Mathematics Programme of Study

This document supports the school vision
Caring For Others And Courageously Striving For Excellence

NUMBER AND PLACE VALUE

EYFS	Have a deep understanding of number to 10, including the composition of each number Verbally count beyond 20, recognising the pattern of the counting system. Subitise (recognise quantities without counting) up to 5
YEAR 1 **YEAR 2**	Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number Given a number, identify one more and one less Read and write numbers from 1 to 20 in words Read and write numbers to 20 in numerals Identify and represent numbers using objects and pictorial representations including the number line Use the language of: equal to, more than, less than (fewer), most, least Order and Compare quantities Count in multiples of twos, fives and tens Count Read and write numbers to 50 in numerals Count Read and write numbers to 100 in numerals Count in steps of 2, 5, 3 and 10 from any number, forward and backward Identify ten more or ten less than any given number Recognise the place value of each digit in a two-digit number (tens, ones) Read and write numbers to at least 100 in numerals and words Identify, represent, estimate numbers to 100 using different representations, inc. number line, and partitioning in different ways Compare and order numbers from 0 up to 100; use <, > and = signs Solve number problems with number facts and place value
YEAR 3 **YEAR 4**	Find 10 or 100 more or less than a given number Recognise the place value of each digit in a three-digit number (hundreds, tens, ones) Identify, represent and estimate numbers to 1000 using different representations and partitioning in different ways Read and write numbers up to 1000 in numerals and in words Compare and order numbers up to 1000 Count from 0 in multiples of 4, 8, 50 and 100 Round whole numbers up to 100 to the nearest 10 Solve number problems and practical problems with number and place value Count in multiples of 6, 7, 9, 25 and 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, ones) Identify, represent and estimate numbers to 10000 using different representations Count backwards through zero to include negative numbers Order and compare numbers beyond 1000 Round whole numbers to 10,000 to the nearest 10, 100 or 1000 Read Roman numerals to 100 (I to C); know that, over time, the numeral system changed to include zero and place value Solve number and practical problems with number and place value, with increasingly large positive numbers
YEAR 5 **YEAR 6**	Continue to count in any multiples of 2 to 10, 25 and 50 Count Read and write numbers to at least 1,000,000 and determine the value of each digit Order and compare numbers to at least 1,000,000 Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10 000 and 100 000 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 Interpret negative numbers in context Read Roman numerals to 1000 (M) and recognise years written in Roman numerals Numbers Solve number problems and practical problems with number and place value Consolidate counting forwards or backwards in steps of powers of 10 for any given number to 1,000,000 Consolidate counting in multiples of 2, through to 10, 25 and 50 Read and write numbers to 10,000,000 and determine the value of digits Order and compare numbers up to 10,000,000 Round whole numbers to 10,000,000 to a required degree of accuracy Use negative numbers in context and calculate intervals across zero Consolidate reading Roman numerals to 1000 (M) and recognise years written in Roman numerals Solve number problems and practical problems with number and place value

ADDITION AND SUBTRACTION	
EYFS	Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10. Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity.
YEAR 1 YEAR 2	Mentally add and subtract one-digit numbers to 20, including zero Read, write and interpret mathematical statements involving addition (+), subtraction (−) and equals (=) signs Begin to memorise number bonds to 10 and 20, including noticing the effect of adding or subtracting zero Mentally add and subtract one- and two - digit numbers to 20, including zero Represent and use number bonds and related subtraction facts within 20 Solve number problems with number and place value (add and subtract one-digit) Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9 Understand that sum and difference indicate addition and subtraction respectively Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones, and a two-digit number and tens Use addition and subtraction facts to 20 Recall addition and subtraction facts to 20 fluently Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers; applying their increasing knowledge of mental and written methods Record addition and subtraction in columns using an expanded format involving partitioning Check subtraction calculations using addition calculations by adding in a different order Show addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot Add and subtract numbers using concrete objects, pictorial representations, and mentally, including: three one-digit numbers Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving measures; applying their increasing knowledge of mental and written methods Use addition and subtraction facts to 20 and derive related facts up to 100 Recall addition and subtraction facts to 20 fluently, deriving related facts to 100 Add and subtract numbers using concrete objects, pictorial representations, and mentally, including two two-digit numbers Solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving quantities; applying their increasing knowledge of mental and written methods Use the inverse relationship between addition and subtraction to solve missing number problems
YEAR 3 YEAR 4	Use understanding of place value and partitioning to develop methods for addition and subtraction with larger numbers Understand the structure of situations that require addition or subtraction Mentally add and subtract numbers including a three-digit number with ones or hundreds Continue to use addition and subtraction facts to 20 and derive related facts up to 100 Mentally add and subtract numbers including a three-digit number with ones, tens or hundreds Add and subtract numbers with up to three digits, using formal columnar methods of addition and subtraction Check addition calculations using subtraction and addition and subtraction calculations using rounding Solve problems including missing number problems, use place value, number facts and more complex addition and subtraction Understand the inverse relationship between addition and subtraction Use addition and subtraction facts to 100 and derive related facts up to 1000 Check answers to addition and subtraction calculations by estimating and using inverse operations Mentally add and subtract pairs of three-digit and four-digit numbers Mentally Add and subtract numbers with up to 4 digits Add and subtract numbers with up to 4 digits using formal written methods of columnar addition and subtraction if appropriate Solve calculation problems involving two-step addition and subtraction in context, deciding which operations to use and why
YEAR 5 YEAR 6	Continue to develop knowledge of addition and subtraction facts and to derive related facts Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy Develop their understanding of the meaning of the equals sign 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) Solve addition and subtraction multi-step problems in familiar contexts, deciding which operations and methods to use and why Perform mental calculations with mixed operations to carry out calculations Solve multi step problems in context, deciding which methods and operations to use and why Solve problems involving addition and subtraction Use estimation to check answers to calculations

MULTIPLICATION AND DIVISION	
EYFS	To automatically recall doubles facts Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
YEAR 1 YEAR 2	Solve one-step problems involving multiplication by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. (Multiplication and Division) Solve one-step problems involving division by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. (Multiplication and Division) Mentally double numbers up to 10 Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs. Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot. Solve problems involving multiplication and division, using concrete materials and mental methods. Solve problems involving multiplication and division, using arrays, repeated addition and multiplication and division facts, including problems in contexts Use multiplication and division facts for 2, 5 and 10 to make deductions outside known multiplication facts Solve word problems involving multiplication and division with more than one step Recognise the relationships between addition and subtraction and rewrite addition statements as simplified multiplication statements
YEAR 3 YEAR 4	Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables Write and calculate mathematical statements for multiplication and division using the multiplication tables that he/she knows, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods 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 Recall multiplication and division facts for multiplication tables up to 12 × 12 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 calculations Multiply two-digit and three-digit numbers by a one-digit number using formal written layout 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
YEAR 5 YEAR 6	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. 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 Multiply and divide numbers mentally drawing upon known facts 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 Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes Recognise and use cube numbers and the notation for cubed Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates 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 method of short division where appropriate, interpreting remainders according to the context Perform mental calculations, including with mixed operations and large numbers Identify common factors, common multiples and prime numbers Use their knowledge of the order of operations to carry out calculations involving the four operations. 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 Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

FRACTIONS	
EYFS	
YEAR 1 YEAR 2	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, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity and demonstrate understanding that all parts must be equal parts of the whole
	Write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2.
YEAR 3 YEAR 4	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
	Recognise and show, using diagrams, equivalent fractions with small denominators
	Add fractions with the same denominator within one whole
	Subtract fractions with the same denominator within one whole
	Compare and order unit fractions, and fractions with the same denominators
	Solve fraction problems
	Record 1/10 as 0.1, 3/10 as 0.3 etc.
	Recognise and show, using diagrams, families of common equivalent fractions
	Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
	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
	Add and subtract fractions with the same denominator
	Recognise and write decimal equivalents of any number of tenths or hundredths
	Recognise and write decimal equivalents to 1/4, 1/2, ¾
	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
	Round decimals with one decimal place to the nearest whole number
	Compare numbers with the same number of decimal places up to two decimal places
	Solve simple measure and money problems involving fractions and decimals to two decimal places
YEAR 5 YEAR 6	Compare and order fractions whose denominators are all multiples of the same number
	Identify and name equivalent fractions of a given fraction, represented visually, including tenths and hundredths
	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
	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
	Read and write decimal numbers as fractions
	Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
	Round decimals with two decimal places to the nearest whole number and to one decimal place
	Read, write, order and compare numbers with up to three decimal places
	Solve problems involving number 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
	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
	Use common factors to simplify fractions; use common multiples to express fractions in the same denomination
	Compare and order fractions, including fractions > 1 Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
	Multiply simple pairs of proper fractions, writing the answer in its simplest form
	Divide proper fractions by whole numbers
	Associate a fraction with division and calculate decimal fraction equivalents
	Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places
	Multiply one-digit numbers with up to two decimal places by whole numbers
	Use written division methods in cases where the answer has up to two decimal places
	Solve problems which require answers to be rounded to specified degrees of accuracy.
	Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

MEASUREMENT	
EYFS	Develop spatial reasoning skills across all areas of mathematics including shape, space and measures.
YEAR 1 **YEAR 2**	Compare, describe and solve practical problems for lengths and heights e.g. long/short, longer/shorter, tall/short, double/half. Compare, describe and solve practical problems for mass/weight e.g. heavy/light, heavier than, lighter than. Compare, describe and solve practical problems for capacity/volume e.g. full/empty, more than, less than, half, half full, quarter. Measure and begin to record mass/weight. Measure and begin to record capacity and volume. Measure and begin to record time (hours, minutes, seconds). Recognise and know the value of different denominations of coins and notes. Sequence events in chronological order e.g. before/after, next, first, today, yesterday, tomorrow, morning/afternoon/ evening. Recognise and use language relating to dates, including days of the week, weeks, months and years. Measure and begin to record length/height. Choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels. Compare and order lengths, mass, volume/capacity and record the results using >, < and = 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 practical contexts, addition and subtraction of money of the same unit, including giving change Compare and sequence intervals of time Tell and write time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times Remember the number of minutes in an hour and the number of hours in a day. Read scales in divisions of ones, twos, fives and tens Read scales where not all numbers on the scale are given and estimate points in between Read the time on a clock to the nearest 15 minutes
YEAR 3 **YEAR 4**	Measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml). Measure the perimeter of simple 2-D shapes Add and subtract amounts of money to give change, using both £ and p in practical contexts Tell the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks Write the time using 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 and hours; use vocabulary such as o'clock, 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 e.g. to calculate the time taken by particular events or tasks Convert between different units of measure e.g. kilometre to metre; hour to minute Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres Find the area of rectilinear shapes by counting squares Estimate, compare and calculate different measures, including money in pounds and pence Read, write and convert time between analogue and digital 12- and 24-hour clocks Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days.
YEAR 5 **YEAR 6**	Convert between different units of metric measure Understand and use approximate equivalences between metric units and common imperial units e.g. inches, pounds and pints 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 (cm²) and square metres (m²) and estimate the area of irregular shapes Estimate volume e.g. using 1 cm³ blocks to build cuboids (including cubes) and capacity e.g. using water Solve problems involving converting between units of time Use all four operations to solve problems involving measure e.g. length, mass, volume, money (decimal notation), scaling. Solve problems involving calculation and conversion of units of measure, using decimal notation to three decimal places. Use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places Convert between miles and kilometres Recognise that shapes with the same areas can have different perimeters and vice versa Recognise when it is possible to use formulae for area and volume of shapes 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

GEOMETRY	
EYFS	Develop spatial reasoning skills across all areas of mathematics including shape, space and measures.
YEAR 1 YEAR 2	Recognise and name common 2-D shapes e.g. rectangles (including squares), circles and triangles. Recognise and name common 3-D shapes e.g. cuboids (including cubes), pyramids and spheres. Describe position, direction and movement, including whole, half, quarter and three-quarter turns. 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 Name common 2-D and 3-D shapes from a group of shapes or from pictures of the shapes and describe some of their properties Order and arrange combinations of mathematical objects in patterns and sequences Use mathematical vocabulary to describe position, direction and movement, including 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).
YEAR 3 YEAR 4	Draw 2-D and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them Recognise angles as a property of shape or a description of a turn Identify right angles and identify whether other angles are greater or less than a right angle Recognise that two right angles make a half turn, three make three quarters of a turn and four a complete turn Identify horizontal and vertical lines and pairs of perpendicular and parallel lines Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes Identify acute and obtuse angles and compare and order angles up to two right angles by size. Identify lines of symmetry in 2-D shapes presented in different orientations Complete a simple symmetric figure with respect to a specific line of symmetry Begin to recognise where angles are greater than two right angles. 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
YEAR 5 YEAR 6	Identify 3-D shapes, including cubes and other cuboids, from 2-D representations Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles Draw given angles, and measure them in degrees (°) Identify angles at a point and one whole turn Identify angles at a point on a straight line and 1/2 a turn Identify other multiples of 90° 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, 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 Draw 2-D shapes using given dimensions and angles Recognise, describe and build simple 3-D shapes, including making nets Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles Describe positions on the full coordinate grid (all four quadrants) Draw and translate simple shapes on the coordinate plane, and reflect them in the axis

STATISTICS

EYFS	
YEAR 1 YEAR 2	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
YEAR 3 YEAR 4	Interpret and present data using bar charts, pictograms and tables 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 Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs
YEAR 5 YEAR 6	Solve comparison, sum and difference problems using information presented in a line graph Complete, read and interpret information in tables, including timetables Interpret and construct pie charts and line graphs and use these to solve problems Calculate and interpret the mean as an average

RATIO AND PROPORTION

EYFS	
YEAR 1 YEAR 2	
YEAR 3 YEAR 4	
YEAR 5 YEAR 6	Solve problems involving relative sizes of two quantities with missing values found by using integer multiplication/ division facts Solve problems involving the calculation of percentages e.g. of measures (15% of 360) and 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

EYFS	
YEAR 1 YEAR 2	
YEAR 3 YEAR 4	
YEAR 5 YEAR 6	Use simple formulae e.g. perimeter of a rectangle or area of a triangle Generate and describe linear number sequences Express missing number problems algebraically Find pairs of numbers that satisfy an equation with two unknowns Enumerate possibilities of combinations of two variables

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