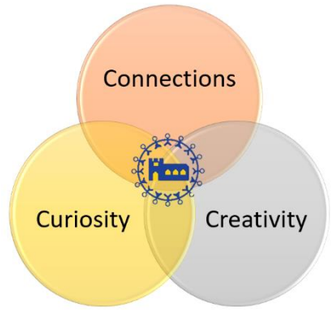
Maths – Knowledge and Skills Progression



Intent

When teaching mathematics at Lyne and Longcross, we intend to provide a curriculum which caters for the needs of all individuals and sets them up with the necessary skills and knowledge for them to become successful in their future adventures. Mathematics is essential to everyday life. Our aim is to help children develop sound mathematical skills, including the ability to make connections, solve calculations, **reason mathematically**, work systematically and **solve problems** creatively. We want children to be confident and curious to try new ways of working and to recognise that they learn from making errors and mistakes. We build children's **fluency skills** with the idea that their flexibility, recall and rote knowledge of number and arithmetic skills is fundamental for all other maths learning.

We incorporate sustained levels of challenge through varied and high quality activities with a focus on fluency, reasoning and problem solving. We aim for all pupils to be given the opportunity to explore maths in depth, using mathematical **vocabulary** to reason and explain their workings. A wide range of mathematical resources are used and pupils are taught to show their workings in a concrete, pictorial and abstract form wherever suitable. They are taught to explain their choice of methods and develop their mathematical reasoning skills. We encourage **resilience**, adaptability and acceptance that struggle is often a necessary step in learning. Our curriculum allows children to better make sense of the world around them relating the pattern between mathematics and everyday life.

Implementation

At Lyne and Longcross, we have *adapted* the White Rose mastery scheme of work throughout the school which ensures that progression and expectations are high and in-line with National Curriculum expectations. These plans are used alongside other high quality maths resources, such as NCETM, to ensure adapted and engaging lessons are planned for. This approach requires children to experience and experiment with different methods and representations of number in order to develop secure understanding. In our Early Years environment, children have the opportunity to lead their own learning however, our teachers skilfully plan for exciting maths based activities that the children will be motivated by and choose to access for themselves.

Each year group follows the key sequence of place value and number, four arithmetic operations (addition, subtraction, multiplication and division) and fractions. Further topics such as measure and geometry are then scattered amongst these key topics to ensure context use of skills and varied questions are offered to children. Year 1 provide a contrast to this, as they start their year learning by looking at measure – introducing key vocabulary which is essential across their other maths topics. The planning and structure is edited and differentiated further by individual teachers, alongside the maths subject lead, to make sure that the cohort and all children's needs are catered for. The adaptation of the teaching sequence is more significant in years two and six, as teachers adapt planning to ensure all key objectives are covered prior to the end of key stage assessment points.

It is required that our maths lessons follow a structure, beginning with an arithmetic task to begin, followed by recap of learning before introducing the aims of the lesson and key vocabulary; children's work and evidence of their learning is then gathered in books. The short arithmetic recap session has the aim of revisiting a previously taught topic to ensure clarity of methods, fluency and accuracy. In the younger years this ensures good fluency of number skills, practice of mental approaches and an overall good foundation of number knowledge to support them as they advance through the school. As the children progress into KS2, this arithmetic recap uses this foundation to revisit and practice methods for the four operations and their times tables. These sessions are sequenced in each half term, each week and each lesson providing a clear structure for teachers to follow. Reception, year 1 and year 2 are beginning a mastering of early number scheme (from Sep '23 – NCETM led) which provides a teaching structure for sessions.

As part of their maths learning, children also take part in a weekly 99 club to assess their progress with their times tables. When children progress in their 99 club, it is recorded in a document in the shared maths folder. Across the school, maths homework is set weekly, often through Mathletics.

Teachers evaluate the children's maths learning against intended learning outcomes of planned activities and against end of year objectives and skills progression ensuring full coverage if the curriculum. Assessment is embedded within our practice so that future lessons can allow for suitable challenge or support is in place based on children's previous learning. We encourage variation in the high quality approaches teachers use to support or challenge pupils and alongside teaching assistance, this will look different every lesson depending on the children's needs, maths topic, or progress in previous learning.

Impact –

Children leave Lyne and Longcross with an **enjoyment** for maths and a sense of confidence in what they can achieve. Having faced challenges in lessons, they understand that perhaps a struggle, reflection and improvement are needed to build correct answers and a good understanding of mathematical skills. Children can articulate in the context in which maths is being taught and communicate with others to explain their thinking using their **fluency** skills to support them.

Within and across each year, children have regularly recapped and revisited their previous learning. Children show confidence when building on what they have previously learnt and making connections with new ideas they are introduced to. Pupils know how and why maths is used in the outside world and in the workplace. They know about different ways that maths can be used to support their future potential. Mathematical concepts or skills are mastered when a child can show it in multiple ways, using the mathematical **vocabulary** to **reason**, and can independently apply the concept to **solve new problems** in unfamiliar situations.

Pupils have the skills to use methods independently and show **resilience** when tackling problems. They develop the flexibility and fluidity to move between different contexts and representations of maths. Children show a high level of pride in the presentation and understanding of the work.

Lyne and Longcross Primary School

Faith, Courage and Respect

'Teach me knowledge and good judgement, for I trust your commands' Psalm 119:66

Children should be taught to: (Key Stage 1 and Key Stage 2)

Topics	Statements for each topic Pupils will be taught to:
Number and Place Value	Year 1 - 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. Year 2 - 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. Year 3 - 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. Year 4 - 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. Year 5 - 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. Year 6 - 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.
Addition and Subtraction	Year 1 - 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. Year 2 - 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. Year 3 - 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. Year 4 - 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 Year 5 - 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. Year 6 - 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. - 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

Multiplication and Division	Year 1 - 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. Year 2 - 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. Year 3 - 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. Year 4 - 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 - 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 (nonprime) 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. Year 6 - 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 - identify common factors, common multiples and prime numbers
Fractions	Year 1 - 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 - recognise, find, name and write fractions ½, 1/3, 1/4, 2/4 and 3/4 of a length, shape, set of objects or quantity - write simple fractions Year 3 - 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 - compare and order unit fractions, and fractions with the same denominators - solve problems that involve all of the above. Year 4 - 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, ½, 3/4 - 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 - 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 - 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 = 100 71] - 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, 1/4, 1/5 , 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25. Year 6 - 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 [for example, 0.375] for a simple fraction - 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	Year 1 - 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. Year 2 - 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. Year 3 - 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]. Year 4 - Convert between different units of measure [for example, 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 Year 5 - 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 (cm2) and square metres (m2) and estimate the area of irregular shapes - estimate volume [for example, using 1 cm3 blocks 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. Year 6 - 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 (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3].
Properties of Shapes	Year 1 - 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]. Year 2 - 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. Year 3 - 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. Year 4 - 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. Year 5 - 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 (o) - identify: - angles at a point and one whole turn (total 360o) - angles at a point on a straight line and 2 1 a turn (total 180o) - other multiples of 90o - 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. Year 6 - 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.

Geometry Position and Direction	Year 1 - describe position, direction and movement, including whole, half, quarter and three quarter turns. Year 2 - 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). Year 4 - 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 - 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. Year 6 - 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.
Statistics	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 - 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. Year 4 - 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 - solve comparison, sum and difference problems using information presented in a line graph - complete, read and interpret information in tables, including timetables. Year 6 - 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	Year 6 - 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	Year 6 - 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.

EYFS

Unlike the National Curriculum objectives outlined above, EYFS outcomes and objectives can be delivered through the seven areas of learning rather than being a discrete subject. The below statements are examples of how children in the Early Years develop so that they can build and develop their Mathematics knowledge and understanding in preparation for the National Curriculum. Alongside the Statutory Framework for the Early Years, we use Development Matters for additional guidance, these areas have been highlighted in purple as they are non-statutory.

Number	Children at the expected level of development will: - have a deep understanding of number to 10, including the composition of each number - Subitise (recognise quantities without counting) up to 5; - Automatically recall (without reference to rhymes, counting or other aids) number bonds up to 5 (including subtraction facts) and some number bonds to 10, including double facts.
Numerical Patterns	Children at the expected level of development will: - Verbally count beyond 20, recognising the pattern of the counting system - Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity - Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.
Shape and Measure	Children in Reception will be learning to: - Select, rotate and manipulate shapes to develop spatial reasoning skills. - Compose and decompose shapes so that children recognise a shape can have other shapes within it, just as numbers can. -Continue, copy and create repeating patterns. -Compare length, weight and capacity

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Curriculum Knowledge and Skills Progression

In Reception, children will cover Mathematical knowledge and understanding:

<table>
<tr><th>Term 1</th><th>Term 2</th><th>Term 3</th></tr>
<tr>
<td>Pupils will build on previous experiences of number from their home and nursery environments, and further develop their subitising and counting skills. They will explore the composition of numbers within 5. They will begin to compare sets of objects and use the language of comparison.

Pupils will:
o identify when a set can be subitised and when counting is needed
o subitise different arrangements, both unstructured and structured, including using the Hungarian number frame
o make different arrangements of numbers within 5 and talk about what they can see, to develop their conceptual subitising skills
o spot smaller numbers 'hiding' inside larger numbers
o connect quantities and numbers to finger patterns and explore different ways of representing numbers on their fingers
o hear and join in with the counting sequence, and connect this to the 'staircase' pattern of the counting numbers, seeing that each number is made of one more than the previous number
o develop counting skills and knowledge, including: that the last number in the count tells us 'how many' (cardinality); to be accurate in counting, each thing must be counted once and once only and in any order; the need for 1:1 correspondence; understanding that anything can be counted, including actions and sounds
o compare sets of objects by matching
o begin to develop the language of 'whole' when talking about objects which have parts</td>
<td>Pupils will continue to develop their subitising and counting skills and explore the composition of numbers within and beyond 5. They will begin to identify when two sets are equal or unequal and connect two equal groups to doubles. They will begin to connect quantities to numerals.

Pupils will:
o continue to develop their subitising skills for numbers within and beyond 5, and increasingly connect quantities to numerals
o begin to identify missing parts for numbers within 5
o explore the structure of the numbers 6 and 7 as '5 and a bit' and connect this to finger patterns and the Hungarian number frame
o focus on equal and unequal groups when comparing numbers
o understand that two equal groups can be called a 'double' and connect this to finger patterns
o sort odd and even numbers according to their 'shape'
o continue to develop their understanding of the counting sequence and link cardinality and ordinality through the 'staircase' pattern
o order numbers and play track games
o join in with verbal counts beyond 20, hearing the repeated pattern within the counting numbers</td>
<td>Pupils will consolidate their counting skills, counting to larger numbers and developing a wider range of counting strategies. They will secure knowledge of number facts through varied practice.

Pupils will:
o continue to develop their counting skills, counting larger sets as well as counting actions and sounds
o explore a range of representations of numbers, including the 10-frame, and see how doubles can be arranged in a 10-frame
o compare quantities and numbers, including sets of objects which have different attributes
o continue to develop a sense of magnitude, e.g. knowing that 8 is quite a lot more than 2, but 4 is only a little bit more than 2
o begin to generalise about 'one more than' and 'one less than' numbers within 10
o continue to identify when sets can be subitised and when counting is necessary
o develop conceptual subitising skills including when using a rekenrek</td>
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Aut 1	Aut 2	Spr 1	Spr 2	Sum 1	Sum 2
Subitising - Subitising within 3 **Counting, ordinality and cardinality** - Focus on counting skills **Composition** - Explore how all numbers are made of 1s - Focus on composition of 3 and 4 **Subitising** - Subitise objects and sounds **Comparison** - Comparison of sets - 'just by looking' - Use the language of comparison: more than and fewer than **Shape, measure and pattern (in provision)** - Match, sort and compare Talk about measure and patterns	**Counting, ordinality and cardinality** - Focus on counting skills - Focus on the 'five-ness of 5' using one hand and the die pattern for 5 **Comparison** - Comparison of sets - by matching - Use the language of comparison: more than, fewer than, an equal number **Composition** - Explore the concept of 'whole' and 'part' **Composition** - Focus on the composition of 3, 4 and 5 - Counting, ordinality - Practise object counting skills - Match numerals to quantities within 10 Verbal counting beyond 20 **Shape, measure and pattern (in provision)** - Circles and triangles Shapes with 4 sides	**Subitising** - Subitise within 5 focusing on die patterns - Match numerals to quantities within 5 **Counting, ordinality and cardinality** - Counting – focus on ordinality and the 'staircase' pattern - See that each number is one more than the previous number **Composition** - Focus on 5 **Composition** - Focus on 6 and 7 as '5 and a bit' **Composition** - Compare sets and use language of comparison: more than, fewer than, an equal number to - Make unequal sets equal **Shape measure and pattern (in provision)** - Mass and capacity	**Counting, ordinality and cardinality** - Focus on the 'staircase' pattern and ordering numbers **Comparison** - Focus on ordering of numbers to 8 Use language of less than **Composition** - Focus on 7 **Composition** - Doubles – explore how some numbers can be made with 2 equal parts **Composition** - Sorting numbers according to attributes - odd and even numbers **Shape measure and pattern (in provision)** - Length, height and time Explore 3D shapes	**Counting, ordinality and cardinality** - Counting – larger sets and things that cannot be seen **Subitising** - Subitising – to 6, including in structured arrangements **Composition** - Composition – '5 and a bit' **Composition** - Composition - of 10 **Comparison** - Comparison – linked to ordinality - Play track games **Shape measure and pattern (in provision)** - Manipulate, compose and decompose - Visualise, build and map - Make connection	**Review and assess: possible e.g:** - Subitise to 5 - Introduce the rekenrek - Automatic recall of bonds to 5 - Composition of numbers to 10 - Comparison - Number patterns - Counting - Focus on shape, measure and pattern

	YEAR 1	YEAR 2	YEAR 3	YEAR 4	YEAR 5	YEAR 6
Place value and number	**Counting**					
	○ Counting to and across 100 from any given starting point.					
	○ Counting in multiples of 2s, 5s and 10s.	○ Counting in multiples of 2, 3, 5 and 10 (forwards and backwards).	○ Counting in multiples of 4, 8, 50, 100.	○ Count in multiples of 6, 7, 9, 25 and 1000.	○ Counting forwards and backwards in steps of powers of 10 up to 1,000,000.	
	Reading, writing and representing numbers					
	○ To read and write numbers up to 100 in digits. ○ To read and write numbers to 20 in words.	○ Read and write numbers up to 100 in digits and words.	○ Read and write numbers up to 1000 in numbers and words.	○ Read, write and compare numbers up to 1 decimal place	○ Read and write numbers up to 1,000,000. ○ Read, write and compare numbers with up to 2 decimal places.	○ Read and write numbers up to 10,000,000. ○ Read, write and compare numbers with up to 3 decimal places.
	○ Represent numbers using objects and pictures -including number lines.	○ Represent and estimate numbers using different representations up to 100 including a number line.	○ Represent and estimate using representations up to 1000.	○ Represent and estimate using representations beyond 1000. ○ Read roman numerals to 100 and know the history of our number system.	○ Read roman numerals to 1000 and recognise years.	
	Ordering (including more than/less than)					
	○ One more, one less ○ Using language of equal to, more than, less than	○ Comparing and ordering numbers to 100. ○ Find 10 more and less ○ Use < > =.	○ Compare and order numbers up to 1000. ○ Find 10 and 100 more and less.	○ Compare and order numbers beyond 1000. ○ Find 1000 more or less.	○ Compare and order numbers up to 1,000,000.	○ Compare and order numbers up to 10,000,000.
	Place value					
		○ Recognise place value of each digit in a two-digit number.	○ Recognise place value of each digit in a 3 digit number.	○ Recognise place value of each digit in a 4 digit number.	○ Recognise the place value of each digit up to 1,000,000. ○ Recognise the place value of numbers, and give answers with up to 2 decimal places	○ Recognise the place value of each digit in numbers up to 10,000,000. ○ Recognise the place value of numbers, and give answers with up to 3 decimal places
	Problem solving					
		○ Use place value and number facts to solve problems.	○ Solve number problems and practical problems.	○ Solve number problems and practical problems with increasingly large positive numbers.	○ Solve number problems and practical problems involving the above.	○ Solve number problems and practical problems involving the above.
	Rounding					
				○ Round any number to the nearest 10, 100, 1000. ○ Round decimals with one decimal place to the nearest whole number.	○ Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000. ○ Round decimals with two decimal places to the nearest whole number and 1 decimal place.	○ Round any number to a required degree of accuracy including decimals.
	Negative numbers					
				○ Count backward through zero to include negative numbers.	○ Interpret negative numbers in contexts. ○ Count forwards and backwards with positive and negative whole numbers.	○ Use negative numbers in context and calculate intervals across zero.

Addition and subtraction	**Number bonds**					
	○ Represent and use number bonds and related subtraction facts within 20.	○ Recall and use number bonds to 20 (addition and subtraction) fluently. ○ Use number bonds, and related facts, to derive related facts to 100.				
	Mental calculation (note this may include the use of resources to scaffold)					
	○ Add and subtract 1 digit and 2 digit numbers up to 20 including 0. ○ Solve 1 step problems that involve addition and subtraction using concrete objects, pictorial representations and missing number problems.	○ Add and subtract two 2 digit numbers ○ add three 1 digit numbers (using concrete, pictorial and mental) ○ Solve problems with addition and subtraction, using concrete objects and pictorial representations, including those involving quantities, measures and money ○ Know that addition of 2 numbers is commutative and subtraction is not.	○ Add and subtract a 3 digit number and ones, 3 digit number and tens, and 3 digit number and hundreds (mentally). ○ Solve problems using number facts, place value and complex addition and subtraction.		○ Add and subtract numbers mentally using increasingly large numbers.	○ Perform mental calculations with mixed operations and large numbers. ○ Use BIDMAS
	Inverse and rounding					
		○ Recognise and use the inverse relationship ○ Use the inverse to solve missing number problems	○ Use inverse and estimation to check answers.	○ Use inverse and estimation to check answers.	○ Use rounding to check answers to calculation and determine, in the context of the problem, levels of accuracy.	
	Written calculation					
	○ Read write and interpret mathematical statements involving addition and subtraction.		○ Add and subtracts numbers with up to 3 digits using formal written methods using column addition and subtraction.	○ Add and subtract numbers with up to 4 digits using formal written methods using column addition and subtraction.	○ Add and subtract numbers with more than 4 digits using formal written methods using column addition and subtraction.	
				○ Solve 2 step addition and subtraction questions in contexts deciding which operation and method is suitable and why.		
Multiplication and division	**Equal sharing/odd and even**					
	○ Recognise odd and even numbers	○ Apply multiplication and division facts to recognise odd and even numbers.				
	Mental calculation					
		○ Recall multiplication and division facts for the 2 5 and 10 times tables.	○ Recall multiplication and division facts for the 3 4 and 8 times tables.	○ Recall multiplication and division facts for multiplication facts up to 12x12.		
	○ Solve simple multiplication and division using concrete objects and arrays	○ Solve multiplication and division questions in context and using resources, arrays, mental facts and repeated addition	○ Solve multiplication and division questions using multiplication facts they know through mental methods	○ Use known facts to multiply and divide by 1 and 0 and multiply three different numbers.	○ Multiply and divide mentally using known facts.	○ Solve mixed operation questions with large numbers mentally. ○ solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts (ratio and proportion)
		○ Understand that multiplication is commutative, and division is not.		○ Use factor pairs and knowledge of commutativity in mental calculations.	○ Identify factors and multiples including 2 common factors of a pair of numbers. ○ Know and use the terms of prime numbers, prime factors and composite numbers. ○ Establish whether any number up to 100 is a prime number. ○ Recall prime numbers up to 19.	○ Identify common factors, common multiples and prime factors

					○ Recognise and use squared and cubes including notation.	
	Written calculation					
		○ Use x and ÷ symbols to calculate questions within the multiplication tables. .	○ Solve multiplication questions using multiplication facts they know using progressing written methods.	○ Solve multiplication questions of 2/3 digit numbers by a 1 digit number using formal written methods.	○ Solve multiplication questions of 4 digit numbers by a 1/2 digit number using formal written methods including long multiplication.	○ Solve multiplication questions of 4 digit numbers by a 2 digit numbers using long multiplication.
					○ Divide 4 digit numbers with 1 digit numbers using short division and interpret the remainder.	○ Divide 4 digit numbers with 2 digit numbers using short and long division and interpret the remainder by rounding or as a fraction or whole number. ○ Use written division methods where the answer has up to 2 decimal places.
	Problem solving					
			○ Solve missing number multiplication and division problems, scaling problems (3x more girls than boys) and correspondence problems (3 packets of 4 sweets).	○ Solve missing number multiplication and addition problems using the distributive law, scaling problems (3x more girls than boys) and harder correspondence problems (3 packets of 4 sweets).	○ Solve problems using multiplication and division problems using their knowledge of factors, multiples, squares, cubes and scaling problems using simple fractions including understanding of the equals sign.	
Fractions	**Recognising fractions**					
	○ Recognise, find and name a **half** as 1 part of 2 equal parts in an object, shape or quantity. ○ Recognise, find and name a **quarter** as 1 part of 4 equal parts in an object, shape or quantity.	○ Recognise, find, name and write **½, 1/3, 1/4, 2/4 and 3/4** of a length, shape object or quantity.	○ Recognise, find and write **unit** (1/6) and **non-unit** (2/6) fractions with small denominators. ○ Recognise, find and write **tenths** as 1 part of 10 equal pieces	○ Recognise **hundredths** are ones divided by 100 and tenths divided by 10.	○ Recognise and use **thousands** and relate them to tenths, hundredths and decimal equivalents	
			○ . Count in tenths and divide 1 digit numbers by 10.	○ Count up in down in hundredths		
	Equivalence (including decimals)					
		○ Recognise the equivalence of 2/4 and 1/2.	○ Recognise and show equivalent fractions.	○ Recognise and show families of equivalent fractions.	○ Identify, name and write equivalent fractions including tenths and hundredths.	○ Use common factors to simplify fractions and find equivalent fractions.
				○ Recognise and write decimal equivalents of tenths and hundredths ○ Recognise and write decimal equivalents to ¼, ½ and ¾. .	○ Read and write decimal numbers as fractions (0.61 = 61/100) ○ Solve problems that require knowledge of percentage and decimal equivalent of ¼ ½ 1/5 2/5 4/5.	○ Recall and use equivalences between decimals, fractions and percentages to solve problems. ○ Recognise a fraction as division and use this to find decimal equivalents
					○ Recognise mixed fractions and improper fractions and convert between them, recognising when they are more than 1.	

	Calculations (including comparison)					
			○ Compare unit fractions. ○ Compare fractions with the same denominator.		○ Compare and order fractions where the denominators are all multiples of the same number.	○ Compare and order fractions.
			○ Find fractions of numbers. ○ Add and subtract fractions with the same denominator within a whole.	○ Add and subtract fractions with the same denominator.	○ Add and subtractions fractions with denominators that are multiples of the same number.	○ Add and subtractions fractions with different denominators and mixed fraction through equivalent fractions.
				○ Divide numbers by 10 and 100, recognising the place value position of the tenths and hundredths	○ Multiply mixed and improper fractions with whole numbers, supported by resources.	○ Multiply fractions giving the answer in its simplest form. ○ Divide fractions by whole numbers.
			○ Solve problems using all fraction knowledge.	○ Solve problems using fractions and decimals of up to 2 decimal places. ○ Solve problems to calculate and divide quantities including where the answer is a whole number.		○ solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.
					○ Recognise the percent symbol and the importance of 100. Write percentages as a fraction with a denominator of 100.	○ solve problems involving the calculation of and the use of percentages for comparison (ratio and proportion)
Measure	**Units of measure**					
	○ Measure, record, compare, describe and solve problems involving: -Length (taller/shorter) -Mass (lighter/heavier) -capacity (full, almost full) -Time (quick/slow/earlier)	○ Use appropriate equipment and units to when estimating, ordering (using > <) and measuring -length (m/cm) - mass (g/kg) - temperature - capacity (l/ml) ○ Read scales of measuring utensils in various divisions	○ Measure, compare, add and subtract lengths, mass and volume, giving their answer with the correct units.	○ Convert between units of measure (ml and L)	○ Convert between units of measure (g and kg, ml and L, mm and cm) (Introduction to cm to m)	○ convert and solve problems between standard units using decimal notation to up to three decimal places
					○ Understand and use approximate equivalences between metric and common imperial. (Inches and cm)	○ convert between miles and kilometres
	Money					
	○ Recognise and know the value of different coins.	○ Recognise and use £ and p and combine amounts to make a value. ○ Find different combinations of coins that make the same amount of money. ○ Solve problems involving money of the same unit, including giving change.	○ Add and subtract amounts of money using £ and p, including giving change.	Estimate, compare and calculate using £ and p		
	Time					
	○ Tell the time to the hour and half past and draw hands on a clock.	○ Compare and sequence intervals of time. ○ Tell and write time to the nearest 15 minutes, including quarter too and quarter past and draw hands on a clock.	○ Compare duration of events ○ Read and write the time from an analogue clock including 24 hours and roman numerals. ○ Read, record and estimate time with increasing accuracy	○ Read write and convert between 12 and 24 hour clock	○ Solve problems converting between units of time	

	○ Use days of the week, months and dates. ○ Sequence events using first, today, yesterday, tomorrow…	○ Know the number of minutes in an hour, and number of hours in a day.	○ Know the number of seconds in a minutes, and number of days in each month, year and leap year	○ Solve problems that include converting between hours to minutes, minutes to seconds, years to months and weeks to days		
	Area, perimeter and volume					
				○ Measure perimeter	○ Calculate perimeter of rectangular shapes, including composite.	○ recognise that shapes with the same area can have different perimeters
					○ Calculate the area of rectangles and estimate area of irregular shapes	○ calculate area of parallelograms and triangles
					○ Estimate volume and capacity	○ Use formulae to calculate volume of cuboids and consider when a formula if appropriate.
Properties of shapes	**2D shapes**					
	○ Recognise and recall names of common 2-D shapes (rectangles (including squares), circles and triangles)	○ Identify and describe the properties of 2d shapes including sides and lines of symmetry ○ Identify 2d shapes within a 3d shape	○ Draw 2d shapes	○ Compare and classify shapes based on their properties and sizes ○ Identify lines of symmetry in 2D shapes at different orientations Complete a symmetric figure with respect to a given line of symmetry.	○ Use properties of oblongs to deduce missing facts including sides and angles. ○ Distinguish between regular and irregular polygons based on equal sides and angles	○ Draw 2d shapes using given dimensions and angles
						○ Illustrate and names part of a circle including: radius, circumference and diameter and know diameter is twice the radius
	3D shapes					
	○ recognise and recall names of common 3-D cuboids (including cubes), pyramids and sphere	○ Identify and describe the properties of 3d shapes including edges, faces, and vertices ○ Compare and sort 2D and 3D shapes and everyday objects ○ Recognise 3d shapes in everyday objects	○ Make 3d shapes using modelling materials and recognise them at different orientations		○ Identify 3D shapes by 2D representations	○ Recognise, describe and build 3d shapes, including with nets
	Angles					
			○ Recognise angles as a properties of shape or a description of a turn		○ Know angles are measured in degreed. Draw given angles and measure them in degrees	○ Find missing angles in triangles, quadrilaterals and regular polygons.
			○ Identify right angles ○ Say whether an angle is more or less than a right angle	○ Identify acute and obtuse angles and compare them	○ Compare acute, obtuse and reflex angles	
			○ Identify right angles in quarter, half and three quarter turns ○ Identify horizontal and vertical lines ○ Identify pairs of perpendicular and parallel lines		○ Identify angles: around a point are 360, on a straight line are 180 and other multiples of 90	○ Recognise angles when they meet on a point, on a straight line or vertically opposite and find missing angles.

Position and direction	**Position and direction**					
	○ Describe position, direction and movement ○ Use whole, half, quarter and three quarter turns	○ Use whole, half, quarter and three quarter turns (clockwise and anticlockwise) to describe position, direction and movement ○ Order and arrange objects in patterns and sequences		○ Describe positions on a 2D grid, in the first quadrant ○ Describe movement between translations (left/right up/down) ○ Plot points to draw a polygon	○ Identify, describe and present the position of a shape after a translation or reflection knowing the shape hasn't changed.	○ Describe position on a full coordinate grid ○ Draw and translate shapes and reflect them on the coordinate plane. ○ solve problems involving similar shapes where the scale factor is known or can be found (ratio and proportion)
Statistics	**Statistics**					
		○ Interpret and construct - pictograms - Tally charts - Block diagrams - Simple tables ○ Sort categories by quantity by counting the number of objects ○ Total and compare data ○ Ask and answer simple questions about information presented	○ Interpret and construct -Pictograms -Bar charts -Tables ○ Answer questions using information presented in pictograms and charts	○ Interpret and present discrete and continuous data using - bar charts - Time graphs ○ Solve comparison, sum and difference problems using information presented in charts and graphs	○ Solve comparison, sum and difference problems using information presented in line graphs ○ Complete read and interpret information in timetables	○ Interpret and construct - pie charts -line graphs use them to solve problems. ○ Calculate and interpret the mean as an average.
Algebra	**Algebra**					
						○ 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.