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| **Appendix 2 – language Term**  | **Definition**  |
| additive identity  | An identity is a number such that when another number is combined with it (using a given operation) it does not change that number. The additive identity (i.e. the identity for addition and subtraction) is 0.  |
| adjacent  | In trigonometry, one of the shorter two sides in a right-angled triangle. The side adjacent or next to a given angle.  |
| alternate angles  | Where two straight lines are cut by a third, as in the diagrams, the angles *d* and *f* (also *c* and *e*) are alternate. Where the two straight lines are parallel, alternate angles are equal.  |
| altitude of a triangle  | A line segment through a vertex and perpendicular to the side opposite the vertex.  |
| arc  | A portion of a curve. Often used for a portion of a circle.  |
| arithmetic sequence  | A sequence of numbers in which successive terms are generated by adding or subtracting a constant amount to/from the preceding term. Example 1: 3, 11, 19, 27, 35, …, where 8 is added. Example 2: 4, −1, −6, −11, …, where 5 is subtracted (or −5 has been added). The sequence can be generated by giving one term (usually the first term) and the constant that is added (or subtracted) to give the subsequent terms. Also called an ‘arithmetic progression’.  |
| associative  | A binary operation ∗ on a set S is associative if a ∗ (b ∗ c) = (a ∗ b) ∗ c for all a, b and c in the set S. Addition of real numbers is associative, which means a + (b + c) = (a + b) + c for all real numbers a, b and c. It follows that, for example, 1 + (2 + 3) = (1 + 2) + 3. Similarly, multiplication is associative. Subtraction and division are not associative because 1 − (2 − 3) = 1 − (−1) = 2, whereas (1 − 2) − 3 = (−1) − 3 = −4 and 1 ÷ (2 ÷ 3) = 1 ÷ 23 = 32, whereas (1 ÷ 2) ÷ 3 = ( 12 ) ÷ 3 = 16.  |
| binomial  | An algebraic expression of the sum or difference of two terms.  |
| bisector  | A point, line or plane that divides a line, an angle or a solid shape into two equal parts. A perpendicular bisector is a line at right angles to a line-segment that divides it into two equal parts.  |
| bivariate  | Involving two random variables; used in statistics as a bivariate distribution.  |
| bivariate data  | Data that compares the values of two variables by pairing each value of one of the variables with a value of the other.  |

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| Cartesian coordinate system  | A system used to define the position of a point in 2- or 3-dimensional space: Two axes at right angles to each other are used to define the position of a point in a plane. The usual conventions are to label the horizontal axis as the *x*-axis and the vertical axis as the *y*-axis, with the origin at the intersection of the axes. The ordered pair of numbers (*x*, *y*) that defines the position of a point is the coordinate pair. The origin is the point (0, 0); positive values of *x* are to the right of the origin and negative values are to the left of the origin; positive values of *y* are above the origin and negative values below the origin. Each of the numbers is a coordinate. The numbers are also known as ‘Cartesian coordinates’, after the French mathematician, René Descartes (1596–1650). Three mutually-perpendicular axes, conventionally labelled *x*, *y* and *z*, and coordinates (*x*, *y*, *z*) can be used to define the position of a point in space.  |
| centre of enlarge-ment  | Mentioned in definition for enlargement: a transformation of the plane in which lengths are multiplied whilst directions and angles are preserved. A centre and a positive scale factor are used to specify an enlargement. The scale factor is the ratio of the distance of any transformed point from the centre to its distance from the centre prior to the transformation. Any figure and its image under enlargement are similar.  |
| centre of rotation  | Mentioned in definition for rotation: in 2-dimensions, a transformation of the whole plane, which maps each point to another by rotating it by a specified angle (the angle of rotation) about a fixed point (the centre of rotation).  |
| coefficient  | Often used for the numerical coefficient. More generally, a factor of an algebraic term. Example 1: In the term 4*xy*, 4 is the numerical coefficient of *xy* but *x* is also the coefficient of 4*y* and *y* is the coefficient of 4*x*. Example 2: in the quadratic equation 3*x2* + 4*x* – 2, the coefficients of *x2* and *x* are 3 and 4 respectively.  |
| combined event  | A combined (or compound) event is an event that includes several outcomes. Example: In selecting people at random for a survey, a combined event could be ‘girl with brown eyes’.  |
| commut-ative  | A binary operation ∗ on a set S is commutative if a ∗ b = b ∗ a for all a and b ∈ S. Addition and multiplication of real numbers are commutative where a + b = b + a and a × b = b × a for all real numbers a and b. It follows that, for example, 2 + 3 = 3 + 2 and 2 × 3 = 3 × 2. Subtraction and division are not commutative since, as counter examples, 2 − 3 ≠ 3 − 2 and 2 ÷ 3 ≠ 3 ÷ 2.  |
| conditional probability  | The conditional probability of an event B is the probability that the event will occur, given the knowledge that an event A has already occurred. This probability is written P(B|A) (‘the probability of B given A’). In the case where events A and B are independent, P(B|A) = P(B). If events A and B are dependent, then the probability that both events occur is P(A and B) = P(A) × P(B|A).  |
| congruent (figures)  | Two or more geometric figures are said to be congruent when they are the same in every way except their position in space. Example: Two figures, where one is a reflection of the other, are congruent since one can be transposed onto the other without changing any angle or edge length.  |
| construction  | A construction in geometry is the act of drawing geometric shapes using only a pair of compasses and a straightedge. No measuring of lengths or angles is permitted.  |
| correspond-ing angles  | Where two straight-line segments are intersected by a third, as in the diagrams, the angles a and e are corresponding. Similarly, b and f, c and g, and d and h are corresponding. Where parallel lines are cut by a straight line, corresponding angles are equal.  |
| cube number  | A number that can be expressed as the product of three equal integers. Example: 27 = 3 × 3 × 3. Consequently, 27 is a cube number. It is the cube of 3 or 3-cubed. This is written compactly as 27 = 33, using index (or power) notation.  |
| cube root  | A value or quantity whose cube is equal to a given quantity. Example: the cube root of 8 is 2 since 23 = 8. This is recorded as √83=2 or 813 .  |
| cylinder  | A 3D object whose uniform cross-section is a circle. A right cylinder can be defined as having circular bases with a curved surface joining them, this surface formed by line segments joining corresponding points on the circles. The centre of one base lies over the centre of the second.  |

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| decimal  | Relating to the base ten. Most commonly used synonymously with decimal fractions where the number of tenths, hundredths, thousandths, etc. are represented as digits following a decimal point. The decimal point is placed at the right of the ones column. Each column after the decimal point is a decimal place. Example: The decimal fraction 0.275 is said to have three decimal places. The system of recording with a decimal point is decimal notation. Where a number is rounded to a required number of decimal places, to 2 decimal places for example, this may be recorded as 2 d.p.  |
| dependent and independent events  | See ‘events (dependent)’ and ‘events (independent)’.  |
| dispersion  | Dispersion (also called ‘variability’, ‘scatter’ or ‘spread’) is the extent to which the data in a distribution is spread out. A simple measure of spread is the range. Other common measures are the variance, standard deviation and interquartile range.  |
| distributive  | One binary operation ∗ on a set *S* is distributive over another binary operation • on that set if *a* ∗ (*b* • *c*) = (*a* ∗ *b*) • (*a* ∗ *c*) for all *a*, *b* and *c* ∈ *S*. For the set of real numbers, multiplication is distributive over addition and subtraction since *a*(*b* + *c*) = *ab* + *ac* for all *a*, *b* and *c* real numbers. It follows that 4(50 + 6) = (4 × 50) + (4 × 6) and 4 × (50 − 2) = (4 × 50) − (4 × 2).   |
| enlarge-ment  | A transformation of the plane in which lengths are multiplied whilst directions and angles are preserved. A centre and a positive scale factor are used to specify an enlargement. The scale factor is the ratio of the distance of any transformed point from the centre to its distance from the centre prior to the transformation. Any figure and its image under enlargement are similar.  |
| equation  | A mathematical statement showing that two expressions are equal. The expressions are linked with the symbol = Examples: 7 – 2 = 4 + 1 4x = 3 x2 − 2x + 1 = 0  |
| events (dependent)  | Two events are said to be dependent when the outcome of one has an influence on the outcome of the other. Example: Picking two balls from a bag of balls when the first one is not replaced; the probability of choosing the second ball will be influenced by which ball is chosen first.  |
| events (independ-ent)  | Two events are said to be independent there is no influence on the second as a result of the first. Example: Picking two balls from a bag of balls when the first ball is replaced before picking the second.  |
| exponent  | Also known as ‘index’, a number, positioned above and to the right of another (the base), indicating repeated multiplication when the exponent is a positive integer. Example 1: n2 indicates n × n; and ‘n to the (power of) 4’, that is n4 means n × n × n × n. Example 2: since 25 = 32 we can also think of this as ’32 is the fifth power of 2’. Any positive number to the power of 1 is the number itself; x1 = x, for any positive value of x. Exponents may be negative, zero, or fractional. Negative integer exponents are the reciprocal of the corresponding positive integer exponent, for example, 2-1 = $\frac{1}{2}$ Any positive number to the power of zero equals 1; x0 = 1, for any positive value of x.  |
| expression  | A mathematical form expressed symbolically. Examples: 7 + 3 a2 + b2  |
| factorise  | To express a number or a polynomial as the product of its factors. Example 1: Factorising 12: 12 = 1 × 12 = 2 × 6 = 3 × 4 The factors of 12 are 1, 2, 3, 4, 6 and 12. 12 may be expressed as a product of its prime factors: 12 = 2 × 2 × 3 Example 2: Factorising x2 − 4x − 21: x2 − 4x – 21 = (x + 3)(x − 7) The factors of x2 − 4x – 21 are (x + 3) and (x − 7).  |
| formula  | An equation linking sets of physical variables. Example: 𝐴=𝜋𝑟2 is the formula for the area of a circle. Plural: formulae.  |
| geometric sequence  | A series of terms in which each term is a constant multiple of the previous term (known as the common ratio) is called a geometric sequence, sometimes also called a ‘geometric progression’. Example 1: 1, 5, 25, 125, 625, …, where the constant multiplier is 5. Example 2: 1, −3, 9, −27, 81, …, where the constant multiplier is −3. A geometric sequence may have a finite number of terms or it may go on forever, in which case it is an infinite geometric sequence. In an infinite geometric sequence with a common ratio strictly between zero and one, all the terms add to a finite sum.  |
| hypotenuse  | In trigonometry, the longest side of a right-angled triangle. The side opposite the right-angle.  |
| image  | When a transformation is applied to a shape, the transformed shape is called the ‘image’. The original shape is called the ‘object’.  |
| interior angle  | At a vertex of a polygon, the angle that lies within the polygon.  |
| line  | A set of adjacent points that has length but no width. A straight line is completely determined by two of its points, say A and B. (see ‘line segment’)  |
| line segment  | The part of a line between any two of its points is a line segment. (See ‘line’.)  |
| linear  | In algebra, describing an expression or equation of degree one. Example: 2x + 3y = 7 is a linear equation. All linear equations can be represented as straight line graphs.  |
| locus  | A locus of points is the set of points, and only those points, that satisfies given conditions. Example: The locus of points at a given distance from a given point is a circle.  |
| (arithmetic) mean  | The sum of a set of numbers, or quantities, divided by the number of terms in the set. Example: The arithmetic mean of 5, 6, 14, 15 and 45 is (5 + 6 + 14 + 15 + 45) ÷ 5, i.e. 17.  |
| measure of central tendency  | In statistics, a measure of how the values of a particular variable are located in terms of the values collected for a particular sample, or for the relevant population as a whole. In school mathematics up to Key Stage 4, there are three important measures of central tendency: the arithmetic mean, the median and the mode. These are all statistical averages and often one is more useful than another, depending on the spread of the values under consideration.  |
| median  | The middle number or value when all values in a set of data are arranged in ascending order. Example: The median of 5, 6, 14, 15 and 45 is 14. When there is an even number of values, the arithmetic mean of the two middle values is calculated. Example: The median of 5, 6, 7, 8, 14 and 45 is (7 + 8) ÷ 2, i.e. 7.5. The median is one example of an average.  |

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| mode  | The most commonly occurring value or class with the largest frequency. Example: The mode of this set of data: 2, 3, 3, 3, 4, 4, 5, 5, 6, 7, 8 is 3. Some sets of data may have more than one mode.  |
| multiplicat-ive identity  | An identity is a number such that when another number is combined with it (using a given operation) it does not change that number. The multiplicative identity (i.e. the identity for multiplication and division) is 1.  |
| mutually- exclusive events  | In probability, events that cannot both occur in one experiment. When the mutually exclusive events cover all possible outcomes, the sum of their probabilities is one.  |
| *n*th term of a sequence  | This is the name for the term that is in the *n*th position starting the count of terms from the first term. The nth term is sometimes represented by the symbol un.  |
| object  | When a transformation is applied to a shape, the original shape is called the ‘object’. The transformed shape is called the ‘image’.  |
| opposite  | In trigonometry, one of the shorter two sides in a right-angled triangle. The side opposite a given angle.  |
| outlier  | In statistical samples, an outlier is an exceptional trial result that lies beyond where most of the results are clustered. Example: Six people have the following salaries: £20 000, £25 600, £2 000, £19 000, £30 000, £160 000. The salary of £160 000 is clearly out of line with the others and is an outlier. At the other end, £2 000 is also well below the central cluster of values and so may also be considered as an outlier.  |
| perpen-dicular  | A line or plane that is at right angles to another line or plane.  |
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| pi (𝜋)  | The ratio of the circumference of a circle to the length of its diameter is a constant called pi (symbol: 𝜋). Pi is an irrational number and so cannot be written as a finite decimal or as a fraction. One common approximation for 𝜋 is 227. 3.14159265 is a more accurate approximation, to 8 decimal places.  |
| prime number  | A whole number greater than one that has exactly two factors: itself and one. Examples: 2 (factors 2, 1), 3 (factors 3, 1). 51 is not prime (factors 51, 17, 3, 1).  |
| prism  | A solid bounded by two congruent polygons that are parallel (the bases) and parallelograms (lateral faces) formed by joining the corresponding vertices of the polygons. Prisms are named according to the base, e.g. triangular prism, quadrangular prism, pentagonal prism, etc. Examples: If the lateral faces are rectangular and perpendicular to the bases, the prism is a right prism.  |
| probability  | The likelihood of an event happening. Probability is expressed on a scale from zero to one. Where an event cannot happen, its probability is zero and where it is certain its probability is one. Example: The probability of scoring one with a fair dice is 16. The denominator of the fraction expresses the total number of equally likely outcomes. The numerator expresses the number of outcomes that represent a ‘successful’ occurrence. Where events are mutually exclusive and exhaustive the total of their probabilities is one.  |
| proportion  | A part-to-whole comparison. Example: Where £20 is shared between two people in the ratio 3:5, the first receives £7.50, which is 38 of the whole £20. This is the first person’s proportion of the whole. If two variables x and y are related by an equation of the form y = kx, then y is directly proportional to x; it may also be said that y varies directly as x. When y is plotted against x, this produces a straight-line graph through the origin. If two variables x and y are related by an equation of the form xy = k, or equivalently 𝑦= 𝑘𝑥, where k is a constant and x ≠ 0, y ≠ 0, they vary in inverse proportion to each other.  |
| Pythagoras’ theorem  | In a right-angled triangle, the square of the length of the hypotenuse is equal to the sum of the squares of the lengths of the other sides, i.e. the sides that bound the right angle. Example: When ∠DEF is a right angle, a2 + b2 = h2.  |
| range  | A measure of spread in statistics. The difference between the greatest value and the least value in a set of numerical data.  |
| ratio  | A part-to-part comparison. The ratio of a to b is usually written a:b. Example: In a recipe for pastry, fat and flour are mixed in the ratio 1:2, which means that the fat used has half the mass of the flour. That is, 𝑎𝑚𝑜𝑢𝑛𝑡 𝑜𝑓 𝑓𝑎𝑡𝑎𝑚𝑜𝑢𝑛𝑡 𝑜𝑓 𝑓𝑙𝑜𝑢𝑟= 12. Thus, ratios are equivalent to particular fractional parts.  |
| rectilinear  | Bounded by straight lines. A closed rectilinear shape is also a polygon. A rectilinear shape can be divided into rectangles and triangles for the purpose of calculating its area.  |
| sample space  | The sample space is the set of all possible outcomes of a trial. The sum of all the probabilities for all the events in a sample space is one.  |
| scale factor  | For two similar geometric figures, the ratio of corresponding edge lengths.  |
| sequence  | A succession of terms formed according to a rule. There is a definite relation between one term and the next and between each term and its position in the sequence. Example: 1, 4, 9, 16, 25, …  |
| significant figures  | The run of digits in a number that are needed to specify the number to a required degree of accuracy. Additional zero digits may also be needed to indicate the number’s magnitude. Examples: To the nearest thousand, the numbers 125 000, 2 376 000 and 22 000 have 3, 4 and 2 significant figures respectively; to 3 significant figures 98.765 is written 98.8  |
| similar  | Two shapes are similar if an enlargement of one will produce the other. This may be an enlargement of scale factor 1, although these shapes would then be ‘congruent’. Two similar shapes do not have to share the same orientation nor the same sense.  |
| solution  | A solution to an equation is a value of the variable that satisfies the equation, i.e. when substituted into the equation, makes it true. A solution set is the set of values that satisfy a given set of equations or inequalities.  |
| square number  | A number that can be expressed as the product of two equal numbers. Example: 36 = 6 × 6 and so 36 is a square number or ‘6 squared’. A square number can be represented by dots in a square array.  |
| standard index form (standard form)  | A form in which numbers are recorded as a number between 1 and 10 multiplied by a power of ten. Example: 193 in standard index form is recorded as 1.93 × 102 and 0.193 as 1.93 × 10−1. This form is often used as a succinct notation for very large and very small numbers.  |
| substitute/ substitution  | Numbers can be substituted into an algebraic expression in x to get a value for that expression for a given value of x. Example: When x = −2, the value of the expression 5x2 − 4x + 7 is 5(−2)2 −4(−2) + 7 = 5(4) + 8 + 7 = 35.  |
| surface area  | The surface area of a 3D figure is a measure of the area covered by all of the surfaces of the figure.  |
| term  | A term is either a single number or variable, or the product of several numbers or variables. Terms are separated by a + or − sign in an overall expression. Example: In 3 + 4x + 5yzw; 3, 4x and 5yzw are three separate terms.  |
| terminating decimal  | A decimal fraction that has a finite number of digits. Example: 0.125 is a terminating decimal. In contrast 13 is a recurring decimal fraction. All terminating decimals can be expressed as fractions in which the denominator is a multiple of 2 or 5.  |
| trapezium  | A quadrilateral with exactly one pair of sides parallel.  |
| trigono-metric functions (sine, cosine, tangent)  | Functions of angles. The main trigonometric functions are cosine, sine and tangent. Other functions are reciprocals of these. Trigonometric functions (also called the ‘circular functions’) are functions of an angle. They relate the angles of a triangle to the lengths of its sides. The most familiar trigonometric functions are the sine, cosine and tangent in the context of the standard unit circle with radius 1 unit, where a triangle is formed by a ray originating at the origin and making some angle with the x-axis; the sine of the angle gives the length of the y-component (rise) of the triangle, the cosine gives the length of the x-component (run), and the tangent function gives the slope (y-component divided by the x-component). Trigonometric functions are commonly defined as ratios of two sides of a right-angled triangle containing the angle.  |
| variable  | A quantity that can take on a range of values, often denoted by a letter, x, y, z, t, …, etc.  |
| unknown  | A number that is not known. Example: In the expression 2x − 5, x represents an unknown. When presented with more information, such as in the form of an equation (e.g. 2x – 5 = 6), this unknown can be found.  |