# Glossary for teachers

This glossary contains mathematical terms that are relevant to 11–16 science. The aim is to promote a common understanding of these terms among teachers, publishers, awarding bodies and others. The definitions are not intended for pupils, although it is hoped that they will form a good basis for others to develop glossaries for pupils appropriate to different contexts.

The definitions in the glossary have been kept as consistent as possible with existing sources, where relevant. These include, in particular, *Mathematics Glossary for Teachers in Key Stages 1 to 3* (NCETM) and *The Language of Measurement* (ASE/Nuffield), as well as *Mathematics Glossary for Teachers in Key Stages 1 to 4* (QCA), on which the NCETM glossary was based, and *Signs, Symbols & Systematics: The ASE Companion to 16–19 Science* (ASE). (See *Further references on terminology and conventions* on page 5 in the Introduction for more details of these publications.) The glossary is intended to be complementary to *The Language of Measurement*, and so only those terms from that publication that are essential for the mathematical ideas in the current publication have been included.

Each of the chapters in this publication deals with clusters of key words selected from the list in this glossary. These are included in a panel at the start of each chapter (note that a number of key words appear in more than one chapter). The 'Section' column in the glossary gives links to the sections where the key words are discussed in detail, so the glossary also acts as an index. The key words in the chapters are indicated in ***blue underlined*** text. In the 'Definition' column, *italic terms* are key words than can be found elsewhere in the glossary.

| Key words | Definition | Section |
|---|---|---|
| **algebraic equation** | See *equation*. | 9.1 |
| **anomaly** | An anomaly (or anomalous value) is a measured value that appears not to fit the pattern of the other measurements, and is often (though not always) due to a mistake. For example, a value that is very different from the others in a set of repeated measurements, or a *data point* that lies far from a *line of best fit*. See also *outlier*. | 6.8 |
| **approximation** | A value that is not exact, but sufficiently close to the actual value for it to be useful. | 2.7 |
| **area** | A measure of the size of a surface (usually measured in square units, for example $cm^2$ or $m^2$). | 10.2 |

| Key words | Definition | Section |
|---|---|---|
| **area under the line (on a graph)** | On a graph, the area under a straight line between two values on the *horizontal axis* may have a physical meaning. The area is found by multiplying two values: the *mean* of the values on the *vertical axis*, and the difference between the two values on the horizontal axis. For example, on a *speed–time graph*, the area represents the *mean* (or *average*) *speed* multiplied by the time interval: this gives the *distance* travelled. If a speed–time graph shows a curve rather than a straight line, the area under the curve also represents the distance travelled, though it is not so straightforward to calculate. | 9.13, 10.8 |
| **arithmetic mean** | The sum of a set of values divided by the number of values in the set. Often referred to simply as a *mean* (though there are other types of mean, such as geometric mean). | 2.4, 6.5 |
| **average** | A measure of the 'typical value' of a set of data. Sometimes used synonymously with *mean* (or *arithmetic mean*) even though there are other measures of average, such as *median* and *mode*. | 6.5 |
| **axis** | On a graph or a chart, an axis is a reference line along which distances may represent values of a *variable*. See also *horizontal axis* and *vertical axis*. | 4.1 |
| **axis label** | On the *axis* of a graph, the axis label shows the name of the *variable* and its *unit* where appropriate. | 4.1 |
| **bar chart** | A display for presenting data, in which bars of equal width represent the set of values. Each value is proportional to the length of the bar. The bars may be vertical or horizontal. See also *grouped bar chart* and *stacked bar chart*. | 3.3, 3.4, 3.5, 3.7, 4.1, 6.4 |
| **base unit** | In the International System of Units (SI), there are seven base units. These are the units of the fundamental (and independent) quantities of length (metre), mass (kilogram), time (second), electric current (ampere), temperature (kelvin), chemical amount (mole) and light intensity (candela). See also *derived unit*. | 2.1 |
| **batch** | A set of values related to a single *quantity* or *variable*, for example repeated measurements of the time for a ball to drop a certain distance, or the heights of pupils in a school. | 6.4, 8.3, 8.4, 8.5 |
| **box plot** | A diagram that represents the *distribution* of values in a *batch* of data. The central box represents the *interquartile range*, and the *median* is shown as a line within the box. Lines extend above and below the box to the highest and lowest values. | 6.6, 6.7, 8.3, 8.5 |
| **brackets** | Symbols used to group numbers and letters in *expressions*, and indicating certain operations as having priority. See *order of operations*. | 9.4 |

| Key words | Definition | Section |
|---|---|---|
| **categorical** | Categorical data are data that can be sorted into categories (e.g. different 'eye colours' or 'food groups') but cannot be ordered (since they are 'labels' that have no particular order). Categorical data are *qualitative data*. | 1.4, 3.2, 6.4 |
| **circumference** | The distance around a circle (its perimeter). | 10.4 |
| **class interval** | When drawing a *histogram*, the set of *quantitative data* is split into a number of classes (groups). The class interval is the range of values within each class. | 6.4 |
| **coefficient** | In mathematics, a coefficient is a *factor* of an algebraic term, though often it is used to mean a 'numerical coefficient'. For example, in the term $4xy$, 4 is the numerical coefficient of $xy$, but $x$ is also the coefficient of $4y$ and $y$ is the coefficient of $4x$.<br>In science, the term is also used to apply to the properties of particular materials (e.g. the coefficient of expansion). | 9.2 |
| **combined events** | A combination of two or more events. The *probability* of a combined event can be calculated by multiplying together each of the probabilities of the separate events, but only if these are *independent events*. | 6.9 |
| **compound measure** | In mathematics, a compound measure is one that involves two (or more) other measures of different types. For example, speed (which can be calculated from distance / time) is a compound measure, and has units of metres per second. | 2.1 |
| **constant** | A number or quantity that does not vary. For example, in the *equation* $y = 3x + 6$, the 3 and 6 are constants, where $x$ and $y$ are *variables*. In the general equation for a straight line, $y \quad mx + c$, $m$ and $c$ are constants for a specific line.<br>In science, the term may be used to refer to 'universal constants' (e.g. the speed of light or the Avogadro constant) or to values that are constant within a particular context (e.g. for a spring that follows Hooke's Law, the value of the spring constant is constant for a specific spring). | 5.4, 9.2 |
| **constant of proportionality** | In a *directly proportional* relationship between two *variables*, $x$ and $y$, of the form $y = kx$, the *constant* $k$ is referred to as the constant of proportionality. | 5.4, 5.5, 5.9, 9.11 |
| **continuous** | Continuous data are a type of *quantitative data* (numerical data) for which the values can take on any value within a certain range (e.g. the heights of pupils or the temperatures of an object.). See also *discrete*. | 1.4, 3.2, 6.4 |
| **control variable** | In an investigation, the control *variables* are those that are kept constant by the investigator. | 1.5 |
| **coordinate** | On a graph, the coordinates determine the position of each *data point* in relation to the *axes*. See *x-coordinate* and *y-coordinate*. | 4.7 |

| Key words | Definition | Section |
|---|---|---|
| **correlation** | A measure of the strength of the association between two *variables*. High correlation implies a close relationship and low correlation a less close one. If an increase in one variable corresponds to an increase in the other, the correlation is positive. If an increase in one variable corresponds to a decrease in the other, the correlation is negative. | 8.7 |
| **cross-sectional area** | The area of a cross-section of a three-dimensional object or geometrical figure. The cross-section is the surface that would be exposed by making a 'straight cut' through the object, often at right angles to an axis of symmetry. | 10.3 |
| **cube** | In geometry, a three-dimensional figure with six identical square faces.<br>In number (arithmetic) and algebra, the result of cubing a number or *expression*. For example, $2^3$ (pronounced 'two cubed') is $2\times2\times2=8$. | 10.2<br>2.5 |
| **cube root** | A value whose *cube* is equal to a given value. For example, the cube root of 8 is 2 (since $2^3=8$), and this is represented as $\sqrt[3]{8}=2$ or $8^{1/3}=2$. | 2.5 |
| **cuboid** | A three-dimensional figure with six rectangular faces. (Some of the rectangular faces may be squares; a *cube* is a special cuboid in which all the faces are squares.) | 10.2 |
| **data point** | On a *line graph* or a *scatter graph*, a data point is represented by a symbol (e.g. $\times$ or $+$). Its position represents a pair of values for the two *variables*. | 3.6, 4.1, 4.7 |
| **decimal** | A term commonly used synonymously with 'decimal fraction', where the number of tenths, hundredths, thousandths, etc. are represented as digits following a decimal point. | 2.2 |
| **decimal place** | In a *decimal*, each column after the decimal point is a decimal place. For example, 5.275 is said to have three decimal places. | 2.3 |
| **dependent variable** | In an investigation, the dependent *variables* are those that are observed or measured by the investigator. | 1.5, 3.6, 4.2 |
| **derived unit** | All SI units, except for the seven *base units*, are derived units. They are produced by suitable multiplication or division involving two or more of the base units. | 2.1 |
| **diameter** | Any straight line segment joining two points on a circle or sphere that passes through the centre. | 10.4 |

| Key words | Definition | Section |
|---|---|---|
| **directly proportional** | If the algebraic relation between two *variables*, $x$ and $y$, is of the form $y = kx$ (where $k$ is a *constant*), $y$ is directly proportional to $x$. It also follows that $x$ is directly proportional to $y$ (since $x = \frac{1}{k}y$). Another way of expressing this (more common in mathematics than in science) is that $x$ and $y$ are in direct proportion.<br>If $y$ is directly proportional to $x$, when $x$ is doubled, $y$ also doubles, and when $x$ is multiplied by 10, $y$ is also multiplied by 10.<br>The graphical representation of $y = kx$ is a straight line through the *origin*, where $k$ is the *gradient* of the line.<br>The word 'directly' is often dropped, and the term *proportional* is used to mean the same thing. Using the full term 'directly proportional', however, is helpful when it is being contrasted to *inversely proportional*. | 5.2, 9.5, 9.7, 9.11 |
| **discrete** | Discrete data are a type of *quantitative data* (numerical data) for which the values can take on only certain values. These are often *integer* values produced by counting (e.g. the number of trees in a survey area). See also *continuous*. | 1.4, 3.2, 6.4 |
| **displacement** | The length and direction of the straight line from the initial position of an object to its position at a later time. Displacement is a *vector* quantity. | 10.5 |
| **displacement–time graph** | A graph showing how the *displacement* of an object changes over time. | 10.6 |
| **distance** | The length of the path along which an object has moved. Distance is a *scalar* quantity. | 10.5 |
| **distance–time graph** | A graph showing how the *distance* of an object changes over time. | 10.6 |
| **distribution** | For a set of data, the way in which values in the set are distributed (or spread out) between the highest and lowest values. | 6.4, 6.7 |
| **equation** | A mathematical statement showing that two *expressions* are equal. The expressions are linked with the equals ( ) sign. Also referred to as *algebraic equations* where the expressions contain *variables*. A *formula* is an equation that shows the relationship between real-world variables.<br>In science, the term 'equation' is also used to refer to a chemical equation. | 9.1, 9.2, 9.3, 9.11 |
| **estimate** | A rough or approximate value, found by calculating with suitable *approximations* or using previous experience. | 2.7 |
| **experiment** | An investigation in which variables may be manipulated and data are collected by observing the effects of changing some of the variables. See also *survey*. | 1.5 |

| Key words | Definition | Section |
|---|---|---|
| **exponent** | In *index notation*, the term 'exponent' is used synonymously with *index*. | 2.5 |
| **exponential relationship** | A relationship between two *variables*, $x$ and $y$, of the form $y = a^x$. For example, if $a = 2$, each increase of 1 for $x$ corresponds to a doubling of $y$. | 9.11 |
| **expression** | A mathematical form expressed symbolically, consisting of a combination of numbers and *variables* that may be evaluated. Expressions do not contain the equals (=) sign. | 9.1, 9.3, 9.4 |
| **extrapolation** | On a graph, extrapolation means estimating the value of one *variable* from a value of the other, using a *line of best fit* that is extended beyond the *range* of the available data. Care needs to be taken, since the relationship may not apply outside the data range. See also *interpolation*. | 7.5 |
| **factor** | In an investigation, an independent *variable* is often referred to as a factor, particularly when it is a *categorical* variable.<br>In mathematics, the term has an entirely different meaning: when a number can be expressed as the product of two or more numbers, these are factors of the first. For example, 2 and 3 are factors of 6. | 1.5, 3.2, 3.4, 3.5 |
| **formula** | An *equation* that shows the relationship between real-world *variables*. By rearranging the formula, it is possible to make any of the other variables the *subject of the formula*.<br>In science, the term 'formula' is also used to refer to a chemical formula. | 9.1, 9.4, 9.5, 9.6, 9.7, 9.8, 9.9 |
| **fraction** | The result of dividing one *integer* by a second integer, which must be non-zero. | 2.2 |
| **frequency** | In statistics, the number of times an event occurs, or the number of individuals or objects with some specific property. (Although it is a very different context, in science, the frequency of a wave or an oscillation has a related meaning – the number of cycles per unit of time.) | 3.2, 6.4 |
| **frequency table** | A table showing the *frequencies* of objects or events in different categories or *class intervals*. | 3.2 |
| **gradient** | On a graph, the gradient is a measure of the steepness of a line, and is calculated by dividing the vertical change by the corresponding horizontal change. It represents the *rate* at which the *variable* plotted on the *vertical axis* changes with the variable plotted on the *horizontal axis*. | 3.6, 5.3, 7.2, 7.3, 9.12, 10.6, 10.7 |
| **grouped bar chart** | A type of *bar chart* used to represent data categorised by two *factors*. Each group of bars represents one factor, and the bars within each group represent the other factor. (Also known as a clustered bar chart.) | 3.5 |

| Key words | Definition | Section |
|---|---|---|
| **grouped data** | *Discrete* data and *continuous* data can be grouped into *class intervals* and counted to produce a *frequency table*. This is called grouped data. | 3.2 |
| **histogram** | In science, the term 'histogram' is used to refer to a representation of the *distribution* of data, in which the height of each bar is *proportional* to the *frequency* of values in each class: all of the *class intervals* are equal, and the bars are of equal width.<br>In mathematics and statistics, the class intervals may not all be equal, and so the bars may be of different widths. The area of each bar is proportional to the frequency of values in each class, and the height of each rectangle represents the 'frequency density' of the class. | 6.4, 6.7, 8.3 |
| **horizontal axis** | On a *line graph* or a *scatter graph*, the horizontal axis usually represents the *independent variable*. (See also *x-axis*.) | 3.6, 4.1, 4.2, 5.3 |
| **independent events** | Two events are independent if the *probability* of the second event is not affected by the outcome of the first. | 6.9 |
| **independent variable** | In an investigation, the independent *variables* are those that are changed by the investigator. | 1.5, 3.6, 4.2 |
| **index** | In *index notation*, the superscript is called the index, for example in $a^4$ the index is 4. (Note that the plural of index is indices.) It is also possible to have fractional and negative indices. | 2.5 |
| **index notation** | The notation in which a product such as $a \times a \times a \times a$ is recorded as $a^4$. | 2.5 |
| **integer** | Any of the positive or negative whole numbers and zero (e.g. …, −2, −1, 0, +1, +2, …). | 1.4, 2.3 |
| **intercept** | On a graph, the point at which a straight line or a curve crosses an *axis* is called an intercept. The term 'intercept' is typically used in relation to the *vertical axis* (*y-axis*), but also applies to the *horizontal axis* (*x-axis*). | 7.2, 7.6, 9.11, 9.12 |
| **interpolation** | On a graph, interpolation means estimating the value of one *variable* from a value of the other, using a *line of best fit* that does not extend beyond the *range* of the data. See also *extrapolation*. | 7.5 |
| **interquartile range** | The difference between the upper and lower *quartiles*. It contains the middle half of the values in the ordered data set. It is a useful measure of *spread* since, unlike the *range*, it is not much affected by *outliers*. | 6.6, 8.3 |

| Key words | Definition | Section |
|---|---|---|
| **inverse** | Inverse operations are 'opposite' operations that 'undo each other'. For example, subtraction is the inverse of addition, and −5 is the additive inverse of 5 since their sum is zero. Division is the inverse of multiplication, and ⅓ is the multiplicative inverse of 3 since their product is 1. (Sometimes, the term is used synonymously with *reciprocal*, for example 'the inverse of 2 is ½'.) | 5.4 |
| **inverse square relationship** | A relationship between two *variables*, $x$ and $y$, of the form $y = a/x^2$, where $a$ is a *constant*. | 9.11 |
| **inversely proportional** | If the algebraic relation between two *variables*, $x$ and $y$, is of the form $y = k/x$ (where $k$ is a *constant*), $y$ is inversely proportional to $x$. It also follows that $x$ is inversely proportional to $y$ (since $x = k/y$). Another way of expressing the equation is $xy = k$.<br>If $y$ is inversely proportional to $x$ then, for example, when $x$ is doubled, $y$ is halved, and when $x$ is multiplied by 10, $y$ is divided by 10. | 5.4, 5.5, 9.5, 9.7, 9.11 |
| **line graph** | In mathematics, a line graph is a graph in which adjacent *data points* are joined by straight-line segments. Such graphs are also used in science.<br>However, a 'line graph' in science more often refers to a graph where it is assumed that there is a simple relationship between the two *variables*, such that a *line of best fit* can be drawn that is very close to all the *data points*. In practice, not all the data points fit on this line because of measurement *uncertainty*. | 3.3, 3.6, 4.1, 5.2, 7.1, 7.2, 9.11, 9.12, 9.13 |
| **line of best fit** | A line drawn on a graph that passes through or as close as possible to the *data points*. It represents the best estimate of any underlying relationship between the *variables*. A 'line of best fit' often refers to a straight line but it may also be a curve. | 7.4, 8.8 |
| **linear** | On a graph, a relationship is said to be linear if it is represented by a straight line. See also *linear relationship*. | 7.2 |
| **linear dimension** | A term often used in the context of scaling. A linear dimension refers to the distance between two points of a geometric figure. When comparing two similar geometric figures, the *scale factor* applies only to the linear dimensions (any two corresponding lengths), and not to the area or volume. | 5.9, 10.3, 10.4 |
| **linear relationship** | If the relationship between two *variables*, $x$ and $y$, is *linear*, equal changes in $x$ correspond to equal changes in $y$. For example, with a spring that follows Hooke's Law, for each additional 100 g mass suspended from the spring, its length increases by the same amount as before.<br>The equation for a linear relationship can be expressed in the form $y = mx + c$. When represented as a graph, this is a straight line for which $m$ is the *gradient* of the line and $c$ is the *intercept* on the *y-axis*. | 7.2, 7.4, 9.11 |

| Key words | Definition | Section |
|---|---|---|
| **mass** | A measure of the quantity of matter in an object. The SI *base unit* of mass is the kilogram (kg). In science, it is important to distinguish between mass and *weight*. | 10.1 |
| **mean** | The sum of a set of values divided by the number of values in the set. (More correctly called the *arithmetic mean*, as there are also other types of mean, such as geometric mean.) See also *average*. | 2.4, 6.5 |
| **median** | The middle value in a set of data when all the values are arranged in order. An equal number of data values lie above and below the median. See also *average*. | 6.5, 8.3 |
| **mode** | The most commonly occurring value in a set of *discrete* data. Some sets of data may have more than one mode. See also *average*. | 6.5 |
| **non-linear** | A non-linear relationship is one that is not *linear* and, on a graph, is represented by a curve and not by a straight line. See also *linear relationship*. | 7.2 |
| **order of magnitude** | The approximate size, often given as a *power of 10*. Orders of magnitude are particularly useful when comparing values of very different sizes. For example, 4763 is very roughly 1000 times larger than 3.8, i.e. $10^3$ or 'three orders of magnitude larger'. | 2.6, 2.7 |
| **order of operations** | The order in which different mathematical operations are applied in a calculation. The convention is often encapsulated in the mnemonic BIDMAS (Brackets, Indices, Division/ Multiplication, Addition/Subtraction) or BODMAS (where O represents Order or 'to the power Of'). | 9.4 |
| **origin** | On a graph, the origin is the point at which the values of both *variables* are zero (the *x-coordinate* and the *y-coordinate* are both zero). | 4.3, 5.2, 7.2, 7.6, 9.11 |
| **outlier** | A value in a set of data that is judged to be unusually large or unusually small in comparison with most of the other values, for whatever reason. In sampling a population, an outlier may indicate an individual with exceptional characteristics. By contrast, an outlier in a set of repeated measurements may indicate that a mistake has been made (see also *anomaly*). | 6.8, 7.7, 8.3 |
| **percentage** | A fraction expressed as the number of parts per hundred and recorded using the notation %. | 5.8 |
| **percentile** | When the values in a *batch* of data are arranged in order, the percentiles are the values that split the data into 100 groups containing (as far as possible) equal numbers of values. For example, 10% of the data values lie below the 10th percentile. See also *quartile*. | 8.3 |

| Key words | Definition | Section |
|---|---|---|
| **pie chart** | A display for presenting data, in which the sectors (like 'slices of a pie') represent the proportions of each of the values. The size of each value is *proportional* to the angle at the centre of the circle. | 3.3, 3.4, 3.5 |
| **population** | In statistics, a population is the entire collection of objects or events of a similar nature that are of interest in a study, and about which data may be collected. This is usually done by selecting a *sample*. | 6.3, 8.2 |
| **power** | In *index notation*, the term 'power' is often used synonymously with *index*. Using the term 'power' in its correct sense, the expression $3^4$ can be described as 'the fourth power of 3'. | 2.5 |
| **power of 10** | Any number of the form $10^n$ is called a *power* of 10, where $n$ is an *integer* (negative, zero, or positive), for example … $10^{-2}$, $10^{-1}$, $10^0$, $10^1$, $10^2$, $10^3$ (i.e. 0.01, 0.1, 1, 10, 100, 1000). Each number in the series is 10 times the previous number. | 2.6 |
| **primary data** | Data collected directly by the user. See also *raw data* and *secondary data*. | 1.5 |
| **probability** | The likelihood of an event happening. Probability is expressed on a scale from 0 to 1. Where an event cannot happen its probability is 0 and where it is certain its probability is 1. | 6.9 |
| **proportional** | The term 'proportional' is often used to mean the same as *directly proportional*. Using the full term 'directly proportional', however, is helpful when it is being contrasted to *inversely proportional*. | 5.1, 5.2, 5.4, 5.5, 5.7, 7.2, 7.6, 9.9, 9.11 |
| **qualitative data** | Data that are non-numerical (in contrast to *quantitative data*). See also *categorical*. | 1.1, 6.4 |
| **quantitative data** | Data that are numerical (in contrast to *qualitative data*). See also *continuous* and *discrete*. | 1.1, 6.4 |
| **quantity** | Any property that can be given a magnitude by measuring or counting. | 1.1, 2.1 |
| **quartile** | When the values in a *batch* of data are arranged in order, the quartiles are the three values that split the data into four groups containing (as far as possible) equal numbers of values. They are called the first or lower quartile, the second quartile (or *median*), and the third or upper quartile. The difference between the upper and lower quartiles is the *interquartile range*. | 6.6, 8.3 |
| **radius** | The distance from the centre of a circle or sphere to any point on the circle or sphere. | 10.4 |
| **random error** | A component of measurement error due to measurements varying in unpredictable ways from one measurement to the next. | 6.2 |

| Key words | Definition | Section |
|---|---|---|
| **random sample** | A *sample* from a *population* in which all the individuals in the population are selected at random and have an equal chance of being included in the sample. | 8.2 |
| **range** | For a measuring instrument, the range is the set of values that can be measured, describing its lower and upper limits.<br><br>In an *experiment* investigating the relationship between two *quantitative variables*, the range refers to the lowest and highest values of a variable. For the *independent variable* the range is chosen by the experimenter and for the *dependent variable* the range is determined by the results of the experiment.<br><br>On a graph, the range of an *axis* indicates the highest and lowest values on the axis.<br><br>For a *distribution* of data, the range is a measure of *spread*, and is the difference between the highest and lowest values. Note that in school science, the term 'range' is generally used to indicate both the lowest and highest values themselves, and not the difference between them. | 1.2<br><br>4.3, 4.5<br><br>4.3, 4.4<br><br>6.6, 8.3 |
| **rate** | A measure of how quickly one *variable* changes in comparison with another variable. For example, *speed* is the rate of change of *distance* with time. | 5.3, 7.3, 9.12, 9.13 |
| **ratio** | A ratio shows the relative sizes of two values, usually written in the form $a : b$ (and pronounced 'the ratio of $a$ to $b$'). Since a ratio is a comparison of two similar quantities, it does not have *units*. | 5.6 |
| **raw data** | Data collected directly from *experiments* or *surveys*, before being processed. See also *primary data*. | 1.5, 3.2 |
| **reciprocal** | The reciprocal of a value is 1 divided by the value; for example, the reciprocal of 2 is ½. | 2.5, 5.4 |
| **recurring decimal** | A decimal with an infinitely repeating digit or group of digits (e.g. the fraction ⅓ is the decimal 0.33333…). | 2.3 |
| **resolution** | The resolution of a measuring instrument is the smallest change in the quantity being measured that gives a perceptible change in the indication on the instrument. | 1.2 |
| **risk** | Risk is related to the *probability* of harm occurring when exposed to a hazard. The actual value of a risk is often called the 'absolute risk', while a 'relative risk' may be used to compare the risks for two different situations or groups (e.g. in a clinical trial, to compare the risks for the control group and for the treatment group). | 6.10, 6.11 |
| **round** | 'Rounding a number' means expressing it as an *approximation* with fewer *significant figures*. For example, 5.432 rounded to the nearest 0.1 is 5.4 (from four to two significant figures). | 2.3 |

| Key words | Definition | Section |
|---|---|---|
| **sample** | A subset of a *population*. In collecting data, a sample of observations may be made from which to draw inferences about a larger population. | 6.3, 8.2 |
| **scalar** | A *quantity* that has a magnitude (size) but no direction, for example *mass*. See also *vector*. | 10.5, 10.6 |
| **scale** | Used as a noun: a set of marks on a line with equal intervals. Applies to:<br>• an analogue measuring instrument<br>• the *axis* on a graph.<br>Used as a verb: to enlarge or reduce a number, quantity or measurement by a given amount (called a *scale factor*). | <br><br><br>1.2<br>4.4, 4.5<br>5.9 |
| **scale drawing** | A representation of a physical object in which all lengths in the drawing are in the same *ratio* (the *scale factor*) to the corresponding lengths in the actual object. | 5.9, 10.3 |
| **scale factor** | In a *scale drawing*, the *ratio* of any length in the drawing to the corresponding length in the physical object. More generally, the scale factor for two similar geometric figures is the ratio of any two corresponding lengths. | 5.9, 10.3 |
| **scatter graph** | A graph on which paired values for two *variables* are plotted and which may indicate a relationship between the variables. On a scatter graph, it is not meaningful to join the *data points* with line segments, but a *line of best fit* may be drawn. | 3.3, 3.6, 4.1, 8.7, 8.8 |
| **scientific notation** | See *standard form*. | 2.6 |
| **secondary data** | Data obtained indirectly from sources such as books, articles or web pages. See also *primary data*. | 1.5 |
| **significant figures** | The number of digits that contribute information about the size of a value (related to the measurement *uncertainty*). | 1.2, 2.3 |
| **slope** | Sometimes used as an informal alternative to *gradient*, although gradient is the preferred term. | 5.3 |
| **speed** | The rate of change of *distance* with time. Speed is a *scalar* quantity. | 10.6 |
| **speed–time graph** | A graph showing how the *speed* of an object changes over time. | 10.6, 10.7, 10.8 |
| **spread** | For a *batch* of values, the term 'spread' refers to how close together or far apart the values are. Measures of spread include the *range*, *interquartile range* and standard deviation. | 6.6 |
| **square** | In geometry, a two-dimensional figure with four equal sides and four right angles.<br>In number (arithmetic) and algebra, the result of squaring a number or *expression*. For example, $5^2$ (pronounced 'five squared') is $5 \times 5$ 25. | 10.2<br>2.5 |

| Key words | Definition | Section |
|---|---|---|
| **square root** | A value whose *square* is equal to a given value. For example, a square root of 25 is 5 (since $5^2 = 25$), and this is recorded as $\sqrt{25} = 5$. It also has a negative square root (−5), since $(-5)^2 = 25$. | 2.5 |
| **stacked bar chart** | A type of *bar chart* used to represent data categorised by two *factors*. Each bar represents one factor, and the segments within each bar represent the other factor. (Also known as a compound bar chart.) | 3.5 |
| **standard form** | A form in which numbers are recorded as a number between 1 and 10 multiplied by a *power of 10*. For example, 193 in standard form is recorded as $1.93 \times 10^2$. It is also referred to as *standard index form* and *scientific notation*. | 2.6 |
| **standard index form** | See *standard form*. | 2.6 |
| **stem-and-leaf diagram** | A format for organising the values in a *batch* of data. The *class intervals* are represented on the vertical 'stem', and the values in each class interval are represented as horizontal rows forming the 'leaves'. | 8.3 |
| **subject of a formula** | A *formula* is an *equation* that shows the relationship between real-world *variables*. It is conventionally written so that one of these variables is 'on its own' on the left of the equals sign – this variable is called the subject of the formula. By rearranging the formula, it is possible to make any of the other variables the subject of the formula. | 9.6, 9.7, 9.8 |
| **surface area** | The area of the surface of a three-dimensional object or geometric figure. | 10.3 |
| **surface area : volume ratio** | The ratio of the *surface area* to the *volume* for a three-dimensional object or geometric figure. | 10.3 |
| **survey** | An investigation in which variables are hard to manipulate, and data are collected from *samples* of *populations*. See also *experiment*. | 1.5 |
| **tangent** | On a graph, a straight line that touches a curve at only one point. The line has the same *gradient* as the gradient of the curve at that point. (The term is also used in trigonometry: the tangent of an angle in a right-angled triangle is the ratio of the length of the opposite side to the length of the adjacent side.) | 9.12 |
| **tick mark** | On a graph or chart, the tick marks are the small lines along the *axis* at regular intervals, each representing a value on the *scale*. | 4.1 |
| **tick mark label** | On a graph or chart, the number next to a *tick mark* indicating the size of the value. | 4.1 |
| **time series** | A set of observations, generally measurements or counts, taken over time and usually at equally spaced intervals. | 1.5, 3.6, 4.2 |
| **true value** | The value that would be obtained in an ideal measurement. | 6.2 |

| Key words | Definition | Section |
|---|---|---|
| **two-way table** | A *frequency table* in which the *frequencies* are categorised by two independent *factors* (*categorical* variables). | 3.2 |
| **uncertainty** | The interval within which the true value can be expected to lie, with a given level of confidence or *probability*. | 6.2 |
| **unit** | A unit of measurement is a standard used in measuring (e.g. the metre is a unit of length; the kilogram is a unit of mass). | 1.1, 2.1, 3.1, 4.6 |
| **unit prefix** | The prefix used to form a decimal multiple or submultiple of an SI *unit* (e.g. 'kilo' or 'milli'). | 2.6 |
| **value** | The value of a *quantity* or a *variable* may be a number, or may consist of a number and a *unit*. | 1.1 |
| **variability** | Variability in a set of data relates to how spread out or how close together the values are. It may arise due to measurement *uncertainty* or due to differences between the individuals in a *population*. | 6.1, 6.2, 6.3, 8.3 |
| **variable** | In an investigation: a physical, chemical or biological quantity or characteristic that can differ from case to case.<br><br>In an algebraic equation: a quantity that can take on a range of values, often denoted by a letter (e.g. $x$, $y$, $z$, $t$). | 1.3, 1.5, 2.1, 3.1, 7.2, 8.7<br><br>1.5, 2.1, 9.2 |
| **vector** | A *quantity* that has both a magnitude (size) and a direction, for example *displacement*. See also *scalar*. | 10.5, 10.6 |
| **velocity** | The rate of change of *displacement* with time. Velocity is a *vector* quantity. | 10.6 |
| **velocity–time graph** | A graph showing how the *velocity* of an object changes over time. | 10.6, 10.7, 10.8 |
| **vertical axis** | On a *line graph* or a *scatter graph*, the vertical axis usually represents the *dependent variable*. (See also *y-axis*.) | 3.6, 4.1, 4.2, 5.3 |
| **volume** | A measure of three-dimensional space (usually measured in cubic units, for example $cm^3$, $dm^3$ or $m^3$). | 10.2 |
| **weight** | The weight of an object can be defined as the gravitational force exerted on the object. Its SI *derived unit* is the newton (N). In everyday language, it is common for 'weight' to be measured in units of *mass*, for example grams (g) or kilograms (kg). In science, however, it is important to distinguish between weight and mass. | 10.1 |
| ***x*-axis** | On a graph, the $x$-axis is the *horizontal axis*. | 4.1, 4.2, 5.3 |
| ***x*-coordinate** | On a graph, the $x$-coordinate of a *data point* is its distance along the *x-axis*. | 4.1, 4.7, 5.3 |
| ***y*-axis** | On a graph, the $y$-axis is the *vertical axis*. | 4.1, 4.2, 5.3 |
| ***y*-coordinate** | On a graph, the $y$-coordinate of a *data point* is its distance along the *y-axis*. | 4.1, 4.7, 5.3 |