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Maths

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

The national curriculum for mathematics aims to ensure that all pupils:

- *become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.*
- *reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language*
- *can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.*

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

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Maths Progression

		Nursery	Reception	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
PLACE VALUE	**Count**	*Verbally counts with separate words up to at least five, but, not necessarily in the correct order above "five".* *Verbally counts to ten with some correspondence to objects, but may continue to make errors (e.g. skipping, double counting).* *Keeps one-to-one correspondence between counting words and objects (one number word for each object), at least for small groups of objects laid in a line* *Counts arrangements of objects to 10. May be able to write numerals to represent 1–10. May be able to tell the number just after or just before another number, but only by counting up from 1.*	*Counts out objects to 5. Recognises that counting is relevant to situations in which a certain number must be placed.* *Counts and counts out objects accurately beyond 10 (usually to 30 or more).* *Has explicit understanding of cardinality how numbers tell how many).* *Keeps track of objects that have and have not been counted, even in different arrangements.* *Writes or draws to represent 1 to 10 (then 20, then 30).* *Gives next number (usually to 20s or 30s) if allowed to generate a "running start."* *Counts backward from*	*Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number* *Count numbers to 100 in numerals; count in multiples of twos, fives and tens* *given a number, identify one more and one less*	*Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward*	*Count from 0 in multiples of 4, 8, 50 and 100;* *find 10 or 100 more or less than a given number*	*Count in multiples of 6, 7, 9, 25 and 1000* *count backwards through zero to include negative numbers* *find 1 000 more or less than a given number*	*Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000* *Count forwards and backwards with positive and negative whole numbers, including through zero*	*use negative numbers in context, and calculate intervals across zero*

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			10 to 1, verbally, or when removing objects from a group.						
	Represent	*Identify numbers using objects*	*Identify and represent numbers using objects and pictorial representations (this may be guided by an adult)*	*Identify and represent numbers using objects and pictorial representations*	*Identify, represent and estimate numbers using different representations, including the number line*	*Identify, represent and estimate numbers using different representations*	*Identify, represent and estimate numbers using different representations*	*Order and compare)numbers to at least 1 000 000 and determine the value of each digit*	*Order and compare numbers up to 10 000 000 and determine the value of each digit*
	Reading and writing numbers	*Represent numbers using objects*	*Write numerals to 10 and number names to 10 in words.*	*Read and write numbers to 100 in numerals* *Read and write numbers from 1 to 20 in numerals and words*	*Read and write numbers to at least 100 in numerals and in words*	*Read and write numbers up to 1000 in numerals and in words*	*Read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value*	*Read Roman numerals to 1000 (M) and recognise years written in Roman numerals* *Read, write, numbers to at least 1 000 000*	
	Compare	*Identifies the "first" and "second" objects in a sequence.* *Compares collections of 1–4 of the same items verbally or nonverbally ("just by looking")* *Matches small (1 to about 4), equal collections consisting of different items, showing that they are the same number.*	*Compares groups of 1-6 by matching and understands that the two sets contain the same number.* *Accurately compares via counting, but only when objects are about the same size and the groups are small (1 to about 5).* *Estimates which set is more or less if the differences are clear* *Uses knowledge of counting number relationships to determine relative size and position of numbers up to about 5 when given perceptual*	*Use the language of: equal to, more than, less than (fewer), most, least*	*Compare and order numbers from 0 up to 100; use <, > and = signs*	*Compare and order numbers up to 1 000*	*Order and compare numbers beyond 1 000* *Compare numbers with the same number of decimal places up to two decimal places*	*Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit*	*Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit*

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			support. *Compares with counting up to 5, even when collections differ in size or arrangement.* *Orders numerals in a collection up to 5* *Ordinal Counter* *Identifies and uses ordinal numbers from "first" to " tenth".* *Compares with counting up to about 10, regardless of differences in the size of objects.* *Mental Number Line to 10* *Uses knowledge of counting number relationships and mental images to determine relative size and position of numbers up to 10 or more*						
	Subitising	*Begins connecting small quantities to number words to form an explicit idea of cardinality, or "how many-ness."* *Begin to have an understanding of numbers to 5*	*Recognises quantities up to 5 by seeing the parts and instantly knowing the whole.* *Recognises quantities up to 7 by seeing the parts and instantly knowing the whole.* *Verbally labels arrangements up to 6, then up to 10, using groups. Uses*	*Know number bonds up to 20* *Begin to identify odd and even numbers*	*Know number bonds to 100 – multiples of ten* *Identify odd and even numbers*	*Use their knowledge of numbers bonds to determine bonds to 100*	*Use their knowledge of numbers bonds to determine bonds to 1000*	*Use their knowledge of numbers bonds to determine bonds to 10000*	*Use their knowledge of numbers bonds to determine bonds to 100000*

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			structures such as tens-frames to recognize larger quantities						
	Use and compare	*Identifies the "first" and "second" objects in a sequence.* *Compares collections of 1–4 of the same items verbally or nonverbally ("just by looking")* *Matches small (1 to about 4), equal collections consisting of different items, showing that they are the same number.*	*Compares groups of 1-6 by matching and understands that the two sets contain the same number.* *Accurately compares via counting, but only when objects are about the same size and the groups are small (1 to about 5).* *Estimator – Small/Big Estimates which set is more or less if the differences are clear* *Uses knowledge of counting number relationships to determine relative size and position of numbers up to about 5 when given perceptual support.* *Compares with counting up to 5, even when collections differ in size or arrangement.* *Orders numerals in a collection up to 5* *Identifies and uses ordinal numbers from "first" to " tenth".* *Compares with counting up to about 10, regardless of*	*Given a number, identify one more and one less*	*Recognise the place value of each digit in a two-digit number (tens, ones)* *Compare and order numbers from 0 up to 100; use <, > and = signs*	*Recognise the place value of each digit in a three-digit number (hundreds, tens, ones)* *Compare and order numbers up to 1000*	*Find 1000 more or less than a given number* *Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)* *order and compare numbers beyond 1000*	*(Read, write) order and compare numbers to at least 1 000 000 and determine the value of each digit*	*(Read, write), order and compare numbers up to 10 000 000 and determine the value of each digit*

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			differences in the size of objects. *Uses knowledge of counting number relationships and mental images to determine relative size and position of numbers up to 10 or more*						
	Problems / Rounding				*Use place value and number facts to solve problems*	*Solve number problems and practical problems involving these ideas*	*Round any number to the nearest 10, 100 or 1000* *Solve number and practical problems that involve all of the above and with increasingly large positive numbers*	*Interpret negative numbers in context* *Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000* *Solve number problems and practical problems that involve all of the above*	*Round any whole number to a required degree of accuracy* *Use negative numbers in context, and calculate intervals across zero* *solve number and practical problems that involve all of the above*
ADDITION AND SUBTRACTION	**Composition (number bonds)**	*Knows that a whole is bigger than parts, although may not accurately quantify*	*Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts.*	*Represent and use number bonds and related subtraction facts within 20*	*recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100*	*Know number bonds to 100*			
	Calculations (Practically)	*Finds results for Join problems or for Separate problems, with totals up to 5, by counting all with objects/fingers.*	*Finds sums for join, result unknown problems and part–part–whole, whole unknown problems by*						

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			direct modelling, counting all, with objects, as well as for separate, result unknown problems by separating with objects. *Adds on objects to "make one number into another," without needing to count from 1. They do not (necessarily) represent or know how many were added.*						
	Calculations (Mentally)			*Add and subtract one-digit and two-digit numbers to 20, including zero* *read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs*	*Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones a two-digit number and tens two two-digit numbers Adding three one-digit numbers* *show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot*	*Add and subtract numbers mentally, including: a three-digit number and ones a three-digit number and tens a three digit number and hundreds* *Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction*	*Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate*	*Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)* *Add and subtract numbers mentally with increasingly large numbers*	*Perform mental calculations, including with mixed operations and large numbers* *Use their knowledge of the order of operations to carry out calculations involving the four operations*
	Calculations (written)		*Begin to use simple written linear methods to records a calculation*	*read, write and interpret mathematical statements involving addition (+),*	*Add and subtract numbers with up to two digits, using formal written methods of columnar*	*add and subtract numbers with up to three digits, using formal written methods of*	*Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate*	*add and subtract whole numbers with more than 4 digits, including using formal written method*	

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				subtraction (-) and equals (=) signs	*addition and subtraction*	*columnar addition and subtraction*			
	Inverse operations, estimating and checking answers.				*Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems*	*Estimate the answer to a calculation and use inverse operations to check answers*	*Estimate and use inverse operations to check answers to a calculation*	*Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy*	*Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.*
	Problems		*Solve simple number problems practically using concrete objects.*	*solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = – 9*	*Solve problems with addition and subtraction: using concrete objects and pictorial representations, including those involving numbers, quantities and measures Applying their increasing knowledge of mental and written methods*	*Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction*	*Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why*	*Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why* *Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign*	*Solve addition and subtraction multi- step problems in contexts, deciding which operations and methods to use and why*
MULTIPLICATION AND DIVISION	**Recall**			*count in multiples of twos, fives and tens*	*count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward* *Recall and use multiplication and division facts for the 2, 5 and 10 multiplication*	*count from 0 in multiples of 4, 8, 50 and 100* *Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables*	*count in multiples of 6, 7, 9, 25 and 1 000* *Recall multiplication and division facts for multiplication tables up to 12 × 12*	*count forwards or backwards in steps of powers of 10 for any given number*	*Identify common factors, common multiples and prime numbers*

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					tables, including recognising odd and even numbers				
	Calculations (mental)				Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers recognise and use factor pairs and commutativity in mental calculation	Multiply and divide numbers mentally drawing upon known facts Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	Perform mental calculations, including with mixed operations and large numbers Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)
	Calculations (Written)	Gives some, but not necessarily an equal number to each person. Continue with counting and subitising skills as a foundation for later work on equal groups.	Makes small groups (fewer than 5). Shares by "dealing out," but usually only between 2 people. May not appreciate the numerical result. Makes small equal groups (fewer than 6). Deals out equally between two or more recipients but may not understand that equal quantities are produced. Have a deep understanding of number to 10, including the composition of each Subitise (recognise quantities without counting) up to 5		Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs	Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods	Multiply two-digit and three-digit numbers by a one-digit number using formal written layout	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 Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context Divide numbers up to 4 digits by a two-digit number using the formal written

			Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 and some number bonds to 10, including double facts. • Explore and represent patterns within numbers up to 10, including evens and odds, *Double facts and how quantities can be distributed equally*						*method of short division where appropriate, interpreting remainders according to the context* *Perform mental calculations, including with mixed operations and large numbers* *Use written division methods in cases where the answer has up to two decimal places*
	Properties of numbers: multiples, factors, primes, square and cube numbers						*Recognise and use factor pairs and commutativity in mental calculations*	*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*	*Identify common factors, common multiples and prime numbers use common factors to simplify fractions; use common multiples to express fractions in the same denomination* *Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm3) and cubic metres (m3), and extending to other units such as mm3 and km3*

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								cubed (3)	
	Problems			*Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher*	*Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts*	*Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects*	*Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects*	*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*	*Solve problems involving addition, subtraction, multiplication and division*
	inverse operations, estimating and checking answers					*Estimate the answer to a calculation and use inverse operations to check answers*	*Estimate and use inverse operations to check answers to a calculation*	*Estimate and use inverse operations to check answers to a calculation*	*use estimation Uo check answers to calculations and determine, in the context of a problem, levels of accuracy*
	Order of operations						*Estimate and use inverse operations to check answers to a calculation*		*Use their knowledge of the order of operations to carry out calculations involving the four operations*

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FRACTIONS	**Counting in fractional steps**				*Count in fractions up to 10, starting from any number and using the1/2 and 2/4 equivalence on the number line*	*Count up and down in tenths*	*Count up and down in hundredths*		
	Recognise and write			*Recognise, find and name a half as one of two equal parts of an object, shape or quantity* *Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity*	*Recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity*	*Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10* *Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators* *Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators*	*Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.*	*Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths* *Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number 2/5 + 4/5 = 6/5 or 1 1/5*	*Recognise, find and name a half as one of two equal parts of an object, shape or quantity* *Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity*
	Compare				*Recognise the equivalence of 2/4 and 1/2*	*Recognise and show, using diagrams, equivalent fractions with small denominato rs* *Compare and*	*Recognise and show, using diagrams, families of common equivalent fractions*	*Compare and order fractions whose denominators are all multiples of the same number*	*Use common factors to simplify fractions; use common multiples to express fractions in the same denomination* *Compare and order fractions, including fractions*

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						order unit fractions, and fractions with the same denominators			*> 1*
	Equivalence				*Recognise the equivalence of 2/4 and 1/2.*	*Recognise and show, using diagrams, equivalent fractions with small denominators*	*Recognise and show, using diagrams, families of common equivalent fractions*	*Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths*	*Use common factors to simplify fractions; use common multiples to express fractions in the same denomination*
	Calculations (Addition and subtraction)					*Add and subtract fractions with the same denominator within one whole (e.g. 5/7 + 1/7 = 6/7)*	*Add and subtract fractions with the same denominator*	*Add and subtract fractions with the same denominator and multiples of the same number* *recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. 2/5 + 4/5 = 6/5 = 11/5)*	*Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions*
	Calculations (Multiplication and division)						*Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths*	*Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams*	*Multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. 1/4 × 1/2 = 1/8)* *Divide proper fractions by whole numbers (e.g. 1/3 ÷ 2 = 1/6)*

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DECIMALS	**Comparing**						*Compare numbers with the same number of decimal places up to two decimal places*	*Read, write, order and compare numbers with up to three decimal places*	*Identify the value of each digit in numbers given to three decimal places*
	rounding including decimals						*Round decimals with one decimal place to the nearest whole number*	*Round decimals with two decimal places to the nearest whole number and to one decimal place*	*Solve problems which require answers to be rounded to specified degrees of accuracy*
	Equivalence						*Recognise and write decimal equivalents of any number of tenths or hundredths* *Recognise and write decimal equivalents to 1/4; 1/2; 3/4*	*Read and write decimal numbers as fractions (e.g. 0.71 = 71/100)* *Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents* *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 as a decimal fraction*	*Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8)* *Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts*
	Calculation (Multiplication and division)						*Find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths*		*Multiply one-digit numbers with up to two decimal places by whole numbers* *Multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal places* *Identify the value of each digit to three decimal places and multiply and divide numbers by 10, 100 and 1000 where the answers are up to three decimal*

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									placesAassociate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. 3/8) *use written division methods in cases where the answer has up to two decimal places*
FRACTIONS AND DECIMALS	**Problem solving (Fractions and decimals)**					*Solve problems that involve all of the above*	*Solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number* *Solve simple measure and money problems involving fractions and decimals to two decimal places*	*Solve problems involving numbers up to three decimal places* *Solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25*	
PERCENTAGES	**Equivalence**							*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 as a decimal fraction*	*Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.*
	Problem solving							*Solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and those with a denominator of a multiple of 10 or 25.*	

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RATIO AND PROPORTION									*Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts* *Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison* *Solve problems involving similar shapes where the scale factor is known or can be found* *Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.*
ALGEBRA	**Equations**	*Recognises a simple sequential pattern, usually ABABAB.* *Fixes a pattern by filling in missing elements, duplicating, and extending ABAB patterns.*	*Duplicates and extends simple repeating patterns, not only AB as the unit but also patterns such as AAB, ABC, and AABC.* *Recogniser Identifies the smallest core unit of a sequential pattern.*	*Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = * - 9 represent and use number bonds and*	*Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and missing number problems.* *Recall and use addition and subtraction facts to 20 fluently, and*	*Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction* *Solve problems, including missing number problems,*		*Use the properties of rectangles to deduce related facts and find missing lengths and angles*	*Express missing number problems algebraically* *Find pairs of numbers that satisfy number sentences involving two unknowns* *Enumerate all possibilities of combinations of*

				related subtraction facts within 20	*derive and use related facts up to 100*	*involving multiplication and division, including integer scaling*			*two variables*
	Formulae						*Perimeter can be expressed algebraically as 2(a + b) where a and b are the dimensions in the same unit.*		*Use simple formulae* *recognise when it is possible to use formulae for area and volume of shapes*
	Sequences		*Put pictures of familiar event in order*	*sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening*	*compare and sequence intervals of time* *order and arrange combinations of mathematical objects in patterns*				*Generate and describe linear number sequences*
MEASURES	**Length**	*Identifies length/distance as an attribute.* *May understand length as an absolute descriptor (e.g., all adults are tall), but not as a comparative*	*Physically aligns two objects to determine which is longer or if they are the same length.* *Compares the length of two objects by representing them with a third object (non-standard measures)* *Orders lengths, marked in 1 to 10 units*	*compare, describe and solve practical problems for lengths and heights[e.g. long/short, longer/shorter, tall/short, double/half] measure and begin to record lengths and heights* *measure and begin to Mecord length*	*Compare and order lengths record the results using >, < and* *Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm);) to the nearest appropriate unit using a ruler*	*Measure, compare, add and subtract: lengths (m/cm/mm)* *Estimate, compare and calculate different measures,*	*Estimate, compare and calculate different measures* *Convert between different units of measure (e.g. kilometre to metre; hour to minute)*	*Use all four operations to solve problems involving measure using decimal notation including scaling.* *Convert between different units of metric measure* *Understand and use equivalences between metric units and common imperial units such as inches, pounds and pints*	*Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate* *Use, read, write and convert between standard units, converting measurements of length, from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places* *Solve problems involving the calculation and conversion of units of measure, using decimal*

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									notation up to three decimal places where appropriate *Convert between miles and kilometres*
	Area / perimeter	*Perceives the amount of two-dimension space and can make intuitive comparisons*	*Attempts to cover a spaces with physical tiles. However, doesn't organize or structure the 2D space without considerable perceptual support, such as a grid that outlines each individual unit* *Draws lines or uses manipulatives to completely cover a specific region without gaps or overlaps, in approximations of rows.*			*Measure the perimeter of simple 2-D shapes* *Find the area of rectilinear shapes by counting squares*	*Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres* *Estimate, compare and calculate different measure*	*Calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes* *Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres* *Calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)* *Convert between different units of metric measure*	*Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm3) and cubic metres (m3), and extending to other units such as mm3 and km3* *Recognise that shapes with the same areas can have different perimeters and vice versa* *Calculate the area of parallelograms and triangles* *Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm3) and cubic metres (m3), and extending to other units [e.g. mm3 and km3].* *Recognise when it is possible to use formulae for area and volume of shapes* *Solve problems involving the calculation and conversion of units of measure, using decimal*

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									notation up to three decimal places where appropriate
	Volume / capacity	*Identifies capacity or volume as an attribute.* *Builds with blocks, associating more blocks with terms like "big" and fewer blocks with terms like "small."* *Initially, recognises volume as an attribute, describes objects with words such as big, small, and tiny. Eventually, may compare volume recognising only one dimension*	*Can compare two containers by pouring one into the other Fills a container using another (smaller container) and counts the number needed to completely fill the larger container (but may not use accurately filled scoops and may not focus on quantifying the total volume or capacity).* *Places cubes into a rectangular box to fill it, eventually, packs entire box with cubes in an organized way.* *Compares objects by physically or mentally aligning; refers to at least two dimensions of objects.* *Some may be able to compare two containers using a third container and transitive reasoning.*	*Compare, describe and solve practical problems for: capacity and volume [e.g. full/empty, more than, less than, half, half full, quarter] measure and begin to record volume*	*Choose and use appropriate standard units to estimate and measure capacity (litres/ml) to the nearest appropriate unit, using measuring vessels*	*Estimate, compare and calculate different measures* *Measure, compare, add and subtract volume/capacity (l/ml)*	*Convert between different units of measure (e.g. kilometre to metre; hour to minute)* *Estimate, compare and calculate different measure*	*Convert between different units of metric measure* *Understand and use equivalences between metric units and common imperial units such as inches, pounds and pints* *Estimate volume (e.g. using 1 cm3 blocks to build cubes and cuboids) and capacity (e.g. using water)* *Use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling.*	*Recognise when it is possible to use formulae for area and volume of shapes* *Use, read, write and convert between standard units, converting measurements of volume from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places* *Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate* *Calculate, estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm3) and cubic metres (m3), and extending to other units such as mm3 and km3.*
	Mass		*Begin to compare masses*	*Compare, describe and solve practical problems mass/weight [e.g. Heavy/light, heavier than, lighter than] measure and begin to record mass*	*Choose and use appropriate standard units to estimate and measure mass (kg/g); to the nearest appropriate unit, using scales*	*Measure, compare, add and subtract: mass (kg/g)*	*Estimate, compare and calculate different measure* *Convert between different units of measure*	*Use all four operations to solve problems involving measure using decimal notation including scaling.* *Convert between different units of metric measure*	*Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate*

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	Time	*Know the difference between night and day.*	*Begin to sequence events in chronological order using appropriate language – first, next, after.*	*Sequence events in chronological order using language [e.g. before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening tell the time to the hour and half past the hour and draw the hands on a clockface to show these times.* *Recognise and use language relating to dates, including days of the week, weeks, months and years* *Compare, describe and solve practical problems for time [e.g. quicker, slower, earlier, later measure and begin to record time (hours, minutes, seconds)*	*Tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times* *Know the number of minutes in an hour and the number of hours in a day.* *Compare and sequence intervals of time*	*Tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks* *Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight* *Know the number of seconds in a minute and the number of days in each month, year and leap year* *Compare durations of events, for example to calculate the time taken by particular events or tasks* *Estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes, hours and o'clock; use vocabulary such as a.m./p.m., morning, afternoon, noon and midnight*	*Read, write and convert time between analogue and digital 12 and 24-hour clock* *solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days* *Convert between different units of measure (e.g. kilometre to metre; hour to minute)*	*Solve problems involving converting between units of time* *Use all four operations to solve problems involving measure using decimal notation including scaling.*	*Use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places*

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						Estimate, compare and calculate different measures			
	Temperature	*Begin to know the difference between hot and cold in the weather.*	*Describe the temperature as hot or cold.*		*Choose and use appropriate standard units to estimate and measure temperature to the nearest appropriate unit, using thermometers*			*Use all four operations to solve problems involving measure using decimal notation including scaling.*	
	Money	*Be familiar with the different shape and sized coins.*	*Begin to recognise the value of coins*	*Recognise and know the value of different denominations of coins and notes*	*Recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value* *Find different combinations of coins that equal the same amounts of money* *Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change*	*Add and subtract amounts of money to give change, using both £ and p in practical contexts* *Estimate, compare and calculate different measures, including money in pounds and pence*		*Use all four operations to solve problems involving measure) using decimal notation including scaling.*	
GEOMETRY	**identifying shapes and their properties**	*Recognises and names typical circle, square, and sometimes a typical triangle.* *Compares and matches a wider variety of shapes with the same size and orientation.* *Shape Compares and matches a wider variety of shapes with different sizes and orientations.*	*Recognises some less typical squares and triangles and may recognize some rectangles, but usually not rhombuses (diamonds). May not distinguish between sides and corners. Differentiates between 2D and 3D shapes and recognises faces of 3D shapes as 2D shapes.* *Uses manipulatives representing parts of shapes, such as sides, to make a shape that "looks like" a goal*	*Recognise and name common 2-D and 3-Dshapes, including:** *2-D shapes [e.g. rectangles (including squares), circles and triangles* *3-D shapes [e.g. cuboids (including cubes), pyramids and spheres].*	*Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line* *Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces* *Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]*		*Identify lines of symmetry in 2-D shapes presented in different orientations*	*Identify 3-D shapes, including cubes and other cuboids, from 2-D representations*	*Recognise, describe and build simple 3-D shapes, including making nets* *Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius*

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		Compares and matches combinations of shapes to each other. *Fills simple Pattern Block Puzzles, in which all shapes are outlined, often using trial and error. Children can create simple pictures from shapes in which each shape represents a unique role* *Builds vertical and horizontal components within a building, but within a limited range, such as building a "floor" or simple "wall."*	*shape. May think of angles as a corner* *Recognises more rectangle sizes, shapes, and orientations of rectangles.* *Identifies sides as distinct geometric objects.* *Puts several shapes together to make one part of a picture* *Decomposes simple shapes that have obvious clues as to their decomposition* *Composes shapes with anticipation ("I know what will fit!"). Chooses shapes using angles as well as side lengths* *Uses multiple spatial relations, extending in multiple directions and with multiple points of contact among components, showing flexibility in integrating parts of the structure* *Composes shapes with anticipation, understanding what 3D shape will be produced with a composition of 2 or more other (simple, familiar) 3D shapes.*						
	Drawing and constructing					*Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in*	*Complete a simple symmetric figure with respect to a specific line of symmetry*	*Draw given angles, and measure them in degrees (o)*	*Draw 2-D shapes using given dimensions and angles*

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						different orientations and describe them			*Recognise, describe and build simple 3-D shapes, including making nets*
	Comparing and classifying				*Compare and sort common 2-D and 3-D shapes and everyday objects*		*Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and size*	*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*	*Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons*
	Angles and lines	*Intuitively uses some angle or turn measure notions in everyday settings, such as building with blocks, solving puzzles, and walking.*	*Implicitly uses some angle notions -- including parallelism and perpendicularity -- in physical alignment tasks, construction with blocks or other everyday contexts*			*Recognise angles as a property of shape or a description of a turn* *Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle* *Identify horizontal and vertical lines and pairs of perpendicular and parallel lines*	*Identify acute and obtuse angles and compare and order angles up to two right angles by size*	*identify:* ** angles at a point and one whole turn (total 360o)* ** angles at a point on a straight line and ½ a turn (total 180o)* ** other multiples of 90o* *know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles*	*Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles*
	Position and direction and movement	*Can move shapes to a location.* *Mentally turns object in easy tasks.* *Uses distant landmarks to find objects or locations near them, even after they have moved themselves relative to the landmarks*	*Rotations and reflections (flips) are used intentionally to select and place shapes. Pattern* *Uses the correct motions, but not always* *Locates objects after moving, maintaining the overall shape of the arrangement of*	*Describe position, direction and movement, including half, quarter and three-quarter turns*	*uUe mathematical vocabulary to describe position, direction and movement including movement in a straight line and distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise)*		*Describe positions on a 2-D grid as coordinates in the first quadrant* *Describe movements between positions as translations of a given unit to the left/right and up/down* *Plot specified points and draw sides to complete a given polygon*	*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*	*Describe positions on the full coordinate grid (all four quadrants* *Draw and translate simple shapes on the coordinate plane, and reflect them in the axe*

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		Uses words referring to frames of reference such as "in front of" and "behind" or "left" and "right."	*objects. Represents objects' positions relative to landmarks (e.g., about halfway in between two landmarks) and keeps track of own location in open areas or mazes.* *Uses spatial vocabulary to direct attention to spatial relations. Some use coordinate labels in simple situations such as games.*						
	Pattern	*Recognises a simple sequential pattern, usually ABABAB.* *Fixes a pattern by filling in missing elements, duplicating, and extending ABAB patterns.*	*Duplicates and extends simple repeating patterns, not only AB as the unit but also patterns such as AAB, ABC, and AABC.* *Recogniser Identifies the smallest core unit of a sequential pattern.*	*Order and arrange combinations of mathematical objects in patterns and sequences*					
STATISTICS	**interpreting, constructing and presenting data**	*Follows verbal rules for sorting*	*Sorts objects according to a given attribute, although may switch attributes during the sorting.* *Sorts consistently by a single attribute and re-classifies by different attributes. Sorts consistently and exhaustively by an attribute, given or created, and uses the terms "some" and "all."* *Associates a value with an individual case. Uses numeric data to*		*Interpret and construct simple pictograms, tally charts, block diagrams and simple tables#* *Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity* *Ask and answer questions about totalling and comparing categorical data*	*Interpret and present data using bar charts, pictograms and tables*	*Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs*	*Complete, read and interpret information in tables, including timetable*	*Interpret and construct pie charts and line graphs and use these to solve problems*

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			identify largest/smallest cases.						
	Solving problems				*Ask and answer questions by counting the number in each category and sorting the categorised by quantity.* *Ask and answer questions about totalling and comparing categorical data*	*Solve one-step and two-step questions [e.g. 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.*	*Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs.*	*Solve comparison, sum and difference problems using information presented in a line graph*	*Ccalculate and interpret the mean as an average*