cases, the formula for r is:

$$r = \frac{1}{n-1}\sum\left(\frac{x_i - \bar{x}}{s_x}\right)\left(\frac{y_i - \bar{y}}{s_y}\right)$$

Extrapolation

In the context of fitting a linear relationship between two variables, extrapolation occurs when the fitted model is used to make predictions using values of the explanatory variable that are outside the range of the original data. Extrapolation is a dangerous process as it can sometimes lead to quite erroneous predictions.

Five-number summary

A five-number summary is a method of summarising a set of data using the minimum value, the lower or first-quartile (Q_1), the median, the upper or third-quartile (Q_3) and the maximum value. Forms the basis for a boxplot.

Frieds' formula Young's formula Clarks formula Drip rates

Frieds' formula

Dosage for children 1-2 years = (age (in months) x adult dosage) /150

Young's formula

Dosage for Children 1-12 years = (weight in kg x adult dosage)/ (age of child (in years) + 12)

Clarks formula

Dosage for children (general formula) = (weight in kg x adult dosage) /70

GST

The GST (Goods and Services Tax) is a broad sales tax of 10% on most goods and services transactions in Australia.

Interquartile range

The interquartile range (IQR) is a measure of the spread within a numerical data set. It is equal to the upper quartile (Q_3) minus the lower quartiles (Q_1); that is, $IQR = Q_3 - Q_1$

The IQR is the width of an interval that contains the middle 50% (approximately) of the data values. To be exactly 50%, the sample size must be a multiple of four.

kWh (kilowatt hour)

The kilowatt hour, or kilowatt-hour, is a unit of energy equal to 1000 watt hours or 3.6 megajoules The kilowatt hour is most commonly known as a billing unit for energy delivered to consumers by electric utilities.

MJ (Megajoule)

A joule is the SI unit of work. The megajoule (MJ) is equal to one million joules

Mean

The arithmetic mean of a list of numbers is the sum of the data values divided by the number of values in the list.

In everyday language, the arithmetic mean is commonly called the average.

For example, for the following list of five numbers 2, 3, 3, 6, 8 the mean equals

$$\frac{2+3+3+6+8}{5} = \frac{22}{5} = 4.4$$

In more general language, the mean of n observations $x_1, x_2, \ldots, x_n$ is

$$\bar{x} = \frac{\sum x_i}{n}$$

Median

The median is the value in a set of ordered set of data values that divides the data into two parts of equal size. When there are an odd number of data values, the median is the middle value. When there is an even number of data values, the median is the average of the two central values.

Mode

The mode is the most frequently occurring value is a data set.

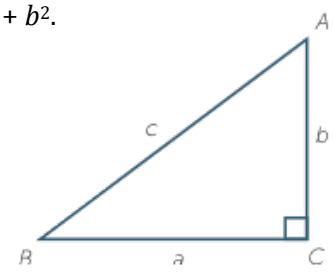
Outlier

An outlier in a set of data is an observation that appears to be inconsistent with the remainder of that set of data. An outlier is a surprising observation.

Pythagoras' theorem

The square of the hypotenuse of a right-angled triangle equals the sum of the squares of the lengths of the other two sides.

In symbols, $c^2 = a^2 + b^2$.



The converse

If $c^2 = a^2 + b^2$ in a triangle ABC, then $\angle C$ is a right angle.

Range

The range is the difference between the largest and smallest observations in a data set.

The range can be used as a measure of spread in a data set, but it is extremely sensitive to the presence of outliers and should only be used with care.

Reaction time

The time a person takes to react to a situation (pressing the brake) requiring them to stop

Simple interest

Simple interest is the interest accumulated when the interest payment in each period is a fixed fraction of the principal. For example, if the principle P earns simple interest at the rate of i % per period, then after n periods the accumulated simple interest is $\frac{Pni}{100}$.

Stopping distances

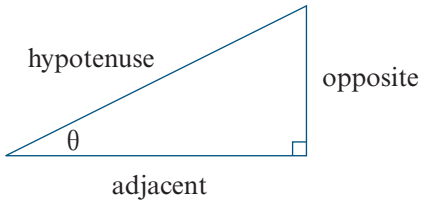
The distance a car travels after the driver has applied the brake given speed of the vehicle and/or conditions of the road which can be found using formula or tables.

Stopping distance = braking distance + reaction time(secs) × speed

Sine ratio

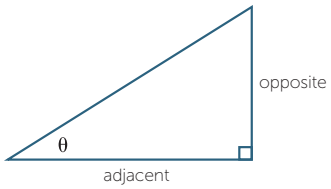
In any right-angled triangle,

$\sin\theta = \frac{\text{opposite}}{\text{hypotenuse}}$, where $0^o < \theta < 90^o$



Tangent ratio

In any right-angled triangle,



$\tan\theta = \frac{\text{opposite}}{\text{adjacent}}$, where $0° < \theta < 90°$.