

Data and Graphs

Numeracy Guide

Language of Data

Data are **measurements** or **observations** that are collected as a source of information.

A **variable** is any characteristics, number, or quantity that can be measured or counted. A variable may **change** between entities being studied in the group being studied (also known as the population) and may change in value over time.

Types of variables

Numerical variables describe a measureable quantity as a number, e.g. 'how many' or 'how much'.

The data collected for a numerical variable are **quantitative** data.

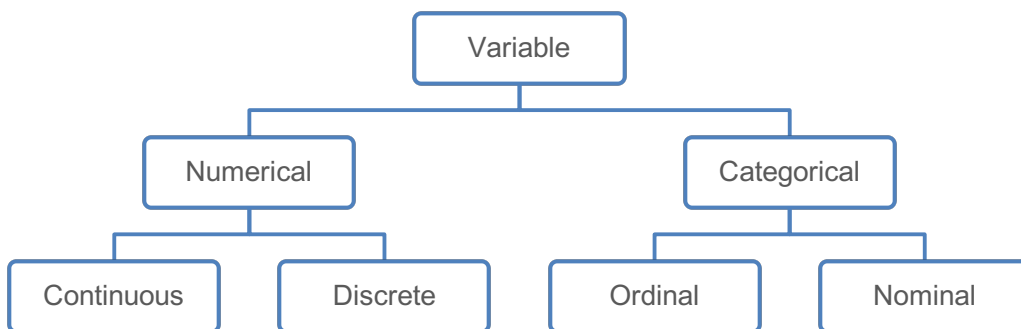
Numerical variables can be further described as either continuous or discrete:

A **continuous** variable can take any value that lies within an interval. These values are collected by **measurement**. Examples include height, reaction time to a stimulus and systolic blood pressure.

A **discrete** variable can take a value based on a **count** from a set of whole values. Examples include the number of cars that pass by and the number of children in a family.

Categorical variables have values that describe a 'quality' or 'characteristic' of the entity. For example, *blood group* is a categorical variable; its values are: A, B, AB or O.

The data collected for a categorical variable are qualitative data.



variable defined in Mathematics, Stage 4 (Year 8)

numerical and *categorical* introduced in Mathematics Stage 3, but not specifically identified until Stage 4 (Year 8)

continuous and *discrete* identified in Mathematics Stage 4 (Year 8)

ordinal and *nominal* introduce in Mathematics Stage 6 (Year 11)

Representing Data

Choosing the right graph

The type of data being collected should be used to determine the method of representation the data.

Column Graphs and Sector Graphs are used for **categorical** and **discrete numerical** data.

Line Graphs are used for **continuous** data.

Matching variables to axis

The **independent** variable is the variable that is deliberately changed, often through a series of preset values. For example, time. Conventionally plotted on the horizontal (x) axis of a graph.

The **dependent** variable is the factor in an experiment that changes as a result of changes to the independent variable; conventionally plotted on the vertical (y) axis of a graph.

Whether the variable is independent or dependent determines what data is displayed on which axis.

Language in the Syllabus

Term	Mathematics Syllabus	Science Syllabus	ABS (Australian Bureau of Statistics)
data	data	data	
variable	variable (statistics)	variable	variable (data item)
numerical	numerical data numerical variables	see quantitative	quantitative
continuous	continuous variable		
discrete			discrete variable
categorical	categorical variable	See qualitative	qualitative
dependent variable		dependent variable	
independent variable		independent variable	

References

Mathematics K-10 Syllabus, BOSTES, <https://syllabus.bostes.nsw.edu.au/mathematics/mathematics-k10/> including Glossary <https://syllabus.bostes.nsw.edu.au/mathematics/mathematics-k10/glossary/>

Statistical Language, Australian Bureau of Statistics,
<http://www.abs.gov.au/websitedbs/a3121120.nsf/home/statistical+language>

Syllabus Links

Science

In Stage 3: Students process and analyse data and information by: constructing and using a range of representations, including tables, graphs (column, picture, line and divided bar graphs) and labelled diagrams. [ST3-4WS]

In Stage 4: Students analyse data and information by: constructing and using a range of representations, including graphs, keys and models to represent and analyse patterns or relationships, including using digital technologies as appropriate [SC4-7WS, WS7.2 b.]

Mathematics

In Stage 3: A Student: uses appropriate methods to collect data and constructs, interprets and evaluates data displays, including dot plots, line graphs and two-way tables [MA3-18SP]

Students:

Pose questions and collect categorical or numerical data by observation or survey

Construct displays, including column graphs, dot plots and tables, appropriate for data type

- consider the data type to determine and draw the most appropriate display(s), such as column graphs, dot plots and line graphs

In Stage 4: collects, represents and interprets single sets of data, using appropriate statistical displays [MA4-19SP]

Students:

Investigate techniques for collecting data, including census, sampling and observation

- define 'variable' in the context of statistics as something measurable or observable that is expected to change over time or between individual observations
- recognise variables as categorical or numerical (either discrete or continuous)