Kingshurst Primary School

Progression in Mathematics

Progression in Mathematics

	Number and Place value	Addition and Subtraction	Multiplication and Division	Fractions (including decimals and percentages)
Year 1	**Pupils should be able to:** • count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number • count, read and write numbers to 100 in numerals; count in multiples of twos, fives and tens • given a number, identify one more and one less • identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least • read and write numbers from 1 to 20 in numerals and words.	**Pupils should be able to:** • read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs • represent and use number bonds and related subtraction facts within 20 • add and subtract one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = – 9.	**Pupils should be able to:** • 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.	**Pupils should be able to:** • 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.
Year 2	**Pupils should be able to:** • count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward • recognise the place value of each digit in a two-digit number (tens, ones) • identify, represent and estimate numbers using different representations, including the number line • compare and order numbers from 0 up to 100; use <, > and = signs • read and write numbers to at least 100 in numerals and in words • use place value and number facts to solve problems.	**Pupils should be able to:** • 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* • recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • 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 • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	**Pupils should be able to:** • 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 materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	**Pupils should be able to:** • recognise, find, name and write fractions 1/3, 1/4, 2/4, 3/4 of a length, shape, set of objects or quantity • write simple fractions for example, 1/2 of 6 = 3 and recognise the equivalence of 2/4 and 1/2.
Year 3	**Pupils should be able to:** • count from 0 in multiples of 4, 8, 50 and 100; 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) • compare and order numbers up to 1000 • identify, represent and estimate numbers using different representations • read and write numbers up to 1000 in numerals and in words • solve number problems and practical problems involving these ideas.	**Pupils should be able to:** • 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 • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	**Pupils should be able to:** • 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 they know, 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.	**Pupils should be able to:** • 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 and subtract fractions with the same denominator within one whole [for example, 7/7 +1/7 = 6/7] • compare and order unit fractions, and fractions with the same denominators • solve problems that involve all of the above.
Year 4	**Pupils should be able to:** • count in multiples of 6, 7, 9, 25 and 1000 • find 1000 more or less than a given number • count backwards through zero to include negative numbers • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) • order and compare numbers beyond 1000 • identify, represent and estimate numbers using different representations • 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 • 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.	**Pupils should be able to:** • add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate • estimate and use inverse operations to check answers to a calculation • solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.	**Pupils should be able to:** • 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.	**Pupils should be able to:** • 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 ¼, ½, ¾ • find the effect of dividing a 1 or 2digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths • round decimals with 1 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.

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	Number and Place value	Addition and Subtraction	Multiplication and Division	Fractions (including decimals and percentages)
Year 5	**Pupils should be able to:** • read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit • count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 • interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero • 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 • read Roman numerals to 1000 (M) and recognise years written in Roman numerals.	**Pupils should be able to:** • 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 • use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.	**Pupils should be able to:** • 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 • recognise and use square numbers and cube numbers, and the notation for squared (^{2}) and cubed (^{3}) • solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes • 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.	**Pupils should be able to:** • compare and order fractions whose denominators are all multiples of the same number • identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths • recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number [for example, 2/5 + 4/5 = 6/5 = 1 1/5] • add and subtract fractions with the same denominator and denominators that are multiples of the same number • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams • read and write decimal numbers as fractions [for example, 0.71 = 71/100] • 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 ½ , ¼, 1/5, 2/5, 4/5and those fractions with a denominator of a multiple of 10 or 25.
Year 6	**Pupils should be able to:** • read, write, order and compare numbers up to 10 000 000 and determine the value of each digit • 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.	**Pupils should be able to:** • 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.		**Pupils should be able to:** • 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 [for example, ¼ x ½ = 1/8 • divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6] • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8] • 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.

	Ratio and proportion	Algebra
Y6 only	**Pupils should be able to:** • 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	**Pupils should be able to:** • use simple formulae • 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.

Progression in Mathematics

	Measurement	Geometry - Properties of Shapes	Geometry - Position and Direction	Statistics

Year 1	**Pupils should be able to:**
	
	• compare, describe and solve practical problems for:
	  ○ *lengths and heights [for example, long/short, longer/shorter, tall/short, double/half]*
	  ○ *mass/weight [for example, heavy/light, heavier than, lighter than]*
	  ○ *capacity and volume [for example, full/empty, more than, less than, half, half full, quarter]*
	  ○ *time [for example, quicker, slower, earlier, later]*
	• measure and begin to record the following:
	  ○ *lengths and heights*
	  ○ *mass/weight*
	  ○ *capacity and volume*
	  ○ *time (hours, minutes, seconds)*
	• recognise and know the value of different denominations of coins and notes
	• sequence events in chronological order using language [for example, before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening]
	• recognise and use language relating to dates, including days of the week, weeks, months and years
	• tell the time to the hour and half past the hour and draw the hands on a clock face to show these times.
		Pupils should be able to:
		
		• recognise and name common 2-D and 3-D shapes, including:
		  ○ *2-D shapes [for example, rectangles (including squares), circles and triangles]*
		  ○ *3-D shapes [for example, cuboids (including cubes), pyramids and spheres].*
			Pupils should be able to:
			
			• describe, position, direction and movement including whole, half, quarter and three quarter turns.	

Year 2	**Pupils should be able to:** • 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 a practical context involving addition and subtraction of money of the same unit, including giving change • compare and sequence intervals of time • 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.	**Pupils should be able to:** • 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] • compare and sort common 2-D and 3-D shapes and everyday objects.	**Pupils should be able to:** • order and arrange combinations of mathematical objects in patterns and sequences • use 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 anticlockwise).	**Pupils should be able 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.
Year 3	**Pupils should be able to:** • 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 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 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 [for example to calculate the time taken by particular events or tasks].	**Pupils should be able to:** • draw 2-D shapes 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, 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.		**Pupils should be able to:** • interpret and present data using bar charts, pictograms and tables • solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables.

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	Measurement	Geometry - Properties of Shapes	Geometry - Position and Direction	Statistics
Year 4	**Pupils should be able to:** • Convert between different units of measure [for example, kilometre to metre; hour to minute] • measure and calculate the perimeter of 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.	**Pupils should be able to:** • 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.	**Pupils should be able to:** • 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.	**Pupils should be able to:** • 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	**Pupils should be able to:**
	• convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
	• understand and use approximate equivalences between metric units and common imperial units such as 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 (cm^2) and square metres (m^2) and estimate the area of irregular shapes
	• estimate volume [for example, using 1 cm^3blocks to build cuboids (including cubes)] and capacity [for example, using water]
	• solve problems involving converting between units of time
	• use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
		Pupils should be able to:
		• 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 (total 360°)*
		  ○ *angles at a point on a straight line and 1/2 a turn (total 180°)*
		  ○ *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.
			Pupils should be able to:
			• 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.
				Pupils should be able to:
				• solve comparison, sum and difference problems using information presented in a line graph
				• complete, read and interpret information in tables, including timetables.

Year 6	**Pupils should be able to:** • 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, 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 (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3].	**Pupils should be able to:** • 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.	**Pupils should be able to:** • describe positions on the full coordinate grid (all four quadrants) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	**Pupils should be able to:** • interpret and construct pie charts and line graphs and use these to solve problems • calculate and interpret the mean as an average.