

Use index notation for simple positive integer powers; substitute positive and negative numbers into expressions such as $4x - 2$, $3x^2 + 4$ and $2x^3$.

Plot graphs of linear functions in which y is given explicitly or implicitly in terms of x .

Draw and interpret graphs modelling real situations.

Use parallel lines, alternate angles and corresponding angles; calculate and use the sums of the interior and exterior angles of quadrilaterals, pentagons and hexagons; calculate and use the angles of regular polygons; understand simple proofs involving triangles and quadrilaterals.

Recall the meaning of circle, chord, tangent, arc, sector, segment; find circumferences and areas enclosed by circles, recalling relevant formulae.

Construct triangles and other 2-D shapes using a ruler and a protractor, given information about their sides and angles; construct inscribed regular polygons; construct nets of cubes, regular tetrahedra, square-based pyramids and other 3-D shapes.

Recall and use the formula for the area of a parallelogram and a triangle; use the formula for the area of a trapezium; calculate perimeters and areas of shapes made from triangles and rectangles; find the surface area of simple shapes using the area formulae for triangles and rectangles.

Calculate volumes of shapes made from cubes and cuboids.

Analyse 3-D shapes through 2-D projections and cross-sections, including plans and elevations.

Recognise, visualise and construct enlargements of objects using positive integer and fractional scale factors; identify the centre and the scale factor of enlargement; understand the implications of enlargement for perimeter.

Transform triangles and other 2-D shapes by rotation or reflection or translation using vectors; recognise and visualise rotations, reflections and translations including reflection symmetry of 3-D shapes; understand the properties preserved by these transformations; understand congruence in the context of transformations.

Identify different mutually-exclusive outcomes and know that the sum of the probabilities of all these outcomes is one.

Draw and interpret scatter graphs including using lines of best fit; have a basic understanding of correlation, identifying 'correlation' or 'no correlation'.

Use and interpret diagrams for discrete and continuous data, including frequency polygons and stem and leaf diagrams; identify the modal class; calculate the mean of grouped discrete data compare distributions and make inferences, using the shapes of the distributions and measures of average and range.

Use and understand terminating and recurring decimals including exact fraction equivalents; solve problems involving multiplication and division by decimals with up to two decimal places

Use the terms cube root, negative square root; recall the squares to 15^2 and the corresponding square roots; recall the cubes of 2, 3, 4, 5, and 10; use index laws with numerical and algebraic expressions involving multiplication and division of positive integer powers.

Use and generate formulae in context; substitute positive and negative numbers into a formula.

Form and solve equations.

Change the subject of a formula in cases where the subject only appears once.

Know that measurements using real numbers depend on the choice of unit; recognise that a measurement given to the nearest whole unit may be inaccurate by up to one half in either direction.

Solve angle problems involving intersecting and parallel lines, and polygons; understand that the tangent at any point on a circle is perpendicular to the radius at that point. Understand, recall and use Pythagoras' theorem.

Solve problems involving area and circumference of circles; use π in exact calculations. Understand and use rates and compound measures, including speed and density.

Solve probability problems involving theoretical models or relative frequency.

Use tables to plot graphs of linear functions given explicitly.

Construct triangles using a ruler and protractor only given information about their sides and angles; use a straight edge and compasses to construct triangles with given sides including equilateral triangles.

Use and interpret maps and scale drawings, including four-figure grid references and estimating distances and areas; use bearings to specify direction.

Classify quadrilaterals by their geometric properties.

Explore the geometry of cuboids (including cubes) and shapes made from cuboids; find the volumes of cuboids, recalling the formula; draw and interpret the net of a cuboid.

Understand that rotations are specified by a centre and an angle; complete the rotation symmetry of 2-D shapes; measure the angle of rotation using right angles and simple fractions of a turn.

List all outcomes for single events, and for two successive events, in a systematic way; find probabilities. Use the fact that the probability of not happening is $1 -$ probability of happening.

Use and interpret the statistical measures mode, median, mean and range for discrete and continuous data, including comparing distributions.

Construct and interpret pie charts.

Use a calculator effectively and efficiently, including using the memory and bracket keys, and function keys for reciprocals, squares and powers; enter a range of measures including 'time'; interpret the display; round off a final answer to a reasonable degree of accuracy.

Use ratio notation, including reduction to its simplest form; solve word problems involving ratio and proportion.

Manipulate algebraic expressions by multiplying a single term over a bracket and by taking out single term common factors.

Solve linear equations with integer coefficients in which the unknown appears on both sides of the equation, or with brackets.

Use index notation for simple positive integer powers; substitute positive and negative numbers into expressions such as $4x - 2$, $3x^2 + 4$ and $2x^3$.

Construct triangles and other 2-D shapes using a ruler and a protractor, given information about their sides and angles; construct inscribed regular polygons; construct nets of cubes, regular tetrahedra, square-based pyramids and other 3-D shapes.

Recall and use the formula for the area of a parallelogram and a triangle; use the formula for the area of a trapezium; calculate perimeters and areas of shapes made from triangles and rectangles; find the surface area of simple shapes using the area formulae for triangles and rectangles.

Calculate volumes of shapes made from cubes and cuboids.

Analyse 3-D shapes through 2-D projections and cross-sections, including plans and elevations.

Identify different mutually-exclusive outcomes and know that the sum of the probabilities of all these outcomes is one.

Use written methods to multiply up a 3 figure by a 2 figure number and divide by a number up to 12.

Add and subtract decimals up to 2 decimal places and use knowledge to solve worded/functional questions including questions involving money.

Use a calculator to solve single operation problems. (Practical/functional problems).

Understand common factors, multiples, primes and square numbers.

Calculate unitary fractions of an amount.

Understand the rules and notation of algebra.

Begin to use simple formulae expressed in words.

Solve single operation equations by using inverse operations. i.e. ($x - 5 = 7$)

Substitute into simple expressions.

Use and interpret co-ordinates in 4 quadrants. Draw and describe horizontal and vertical lines of the form $x = 2$ and $y = -3$

Simplify expressions by collecting like terms. (only positive)

Continue the sequence and describe the pattern of a linear sequence.

Convert miles to kilometres and pounds to kilograms. Answer functional problems using the conversions.

Measure and draw angles using a protractor. Draw circles using a pair of compasses given the radius or diameter. Draw basic scale drawings of room plans. i.e. (ground floor room or house plan)

Reflect shapes and describe the reflections in horizontal and vertical lines

Understand the terms the terms edges, faces and vertices.

Calculate the area of a triangle.

Use mode and range to compare 2 distributions of data.

Design a grouped tally chart to collect discrete data .i.e. (Marks scored in a test)

Draw and interpret dual bar charts.

Use basic Venn diagrams.

Interpret 2 way tables and complete pre drawn 2 way tables.

Round numbers to the nearest integer, to a given power of ten, to one significant figure and to one or two decimal places; estimate answers to one- stage calculations including problems involving money and measurement.

Use the term cube; recall the cubes of 2, 3, 4, 5, and 10; use index notation for simple integer powers.

Understand equivalent fractions, simplifying a fraction (including mixed numbers) by cancelling all common factors; multiply a fraction by an integer or a unit fraction.

Use the equivalence between fractions, decimals and percentages in context; solve simple percentage problems including increase and decrease.

Express one quantity as a fraction or percentage of another.

Use the four operations with positive and negative integers.

Solve problems involving substitution of positive numbers into simple algebraic formulas.

Solve simple linear equations in which the unknown appears on either side of the equation.

Manipulate algebraic expressions by collecting like terms.

Use tables to plot graphs of linear functions given explicitly.

Construct triangles using a ruler and protractor only given information about their sides and angles; use a straight edge and compasses to construct triangles with given sides including equilateral triangles.

Use and interpret maps and scale drawings, including four-figure grid references and estimating distances and areas; use bearings to specify direction.

Classify quadrilaterals by their geometric properties.

Explore the geometry of cuboids (including cubes) and shapes made from cuboids; find the volumes of cuboids, recalling the formula; draw and interpret the net of a cuboid.

Understand that rotations are specified by a centre and an angle; complete the rotation symmetry of 2-D shapes; measure the angle of rotation using right angles and simple fractions of a turn.

List all outcomes for single events, and for two successive events, in a systematic way; find probabilities. Use the fact that the probability of not happening is $1 -$ probability of happening.

Use and interpret the statistical measures mode, median, mean and range for discrete and continuous data, including comparing distributions.

Year 8 Pathway W

MATHS

Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers.

Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.

Establish whether a number up to 100 is prime and recall prime numbers up to 19

Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3).

Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit.

Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero.

Add and subtract numbers mentally with increasingly large numbers.

Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).

Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Multiply and divide numbers mentally drawing upon known facts.

Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers.

Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.

Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes.

Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign.

Use the properties of rectangles to deduce related facts and find missing lengths and angles.

Distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.

Solve problems involving converting between units of time.

Identify 3-D shapes, including cubes and other cuboids, from 2-D representations.

Solve problems involving converting between units of time.

Complete, read and interpret information in tables, including timetables.

Solve comparison, sum and difference problems using information presented in a line graph.

Compare and order fractions whose denominators are all multiples of the same number.

Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths.

Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents.

Read and write decimal numbers as fractions [for example, $0.71 = 71/100$].

Read, write, order and compare numbers with up to three decimal places.

Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal.

Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000

Convert between different units of metric measure (i.e. kilometre and metre etc).

Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints.

Use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles

Draw given angles, and measure them in degrees ($^{\circ}$).

Identify: angles at a point and one whole turn (total 360°); angles at a point on a straight line and $1/2$ a turn (total 180°); other multiples of 90°

Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, $2/5 + 4/5 = 6/5 = 1 \frac{1}{5}$]

Add and subtract fractions with the same denominator and denominators that are multiples of the same number.

Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams.

Solve problems which require knowing percentage and decimal equivalents of $1/2$, $1/4$, $1/5$, $2/5$, $4/5$ and those fractions with a denominator of a multiple of 10 or 25

Solve problems involving number up to three decimal places.

Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres.

Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes.

Estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes)] and capacity [for example, using water].

Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000

Round decimals with two decimal places to the nearest whole number and to one decimal place.

Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.

Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.