Kingsthorne Primary School

Maths

Key Principles:

This intent document supports the implementation of mathematics at Kingsthorne, alongside the general mathematics policy, progression in calculations policy and more in-depth individual year-group and key-stage progression maps. It is intended as a reference and whole-school overview.

Intent

All pupils will:

- 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 nonroutine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Year Group	What we teach		
	Autumn	**Spring**	**Summer**
Year 3 Strand of maths covered during the term	**Place Value** **Number** **Fractions**	**Measurement** **Place Value** **Number** **Statistics** **Geometry**	**Number** **Measurement** **Geometry** **Statistics** **Problem-solving and investigative work.**
Year 3 Learning objectives taught	**Place Value** 1. Count from 0 in multiples of 4,8,50,100 2. 10, 100 more or less than a number 3. compare and order numbers to 1000 4. use different representations for numbers 5. read and write numbers in numerals and words up to 1000 6. solve problems with all of the above **Number** 1. add and subtract numbers mentally (3 digits and 1s, 10s,100s)	**Measurement** 1. measure, compare, add and subtract lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) 2. tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks 3.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, am/pm, morning, afternoon, noon and midnight **Place Value**	**Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 3 expected standard and prepare for transition?* All objectives revisited from Autumn and Spring for Number and Place Value. These objectives are now expected to be completed with minimal adult support, without manipulatives (this does not include the children's drawings, jottings or diagrams which will be taught and expected to demonstrate to show their understanding.) Integer scaling to be consolidated **Measurement** 4. measure the perimeter of simple 2-D shapes

	2. 3 digit column addition and subtraction 3. Estimate and use the inverse for the above 4. Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. 5. Recall multiplication and related division facts for 3,4,8 multiplication tables. 6. Write mathematical statements for the tables I know. 7. 2 digit by 1 digit multiplication 8. 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. **Fractions** 1. Count backwards and forwards in tenths from any given point. 2. Know that a tenth is dividing 1 into ten equal pieces. 3. Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators. 4. recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators 5. recognise and show, using diagrams, equivalent fractions with small denominators	*What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 3 expected standard?* 7. compare and order numbers to 1000 Children should be able to use the < > and = signs independently or using classroom support (Toolkits, learning walls, fact finders) 8. use different representations for numbers Children should now be able to recognise numbers represented with place value counters, diennes blocks and more abstract with missing numbers. 9. read and write numbers in numerals and words up to 1000 Children should be working on when to use a hyphen, correct spellings of commonly misspelled numbers (eighteen, four, forty, fourteen, eighty) 10. solve problems with all of the above Children build on their problem-solving skills using number with increasingly difficult questions from the expected standard and even greater depth. **Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 3 expected standard?* 1. 3 digit column addition and subtraction Step 3 of the calculation policy.	5. add and subtract amounts of money to give change, using both £ and p in practical contexts 6. 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, am/pm, morning, afternoon, noon and midnight 7. know the number of seconds in a minute and the number of days in each month, year and leap year compare durations of events **Geometry** 1. Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them 2. Recognise angles as a property of shape or a description of a turn 3. Identify right angles, recognise that 2 right angles make a half-turn, 3 make three quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle **4.** Identify horizontal and vertical lines and pairs of perpendicular and parallel lines. **Statistics** 1. interpret and present data using bar charts, pictograms and tables **2.** solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables **Problem-solving and investigative work.** **School Fair Necklaces** https://nrich.maths.org/9692/note **A square of numbers** https://nrich.maths.org/2005/note **Magic Vs** https://nrich.maths.org/6274/note **Fifteen Cards** https://nrich.maths.org/7506/note **Multiplication Squares**

	6. add and subtract fractions with the same denominator within one whole 7. compare and order unit fractions, and fractions with the same denominators Solve problems with all of the above.	2. Estimate and use the inverse for the above Children will be able to independently create an inverse calculation to check accuracy of their answers. 3. Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. Multi-step problems which need children to keep track. Children will be taught strategies to problem-solve other than trial and error to start to organise their thinking. 4. 2 digit by 1 digit multiplication Grid method – partitioning to solve using known and related facts. e.g. 2 x 4 – 8 so 2 x 40, or 20 x 4 = 80) 5. 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. Introduce integer scaling problems. **Statistics** 1. interpret and present data using bar charts, pictograms and tables **2.** solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables **Geometry** 1. Draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them	https://nrich.maths.org/1134/note **Beads and Bags** https://nrich.maths.org/7374/note

		2. Recognise angles as a property of shape or a description of a turn 3. Identify right angles, recognise that 2 right angles make a half-turn, 3 make three quarters of a turn and 4 a complete turn; identify whether angles are greater than or less than a right angle **4.** Identify horizontal and vertical lines and pairs of perpendicular and parallel lines.	
Year 4 Strand of maths covered during the term	**Place Value** **Number** **Fractions**	**Measurement** **Number** **Decimals** **Measurement**	**Geometry** **Statistics** **Measurement** **Place Value and Number** **Problem-solving and investigative work.**
Year 4 Learning objectives taught	**<u>Place Value</u>** 1. Count in multiples of 6, 7, 9, 25 and 1000 2. Find 1000 more or less than a given number 3. Count backwards through zero to include negative numbers 4. Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) 5. Order and compare numbers beyond 1000 6. Identify, represent and estimate numbers using different representations 7. Round any number to the nearest 10, 100 or 1000 8. Solve number and practical problems that involve all of the above and with increasingly large positive numbers 9. 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.	**<u>Measurement</u>** 1. Read, write and convert time between analogue and digital 12- and 24-hour clocks 2. Solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days. **<u>Number</u>** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 4 expected standard?* 1. Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) 2. Order and compare numbers beyond 1000 3. Round any number to the nearest 10, 100 or 1000 4. Add and subtract numbers with up to 4 digits using the formal written methods of columnar	**<u>Geometry</u>** 1. Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes 2. Identify acute and obtuse angles and compare and order angles up to two right angles by size 3. Identify lines of symmetry in 2-d shapes presented in different orientations 4. Complete a simple symmetric figure with respect to a specific line of symmetry. 5. describe positions on a 2-D grid as coordinates in the first quadrant 6. describe movements between positions as translations of a given unit to the left/right and up/down 7. plot specified points and draw sides to complete a given polygon. **<u>Statistics</u>** 1. Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs. 2. Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs **<u>Measurement</u>**

	Number 1. Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate 2. Estimate and use inverse operations to check answers to a calculation 3. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. 4. Recall multiplication and division facts for multiplication tables up to 12 × 12 5. 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 6. Recognise and use factor pairs and commutativity in mental calculations 7. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout 8. 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	addition and subtraction where appropriate 5. Estimate and use inverse operations to check answers to a calculation 6. Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why. 7. Recall multiplication and division facts for multiplication tables up to 12 × 12 8. 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 9. Recognise and use factor pairs and commutativity in mental calculations 10. Multiply two-digit and three-digit numbers by a one-digit number using formal written layout 11. 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. **Decimals** 1. Recognise and write decimal equivalents of any number of tenths or hundredths 2. Recognise and write decimal equivalents to ¼, ½, ¾ 3. Find the effect of dividing a one- or two-digit number by 10 and 100,	1. Measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres 2. Find the area of rectilinear shapes by counting squares **Place Value and Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 4 expected standard and prepare for transition?* All objectives revisited from Autumn and Spring for Number and Place Value. These objectives are now expected to be completed with minimal adult support, without manipulatives (this does not include the children's drawings, jottings or diagrams which will be taught and expected to demonstrate to show their understanding.) Consolidate any areas that have shown up as a weakness in that year. **Problem-solving and investigative work.** **4 Dom** https://nrich.maths.org/179 **Mixed Up Clock** https://nrich.maths.org/2127/ **Finding Fifteen** https://nrich.maths.org/2645 **Reach 100** https://nrich.maths.org/1130 **Junior Frogs** https://nrich.maths.org/6282 **Money Bags** https://nrich.maths.org/1116

	objects are connected to m objects. **Fractions** 1. Recognise and show, using diagrams, families of common equivalent fractions 2. Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten. 3. 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 4. Add and subtract fractions with the same denominator	identifying the value of the digits in the answer as ones, tenths and hundredths 4. Round decimals with one decimal place to the nearest whole number 5. Compare numbers with the same number of decimal places up to two decimal places 6. Solve simple measure and money problems involving fractions and decimals to two decimal places. **Measurement** 1. Convert between different units of measure [for example, kilometre to metre; hour to minute] 2. Estimate, compare and calculate different measures, including money in pounds and pence	
Year 5 Strand of maths covered during the term	**Place Value** **Number** **Statistics**	**Number – Fractions, decimals percentages** **Measurement**	**Geometry** **Measurement** **Place Value and Number** **Problem-solving and investigative work.**
Year 5 Learning objectives taught	**Place Value** 1. read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit 2. count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 3. interpret negative numbers in context,	**Number – Fractions, decimals percentages** 1. Compare and order fractions whose denominators are all multiples of the same number 2. Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths 3. Recognise mixed numbers and improper fractions and	**Geometry** **Shape** 1. Identify 3-D shapes, including cubes and other cuboids, from 2-D representations 2. Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles 3. Draw given angles, and measure them in degrees (o) 4. Identify: - angles at a point and 1 whole turn (total 360o)

	count forwards and backwards with positive and negative whole numbers, including through 0 4. round any number up to 1,000,000 to the nearest 10, 100, 1,000, 10,000 and 100,000 5. solve number problems and practical problems that involve all of the above 6. read Roman numerals to 1,000 (M) and recognise years written in Roman numerals. **Number** **Addition and Subtraction** 1.Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) 2.Add and subtract numbers mentally with increasingly large numbers 3.Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy 4.Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. **Multiplication and division**	convert from one form to the other and write mathematical statements > 1 as a mixed number 4. Add and subtract fractions with the same denominator and denominators that are multiples of the same number 5. Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams 6. Read and write decimal numbers as fractions 7. Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents 8. Read, write, order and compare numbers with up to 3 decimal places 9. Round decimals with 2 decimal places to the nearest whole number and to 1 decimal place 10.Solve problems involving number up to 3 decimal places 11.Recognise the per cent symbol (%) and understand that per cent relates to "number of parts per 100", and write percentages as a fraction with denominator 100, and as a decimal fraction 12.Solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4, 1/5, 2/5, 4/5 and fractions with a denominator of a multiple of 10 or 25. **Measurement** 1. Convert between different units of metric measure 2. Understand and use approximate equivalences between metric units and	- angles at a point on a straight line and half a turn (total 180o) - other multiples of 90o 5. Use the properties of rectangles to deduce related facts and find missing lengths and angles 6. 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. (**Without mirrors or tracing paper**) **Measurement** 1. Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres (consolidate) 2. Calculate and compare the area of rectangles (including squares) including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes 3. Estimate volume and capacity **Place Value and Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 5 expected standard and prepare for transition?* All objectives revisited from Autumn and Spring for Number and Place Value focusing on the final step of Y5 calculation policy. These objectives are now expected to be completed with minimal adult support, without manipulatives (this does not include the children's drawings, jottings or diagrams which will be taught and expected to demonstrate to show their understanding.)

	1. Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. 2. Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers 3. Establish whether a number up to 100 is prime and recall prime numbers up to 19 4. 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 5. Multiply and divide numbers mentally drawing upon known facts 6. 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 7. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1,000 8. Recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) 9. Solve problems involving multiplication and division, including using their knowledge of factors and multiples, squares and cubes	common imperial units such as inches, pounds and pints 3. Solve problems involving converting between units of time 4. Use all four operations to solve problems involving measure using decimal notation including scaling. 5. Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres	Consolidate any areas that have shown up as a weakness in that year. **Problem-solving and investigative work.** **Fifteen Cards** https://nrich.maths.org/7506 **Fraction Wall** https://nrich.maths.org/4519 **Matching Fractions** https://nrich.maths.org/8283 **Greater Than or Less Than?** https://nrich.maths.org/10587 **Representing Numbers** https://nrich.maths.org/13272 **Highest and Lowest** https://nrich.maths.org/943

	10. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign 11. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. **Statistics** 1. Solve comparison, sum and difference problems using information presented in a line graph 2. Complete, read and interpret information in tables, including timetables.		
Year 6 Strand of maths covered during the term	**Place Value** **Number** **Measurement** **Fractions, Decimals, Percentages** **Statistics**	**Place Value** **Number** **Algebra** **Ratio and proportion** **Geometry** **Measurement**	**Place Value and Number (revision)** **FDP (revision)** **Geometry and Statistics (revision)** **Problem-solving and investigative work.**
Year 6 Learning objectives taught	**Place Value** 1. Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit 2. Round any whole number to a required degree of accuracy 3. Use negative numbers in context, and calculate intervals across zero 4. Solve number problems and practical problems that involve all of the above.	**Place Value** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 6 expected standard?* **1. Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit** Children revisit place value problems up to 10m and 3dp. Use of test-style questions to practise context-free. **2. Round any whole number to a required degree of accuracy**	**Place Value and Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 6 expected standard and prepare for transition to KS3?* **FDP** 1. Use common factors to simplify fractions; use common multiples to express fractions in the same denomination 2. Compare and order fractions, including fractions >1

	Number 1. Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication 2. 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 3. 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 4. Perform mental calculations, including with mixed operations and large numbers 5. Identify common factors, common multiples and prime numbers 6. Use their knowledge of the order of operations to carry out calculations involving the four operations 7. Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why 8. Solve problems involving addition, subtraction,	Children will have used rounding in division. To use more test-style questions to allow context-free rounding as well as within worded problems. **3. Use negative numbers in context, and calculate intervals across zero** Negative numbers will have been touched upon in statistics and temperature. Children can use their knowledge of negative numbers in sequences and missing number sequences. 4. Solve number problems and practical problems that involve all of the above. Children to solve complex, multi-step problems that require drawings, jottings and diagrams, such as: **Round three dice** https://nrich.maths.org/10436?utm_source=primary-map **Number lines in disguise** https://nrich.maths.org/13452?utm_source=primary-map **Number** *What objectives are you revisiting from the autumn and spring terms number and place value to consolidate at Year 6 expected standard?* **Algebra** 1. Use simple formulae 2. Generate and describe linear number sequences 3. Express missing number problems algebraically	3. Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions 4. Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ × ½ = 1⁄8] 5. Divide proper fractions by whole numbers [for example, 1⁄3 ÷ 2 = 1⁄6] 6. Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3⁄8] 11.Recall and use equivalences between simple fractions, decimals and percentages including in different contexts. **Position and direction** 1. Describe positions on the full coordinate grid (all four quadrants) 2. Draw and translate simple shapes on the coordinate plane, and reflect them in the axes. **Measurement** **Geometry and Statistics** **Problem-solving and investigative work.** Enterprise projects NRICH investigations:

	multiplication and division 9. Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. **Measurement** 1. Solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate 2. 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 3. Convert between miles and kilometres 4. Recognise that shapes with the same areas can have different perimeters and vice versa 5. Recognise when it is possible to use the formulae for area and volume of shapes 6. Calculate the area of parallelograms and triangles 7. 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	4. Find pairs of numbers that satisfy number sentences involving two unknowns 5. Enumerate possibilities of combinations of two variables. **Ratio and proportion** **1.** Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts 2. Solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and use percentages for comparison 3. Solve problems involving similar shapes where the scale factor is known or can be found 4. Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. **Geometry** 1. Draw 2-d shapes using given dimensions and angles 2. Recognise, describe and build simple 3-d shapes including making nets 3. Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons 4. Illustrate and name parts of circle, including radius, diameter and circumference and know that the diameter is twice the radius	

	Fractions, Decimals, Percentages 1. Use common factors to simplify fractions; use common multiples to express fractions in the same denomination 2. Compare and order fractions, including fractions >1 3. Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions 4. Multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, ¼ × ½ = 1⁄8] 5. Divide proper fractions by whole numbers [for example, 1⁄3 ÷ 2 = 1⁄6] 6. Associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3⁄8] 7. 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 8. Multiply one-digit numbers with up to two decimal places by whole numbers 9. Use written division methods in cases where the answer has up to two decimal places.	5. Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. **Measurement**	

	10. Solve problems which require answers to be rounded to specified degrees of accuracy 11. Recall and use equivalences between simple fractions, decimals and percentages including in different contexts. **<u>Statistics</u>** 1. Interpret and construct pie charts and line graphs and use these to solve problems 2. Calculate and interpret the mean as an average		