Knowledge progression across the year groups- Mathematics

	EYFS	Year 1	Year 2	Year 3	Year4	Year 5	Year 6
Number and place value	Subitise (recognise quantities without counting) up to 5. Have a deep understanding of number to 10, including the composition of each number. Verbally count beyond 20, recognising the pattern of the counting system. Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other Quantity`.	count to and across 100, forwards and backwards, starting with 1 or 0, or any given number. Count numbers to 100 in numerals, count in multiples of 2,5 and 10. Identify and represent numbers using objects and pictorial representations. Read and write numbers to 100 in numerals. Read and write numbers from 1 to 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 10s from any number forwards and backwards. Read and write numbers to at least 100 in numerals and words. Identify, represent and estimate numbers using different representations including the numberline. Recognise the place value of each digit in a 2 digit number. Compare and order numbers from 0 up 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 using number and place value knowledge.	Count in multiples of 6, 7, 9, 25 and 1000. Count backwards through 0 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 0 and place value. Find 1000 more or less than a given number. Recognise the place 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 problems that involve number and place value with increasingly large positive numbers.	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 and practical problems using number and place value knowledge.	Read, write, order and compare, numbers to at least 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, calculate intervals across zero. Solve number and practical problems that involve number and place value knowledge.
Addition and subtraction	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 within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally	Read, write and interpret mathematical statements involving + - and = 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.	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 1s A 2 digit number and 10s Two 2 digit numbers Add 3 one digit numbers. Solve problems with addition and subtraction using concrete objects and pictorial	Estimate the answer to a calculation and use inverse operations to check answers. Add and subtract numbers mentally including: A 3 digit number and 1s A 3 digit number and 10s A 3 digit number and 100s Add and subtract numbers with up to 3 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. Add and subtract numbers with up to 4 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 4 digits, including using the formal written methods. 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

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			representations including those involving numbers, quantities and measures. Apply increasing knowledge of mental and written methods.				
Multiplication and division	Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally	Solve one step problems involving multiplication and division by calculating answers using concrete objects, pictorial representations and arrays with the support of the teacher.	Recall and use multiplication and division facts for the 2, 5 and 10 times tables, including recognising odd and even numbers. Show that the multiplication of 2 numbers can be done in any order (commutative) and the division of one number by another cannot. Calculate mathematical statements for multiplication and division within the multiplication tables and write them using x ÷ and = 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 times 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 and use multiplication and division facts for the times 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 3 numbers together. 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 1 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 2 numbers. Know and use the vocabulary of prime numbers, prime factors and composite 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 and the notation for square^{2}and cubed^3. 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 appropriately for the context. Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. Solve problems involving multiplication and division including using knowledge of factors and multiples, squares and cubes. Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the equals sign.	dentify 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 4digits 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 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 2 digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. Perform mental calculations, including with mixed operations and large numbers. Solve problems involving addition, subtraction, multiplication and division. Use knowledge of the order of operations to carry out calculations involving the four operations.

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fractions		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 ⅓¼½ and ¾ of a length, shape, set of objects or a quantity. Recognise the equivalence of two quarters and one half. Write simple fractions, e.g. ½ of 6 = 3.	Count up and down in tenths, recognise that tenths arise from dividing an object into 10 equal parts and in dividing 1 digit numbers or quantities by 10. Recognise, find and write fractions of a discrete set of objects: unit and non-unit fractions with small denominators. Recognise and use fractions as numbers: unit 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 denominator. Add and subtract fractions with the same denominator within one whole. 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 tenths by ten. 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.	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 to the other and write mathematical statements > 1 as a mixed number. 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 and diagrams.	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 the simplest form e.g. ½ x ¼ = ⅛ Divide proper fractions by whole numbers e.g. ⅓ ÷ 2 = ⅙.
Decimals					Recognise and write decimal equivalents of any number of tenths or hundredths. Recognise and write decimal equivalents to ¼½¾. 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. 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.	Read and write decimal numbers as fractions. Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents. Round decimals with two decimal places to the nearest whole number and to one decimal place. Read, write, order and compare numbers with up to three decimal places. Solve problems involving number up to three decimal places.	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 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.
Fractions, decimals and percentages					Solve simple measures and money problems involving fractions and decimals to two decimal places.	Recognise the per cent symbol (%) and understand that per cent relates to ‘number of parts per hundred’ and write percentages s a fraction with denominator 100 and as a decimal. Solve problems which require knowing percentage and decimal equivalents of ½¼⅕⅖⅘ and those fractions with a	ssociate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375 as ⅜). Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts

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						denominator of a multiple of 10 or 25	
Ratio and proportion							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 (e.g. 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		*ALGEBRAIC THINKING Solve one step problems that involve addition and subtraction, using concrete objects and pictorial representations and missing number problems (e.g. 7 =? - 9) *Although algebraic notation is not introduced until Y6, algebraic thinking starts much earlier as exemplified by the missing number objectives from Y1/2/3.	*ALGEBRAIC THINKING Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.	*ALGEBRAIC THINKING Solve problems, including missing number problems.	*ALGEBRAIC THINKING Solve problems, including missing number problems.	*ALGEBRAIC THINKING Solve problems, including missing number problems.	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 using measures	Compare length, weight and capacity.	Compare, describe and solve practical problems for: Length and height (long, short, longer, shorter, tall, short, double, half) Mass/weight (heavy, light, heavier than, lighter than Capacity and volume (full, empty, half full, less than, more than) Time (quicker, slower, earlier, later, before, after). Measure and begin to record the following: Length and height Mass/weight Capacity and volume Time in hours, minutes and seconds.	Choose and use appropriate standard units to estimate and measure: Length and height in any direction (m, cm) Mass (kg, g) Temperature (°C) Capacity (litres/ml) All to the nearest appropriate Unit, using scales, rulers, thermometers and measuring vessels. Compare and order length, height, mass, capacity and record the results using <> and = signs.	Measure, compare, add and subtract: Length (m, cm, mm) Mass (kg, g) Volume/capacity (l, ml)	Convert between different units of measure (e.g. km to m, kg to g, hour to minutes). Estimate, compare and calculate different measures.	Convert between different units of metric measure (e.g. km and m, m and cm, cm and mm, 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 decimal notation including scaling.	rom a smaller unit of measure to a larger unit, and vice versa, using decimal notation up to three decimal places. Convert between miles and kilometres
Measurement- money		Recognise and know the value of different	Recognise and use the symbols for pounds (£) and pence (p). Combine amounts	Add and subtract amounts of money to give change, using	Estimate, compare and calculate different measures,	Use all four operations to solve problems involving measure, including money	

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		denominations of coins and notes.	to make a particular value. Find different combinations of coins that make 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.	both £ and p in practical contexts	including money in pounds and pence.		
Measurement- time		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 hands on a clock face to show these times.	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.	Tell and write the time from an analogue clock, including using Roman numerals from I to XII and 12 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 and calculate the time taken by particular events.	Read, write and convert the time between analogue and digital 12 and 24 hour clocks. Solve problems involving converting from hours to minutes, minutes to seconds, years to months, weeks to days.	Solve problems involving converting between units of time.	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.
Measurement- perimeter, area and volume				Measure the perimeter of simple 2D shapes.	Measure and calculate the perimeter of a rectilinear figure, including squares, in cm and m. Find the area of rectilinear shapes by counting squares.	Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. Calculate and compare the area of rectangles, including squares, and including using standard units, square centimetres (cm^2) and square metres (m^2) and estimate the area of irregular shapes. Estimate volume e.g. using $1cm^3$ blocks to build cuboids, and capacity e.g. using water.	Recognise that shapes with the same areas can have different perimeters and vice versa. Recognise when it is possible to use formulae for area and volume of shapes. Calculate the area of parallelograms and triangles. Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3) and extending to other units e.g. mm^3 and km^3.
Geometry- 2D shapes	Select, rotate and manipulate shapes in order 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.	Recognise and name common 2D shapes e.g. rectangles including squares, circles and triangles	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 e.g. a circle on a cylinder and triangle on a pyramid. Compare and sort	Draw 2D shapes	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.	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.	Draw 2D shapes 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

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	Continue, copy and create repeating patterns.		common 2D shapes and everyday objects.				and know that the diameter is twice the radius.
Geometry- 3D shapes	Select, rotate and manipulate shapes in order 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.	Recognise and name common 3D shapes including cuboids, cubes, pyramids and spheres.	Recognise and name common 3D shapes including cuboids, cubes, pyramids and spheres. Compare and sort common 3D shapes and everyday objects.	Make 3D shapes using modelling materials. Recognise 3D shapes in different orientations and describe them.		Identify 3D shapes, including cubes and cuboids, from 2D representations.	Recognise, describe and build simple 3D shapes, including making nets.
Geometry- angles and lines				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 a three quarter 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 or parallel lines.	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	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 (360°) Angles at a point on a straight line and ½ a turn (180°) Other multiples of 90°	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.
Geometry- positions and direction	Select, rotate and manipulate shapes in order to develop spatial reasoning skills.	Describe position, direction and movement, including whole, half, quarter and three quarter turns.	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 a quarter, half and three quarter turns (clockwise and anticlockwise).		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.	Identify, describe and represent the position of a shape following a reflection or a translation, using the appropriate language, and know that the shape has not changed.	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			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	Interpret and present data using bar charts, pictograms and tables. Solve one step and two step questions 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 in 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.

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			and comparing categorical data				