Maths Progression of Knowledge & Skills

Place Value

R	1	2	3	4	5	6
Three and four year olds • Recite numbers past 5 • Say one number name for each item in order: 1, 2, 3, 4, 5 • Know that the last number reached when counting a small set of objects tells you how many there are in total (cardinal principle) • Develop fast recognition of up to 3 objects, without having to count them individually (subitising) • Show 'finger numbers' up to 5 • Link numerals and amounts, e.g. showing the correct number of fingers to match the numeral, up to 5 • Experiment with their own symbols and marks as well as numerals • Compare quantities using language: more than / fewer than	• Count to and across 100, forwards and backwards, beginning from 0 or 1, or from any given number • Count numbers to 100 in numerals: count in multiples of 2s, 5s and 10s • Identify and represent numbers using objects and pictorial representations • Read and write numbers to 100 in numerals • Read and write numbers from 1 – 20 in numerals and words • Given a number, identify one more and one less	• Count in steps of 2, 3 and 5 from 0, and in tens from any number, forward and backward • Read and write numbers to at least 100 in numerals and words • Identify, represent and estimate numbers using different representations, including the number line • Recognise the place value of each digit in a 2-digit number • Compare and order numbers from 0up to 100; use <, > and = signs • Use place value and number facts to solve problems	• Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number • Identify, represent and estimate numbers using different representations • Read and write numbers up to 1000 in numerals and words • Recognise the place value of each digit in a 3-digit number • Compare and order numbers up to 1000 • Solve number problems and practical problems involving these ideas	• Count in multiples of 6, 7, 9, 25 and 1000 • Count backwards through zero to include negative numbers • Identify, represent and estimate numbers using different representations • 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 • Find 1000 more of less than a given number • Recognise the value of each digit in a 4-digit number • Order and compare numbers beyond 1000 • Round any number to the nearest 10, 100 or 1000 • Solve number and practical problems	• Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000 • Count forwards and backwards with positive and negative whole numbers, including through zero • Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals • Interpret negative numbers in context • Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000 • Solve number problems and practical problems that involve all of the above	• Read, write, order and compare numbers 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 problems and practical problems that involve all of the above

- Solve real world mathematical problems with numbers up to 5

Reception

- Count objects, actions and sounds
- Count beyond 10
- Subitise
- Link the number symbol (numeral) with its cardinal number value
- Compare numbers
- Explore the composition of numbers to 10
- Understand one more than / one less than relationship between consecutive numbers

ELG

- Verbally count beyond 20, recognising the pattern of the number system
- Subitise up to 5
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity
- Have a deep understanding of the numbers to 10, including the composition of each number

that involve all of the above and with increasingly large positive numbers

Addition and Subtraction

R	1	2	3	4	5	6
Reception • Automatically recall number bonds for numbers 0-5 and some to 10 **ELG** • 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 • Explore and represent patterns with numbers up to 10, including evens and odds, double facts and how quantities can be distributed evenly	• Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) symbols • Represent and use number bonds and related subtraction facts within 20 • Add and subtract 1-digit and 2-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	• Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • 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 • Add and subtract numbers using concrete objects, pictorial representations and mentally, including: - a 2-digit number and ones - a 2-digit number and tens - two 2-digit numbers - adding three 1-digit numbers • Solve problems with addition and subtraction:	• Estimate the answer to a calculation and use inverse operations to check answers • Add and subtract numbers mentally, including: - a 3-digit number and ones - a 3-digit number and tens - a 3-digit number and hundreds - add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • Solve problems including missing number problems, using number facts, place value, and more complex addition and subtraction	• Estimate and use inverse operations to check answers to a calculation • Add and subtract numbers with up to four digits using the formal written methods of columnar addition and subtraction where appropriate • Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why	• Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy • Add and subtract whole numbers with more than four digits, using formal written methods (columnar addition and subtraction) • Add and subtract numbers mentally with increasingly large numbers • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why • Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign	• 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 • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

		- using concrete objects and pictorial representations, including those involving numbers, quantities and measures - applying their increasing knowledge of mental and written methods				

Multiplication and Division

R	1	2	3	4	5	6
	• 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	• Recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • Show that multiplication of two numbers ca be done in any order (commutative) and division of one number by another cannot • Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication, division and equals signs • Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts	• 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 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods • Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	• Recall multiplication and division facts for multiplication tables up to 12 x 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 2-digit and 3-digit numbers by a 1-digit number using formal written layout • Solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	• Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers • Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers • Establish whether a number up to 100 is prime and recall prime numbers up to 19 • Recognise and use square numbers and cube numbers, ad the notation for these • Multiply numbers up to 4 digits by a 1 or 2-digit number, using a formal written method, including long multiplication for 2-digit numbers • Multiply and divide numbers mentally drawing upon known facts • Divide numbers up to 4-digits by a 1-digit number using the formal written method of short division and interpret remainders	• Identify common factors, common multiples and prime numbers • Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy • Multiply multi-digit numbers up to 4-digits by a 2-digit whole number using the formal written method of long multiplication • Divide numbers up to 4-digits by a 2-digit whole number using the formal 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 2-digit umber using the formal written method of short division where appropriate, interpreting remainders

					approximately for the context	according to the context
					• Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000	• Perform mental calculations, including with mixed operations and large numbers
					• 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
					• Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	• Use their knowledge of the order of operations to carry out calculations involving the four operations
					• Solve problems involving addition, subtraction, multiplication and division and a combination of these, including the meaning of the equals sign	

Fractions, decimal, percentages

R	1	2	3	4	5	6
	• Recognise, find and name a half as one of two equal parts of an object, shape or quantity • Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity	• Recognise, find, name and write fractions 1/3, ¼, 2/4 and ¾ of a length, shape, set of objects or quantity • Recognise the equivalence of 2/4 and ½ • Write simple fractions for example ½ of 6 = 3	• Count up and down in tenths, recognise that tenths derive from dividing an object into ten equal parts and in dividing 1-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 fraction and non-unit fractions with small denominators • Recognise and show, using diagrams, equivalent fractions with small denominators • Compare and order unit fractions, and fractions with the same denominators • Add and subtract fractions with the same denominator within one whole (for example, 5/7 + 1/7 = 6/7) • Solve problems that involve all of the above	• Count up and down in hundredths, recognise that hundredths arise when dividing an object by one hundred and dividing tenths by 10 • Recognise and show, using diagrams. Families of common equivalent fractions • Add and subtract fractions with the same denominator • 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 • Recognise and write decimal equivalents of any number of tenths or hundredths • Recognise and write decimal equivalents to ¼, ½, ¾ • Round decimals with one decimal place to the nearest whole number • Compare numbers with the same number of decimal	• 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) • Compare and order fractions whose denominators are all multiples of the same 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 diagrams • Read and write decimal numbers as fractions, e.g. 0.71 = 71/100	• 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 • Identify the value of each digit in numbers given to three decimal places • Multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places • Multiply 1-digit numbers with up to two decimal places by whole numbers • Use written division methods in cases where the answer

| | | | | places up to two decimal places
• 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
• Solve simple measure and money problems involving fractions and decimals to two decimal places | • 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 p to three decimal places
• Solve problems involving numbers 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, 4/5 and those fractions with a denominator of a multiple of 10 or 25 | has up to two decimal places
• Solve problems which require answers to be rounded to specified degrees of accuracy
• Associate a fraction with division and calculate decimal fraction equivalents (for example, 0.375) for a simple fraction (for example, 3/8)
• Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts |

Ratio and Proportion

R	1	2	3	4	5	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

R	1	2	3	4	5	6
	Although algebraic notation is not introduced until Year 6, algebraic thinking starts much earlier as exemplified by the 'missing number' objectives from Years 1, 2 and 3					• 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

Measurement

R	1	2	3	4	5	6
Three and four year olds • Begin to describe a sequence of events, real or fictional, using words such as: first, then… • Make comparisons between objects relating to size, length, weight and capacity **Reception** • Compare length, weight and capacity	• Compare, describe and solve practical problems for: - lengths and heights (long / short, longer / shorter, tall / short, double / half) - Mass / weight (heavy / light, heavier than, lighter than) - Capacity and volume (full / empty, more than, less than, half, half full, quarter) - Time (quicker / slower, earlier / later)	• 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	• Measure, compare, add and subtract: lengths (m, cm, mm); mass (kg/g); volume / capacity (l/ml) • 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	• Convert between different units of measure, e.g. km to m; hour to mins • Estimate, compare and calculate different measures • 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	• Convert between different units of metric measure, e.g. km and m, cm and m, g and kg, l and ml • Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints • Use all four operations to solve problems involving measure, using	• 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

• Measure and begin to record the following: - lengths and heights - mass / weight - capacity and volume - Time (hours, mins, seconds • Recognise and know the value of different denominations of coins and notes • Sequence events in chronological order using language (before, after, next, first, today, yesterday, tomorrow, morning, afternoon, evening) • Recognise and use language relating to dates, including days of the week, weeks, months and years • Tell the time to the hour and half past the hour and draw the hands on a clock face to show these times	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	• Estimate and read time with increasing accuracy to the nearest min; record and compare time in terms of seconds, mins and hours; use vocabulary such as o'clock, am / pm, morning, noon and midnight • Know the number of seconds in a min and the number of days in each month, year and leap year • Compare durations of events, e.g. calculate the time taken by particular events or tasks • Measure the perimeter of simple 2D shapes	• Solve problems involving converting from hours to mins, mins to seconds, years to months, weeks to days • Measure and calculate the perimeter of a rectilinear figure (including squares) in cm and m • Find the area of rectilinear shapes by counting squares	decimal notation, including scaling • Use all four operations to solve problems involving measure • Solve problems involving converting between units of time • Measure and calculate the perimeter of composite rectilinear shapes in cm and m • Calculate and compare the area of rectangles (including squares), and using standard units, cm² and 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	unit, and vice versa, using decimal notation to up to three decimal places • Convert between miles and km • Use, read, write and convert between standard units, converting measurements of time from a smaller unit of measure to a larger unit, and vice versa • 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 cm³ and m³ and extending to other units, for example, mm³ and km³

Geometry

R	1	2	3	4	5	6
Three and four year olds • Talk about and explore 2D and 3D shapes (e.g. circles, rectangles, triangles and cuboids) using informal and mathematical language: sides, corners, straight, flat, round • Select shapes appropriately: flat surfaces for a building, a triangular pattern for a roof, etc • Combine shapes to make new ones – an arch, a bigger triangle etc • Understand position through words, for example, 'The bag is under the table', with no pointing • Describe a familiar route • Discuss routes and locations, using words like 'in front of' and 'behind' • Talk about and identify patterns, e.g. pointy, stripey, spotty, blobs etc on clothes / rugs / wallpaper	• Recognise and name common 2D shapes (rectangle, square, circle, triangle) • Recognise and name common 3D shapes (cuboids, cubes, pyramids and spheres) • Describe position, direction and movement, including whole, half, quarter and three-quarter turns	• Identify and describe the properties of 2D shapes, including the number of sides and line symmetry in a vertical line • Identify 2D shapes on the surface of 3D shapes • Compare and sort common 2D shapes and everyday objects • Recognise and name common 3D shapes (cuboids, cubes, pyramids and spheres) • Compare and sort common 3D shapes and everyday objects • 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 anti-clockwise)	• Draw 2D shapes • Make 3D shapes using modelling materials; recognise 3D 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	• Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes • Identify lines of symmetry in 2D shapes presented in different orientations • Identify acute and obtuse angles and compare and order angles up to two right angles by size • Identify lines of symmetry in 2D shapes presented in different orientations • Complete a simple symmetric figure with respect to a specific line of symmetry • Describe positions on a 2D 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	• Distinguish between regular and irregular polygons based on reasoning about equal sides and angles • Use the properties of rectangles to deduce related facts and find missing lengths and angles • Identify 3D shapes, including cubes and other cuboids, from 2D 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 ½ a tun (total 180°) - Other multiples of 90° • Identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know	• Draw 2D shapes using given dimensions and angles • Compare and classify geometric shapes based on their properties and sizes • Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius • Recognise, describe and build simple 3D shapes, including making nets • Find unknown angles in any triangles, quadrilaterals, and regular polygons • Recognise angles where they meet at a point, are on a straight line, or are vertically opposite and find missing angles • Describe positions on the full coordinate grid (all four quadrants) • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes

• Extend and create ABAB patterns – stick, leaf, stick, leaf • Notice and correct an error in repeating patterns **Reception** • Select, rotate and manipulate shapes in order to develop spatial reasoning skills • Compose and decompose shapes so that children can recognise that a shape can have other shapes within it, just as numbers can • Draw information from a simple map • Continue, copy and create repeating patterns					that the shape has not changed	

Statistics

R	1	2	3	4	5	6
Three and four year olds • Experiment with their own symbols and marks, as well as numerals		• Interpret and construct simple pictograms, tally charts, block diagrams and simple tables • Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity • Ask and answer questions about totalling and comparing categorical data	• Interpret and present data using bar charts, pictograms and tables • Solve one-step and two-step questions, (e.g. How many more? How many fewer?) using information presented in scaled bar charts and pictograms and tables	• Interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs • Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs	• Complete, read and interpret information in tables, including timetables • Solve comparison, sum and difference problems using information presented I a line graph	• Interpret and construct pie charts and line graphs and use these to solve problems • Calculate and interpret the mean as an average