

## Analysing and Displaying Data

Topic	Rationale	Knowledge Acquisition	Key Vocabulary	Skills and Enrichment
Analysing and Displaying Data	The ability to organise, rationalise, understand and interpret data in different formats is an important skill both mathematically and in many real-world scenarios.	Group data, where appropriate in equal class intervals	Mode, modal, dual bar chart, compound bar chart, frequency, frequency diagram, two-way table	Use and interpret a wide range of different data formats. Develop a critical eye to ascertain when data is misrepresented (e.g in misleading advertisements)
		Calculate the mean of a set of data		
		Calculate the mean from a simple frequency table		
		Interpret data from compound and comparative bar charts		
		Use two way tables for discrete data		
		Compare two distributions given summary statistics in simple cases		
		Construct on paper and using ICT simple pie charts using categorical data – e.g. two or three categories		
		Use simple two way tables		
		Construct a frequency diagram from a grouped frequency table		
		Interpret and / or compare bar graphs and frequency diagrams which are misleading (with false origins, different scales etc.)		
		Interpret scatter graphs		
		Construct scatter graphs		
		Recognise when it is appropriate to use mean median or mode. (put in extreme values)		
		Use correlation to describe relations between sets of data in simple cases		
		Find the modal class of a set of continuous data		
		Construct and use line graphs for time series to compare several sets of data		
		Understand inequality notation for grouped frequency tables, e.g. $0 \leq k < 2$		
		Compare two distributions using the appropriate statistics		
		Identify key features of data sets described in either line graphs or scatter graphs – including correlation		
		Use correlation to describe relations between sets of data		
Draw a line of best fit by eye				
Use a line a best fit drawn by eye to estimate the missing value in a two variable data set				

## Number Skills

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Number Skills	This section will depend understanding of numbers and the numbers system and show how primes can be used to factor large numbers	Understand the difference between multiples, factors and primes	Prime, square, cube, factor, multiple, root	
		Find factor pairs using any whole number		
		Divide three-digit by two-digit whole numbers		
		Use rounding to the nearest 10 or a nice number, e.g. 62 to 63 when dividing by 9		
		Find the HCF or LCM of two numbers less than 20		
		Add and subtract positive and negative integers		
		Give the positive and negative square root of a square number		
		Extend mental calculations to squares and square roots		
		Estimate square roots of non-square numbers less than 100		
		Work with calculations where the brackets are squared or square rooted		
		Multiply and divide positive and negative integers		
		Use index notation for small integer powers e.g. $3 \times 2^3 = 24$		
		Extend calculations to cubes and cube roots, using mental methods and a calculator when appropriate		
		Estimate answers to calculations involving two or more operations and BIDMAS		
		Find square roots by factorising, e.g. square root of 324 is square root of $4 \times 81$ which is 18. $324 = 4 \times 81$ should be given to them		
		Combine laws of arithmetic for brackets with mental calculations of cubes and squares		
		Find cube roots by factorising, e.g. cube root of 216 is cube root of $8 \times 27$ which is 6. $216 = 8 \times 27$ should be given to them		
Combine laws of arithmetic for brackets with mental calculations of cube roots and square roots				
Understand which part of an expression is raised to a power by knowing the difference between $3 \times (7 + 8)^2$ and $3^2 \times (7 + 8)$ and $(3 \times (7 + 8))^2$				

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Equations Functions and Formulae		Substitute positive integers into simple formulae expressed in word		
		Derive simple formula expressed in letter symbols		
		Construct expression from worded descriptions using addition, subtraction, multiplication and division		
		Construct expressions from worded descriptions using all four basic operations		
		Begin to multiply a positive integers over a bracket containing linear terms		
		Substitute integers into more complex formulae expressed in letter symbols		
		Substitute integers into more complex formula expressed in letter symbols		
		Know that the contents of brackets are evaluated first when using algebra		
		Derive more complex formula expressed in letter symbols		
		Simplify simple expression by collecting like terms		
		Substitute positive and negative integers into simple formula		
		Know that multiplication and division are carried out before addition and subtraction		
		Understand the difference between $2n$ and $n^2$		
		Know that expressions involving repeated addition can be written as $n^2$ , $n^3$ etc.		
		Simplify simple expressions involving power but not brackets by collecting like terms		
		Multiply a single term over a bracket		
		Add, subtract, multiply and divide integers – extend to the distributive law		
		Evaluate an expression by substituting a positive value into the expression $x^2$		
		Substitute positive integers into expressions involving small powers		
		Use the distributive law to take out numerical common factors		
Derive complex algebraic expression and formula				

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Fractions		Simplify fractions by cancelling all common factors		
		Calculate simple fractions of quantities and measurements (whole number answers)		
		Calculate fractions of quantities and measurements (fraction answers)		
		Add and subtract simple fractions with denominators of any size		
		Multiply a fraction by an integer		
		Recall of equivalent fractions and decimals and percentage including for fractions that are greater than 1.		
		Use division to convert a fraction to a decimal		
		Add mixed-number fractions without common denominators, where the fraction parts add up to more than 1		
		Subtract mixed-number fractions when the fractional part of the first fraction is all that is required for the calculation to take place		
		Be able to enter time as a mixed number into a calculator		
		Use fraction notation to express a smaller whole number as a fraction of a larger one		
		Divide an integer by a fraction		
		Multiply a fraction by a fraction (without cancelling)		
		Cancel common factors before multiplying fractions		
		Multiply an integer by a mixed number		
		Divide a mixed number by a fraction		

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Angles and Shapes		Identify all the symmetries of 2D shapes		
		Identify and begin to use angle, side and symmetry properties of quadrilaterals		
		Find co-ordinates of points determined by geometric information		
		Solve simple geometrical problems showing reasoning		
		Recognise and use vertically opposite angles		
		Calculate angles in a triangle		
		Solve geometric problems using side and angle properties of equilateral and isosceles triangles		
		Identify alternate angles		
		Identify corresponding angles		
		Classify quadrilaterals by their geometric properties		
		Identify alternate and corresponding angles on the same diagram		
		Calculate the interior and exterior angles of regular polygons		
		Use the interior and exterior angles of regular and irregular polygons		

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Decimals		Subtract integers and decimals with up to two decimal places, but with varying numbers of significant figures		
		Extend the percentage calculation strategies with jottings to find any percentage e.g. 17% by finding 10%, 5% and 2% and adding		
		Express one given number as a percentage of another		
		Recall of equivalent fractions, decimals and percentage including for fractions that are greater than 1.		
		Understand where to position the decimal point by considering equivalent calculations which are given - not the basic table fact e.g. $0.06 \times 70 = 4.2$ , what is $0.6 \times 0.007$		
		Add and subtract more than two integers or decimals with up to two decimal places, but with varying numbers of significant figures and using a mixture of operations within the calculation		
		Order positive decimals as a list with the smallest on the left. Decimals should be to 4 or 5 significant figures		
		Round decimals to the nearest two decimal places		
		Find the outcome of a given percentage decrease		
		Use a unitary method e.g. if £40 is 60% find 1% by dividing by 60 and then 100% by multiplying by 100		
		Order negative decimals as a list with the smallest on the left. Decimals should be to 2 or 3 significant figures		
		Divide integers and decimals including by decimals such as 0.6 and 0.06 divisions related to $0.t \times 0.t$ or $0.t \times 0.0h$ , $0.0h \times 0.t$ and $0.0h \times 0.0h$		
		Multiply and divide by decimals, dividing by transforming to division by an integer		

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Equations		Solve simple linear equations with integer coefficients, of the form $ax = b$ or $x \pm b = c$ , e.g. $2x = 18$ , $x + 7 = 12$ or $x - 3 = 15$		
		Substitute integers into algebra formulae and solve for missing values one-step equations)		
		Solve simple two-step linear equations with integer coefficients, of the form $ax + b = c$ , e.g. $3x + 7 = 25$		
		Solve simple two-step linear equations with negative $x$ coefficients, of the form $ax + b = c$		
		Construct a one-step equation and solve		
		Solve linear equations of the form $ax \pm b = cx \pm d$		
		Construct a two-step equation and solve		
		Substitute integers into formulae to give equations and solve		
		Solve equations of the form $a(x \pm b) = c(x \pm d)$		
		Find a positive and negative square root as a solution of an equation involving $x^2$		
		Construct and solve linear equations of the form $ax \pm b = cx \pm d$		
		Find a cube root as a solution of an equation involving $x^3$		
		Construct and solve equations of the form $a(x \pm b) = c(x \pm d)$		
Use systematic trial and improvement to find the approximate solution to one decimal place of equations such as $x^3 = 29$				

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Multiplicative Reasoning		Divide a quantity into two parts in a given ratio, where ratio given in ratio notation		
		Reduce a ratio to its simplest form		
		Reduce a three part ratio to its simplest form by cancelling		
		Simplify a ratio expressed in different units		
		Understand the relationship between ratio and proportion (convert proportions to ratios)		
		Use the unitary method to solve simple word problems involving ratio and direct proportion		
		Divide a quantity into more than 2 parts in a given ratio		
		Simplify a ratio expressed in fractions or decimals		
		Compare ratios by changing them to the form $1 : n$ or $n : 1$		
		Use proportional reasoning to solve best buy problems		
		Solve inverse proportion problems e.g. 'it takes 2 men 3 hours...'		
		Use the language of ratios and the associated calculations to the arithmetic of fractions and to linear functions		



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Perimeter, area and volume		Calculate the surface area of simple cuboids (without use of nets)		
		Calculate the perimeter and area of shapes made from rectangles		
		Use a formula to calculate the area of triangles		
		Know the formulae for the volume of cube and a cuboid		
		Calculate areas of compound shapes made from rectangles and triangles		
		Deduce and use the formula for the area of a parallelogram		
		Convert between area measures (e.g. $\text{mm}^2$ to $\text{cm}^2$ , $\text{cm}^2$ to $\text{m}^2$ , and vice versa)		
		Convert between volume measures (e.g. $\text{mm}^3$ to $\text{cm}^3$ , $\text{cm}^3$ to $\text{m}^3$ , and vice versa)		
		Deduce a formula for the area of a trapezium		
		Calculate surface areas of shapes made from cuboids, for lengths given as whole numbers		