Substantive Knowledge Progression- Maths

(SUBJECT KNOWLEDGE) Substantive Knowledge Progression - Maths – EYFS, KS1 & KS2							
Pre-School	Year R	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Place Value: • develop fast recognition of up to 3 objects, without having to count them individually ('subitising') • recite numbers past 5 • know that the last number reached when counting a small set of objects tells you how many there are in total ('cardinal principle') • compare quantities using language 'more than' and 'fewer than'	**Place Value:** • Count objects, actions and sounds • Link the number symbol and its cardinal value • Count beyond 10	**Place Value:** • Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number (A1) • read and write numbers to 100 in numerals (A1) • read and write numbers from 1 to 20 in numerals and words (A1)	**Place Value:** • Count in steps of 2, 3, and 5 from 0, and in tens from any number, forward and backward (A1) • read and write numbers to at least 100 in numerals and in words (A1) • recognise the place value of each digit in a two-digit number (tens, ones) (A1)	**Place Value:** • Count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number (A1) • read and write numbers up to 1000 in numerals and in words (A1) • recognise the place value of each digit in a three-digit number (hundreds, tens, ones) (A1)	**Place Value:** • Count in multiples of 6, 7, 9, 25 and 1000 (A1) • Count backwards through zero to include negative numbers (A1) • 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 (A1) • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) (A1)	**Place Value:** • Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 (A1) • Count forwards and backwards with positive and negative whole numbers, including through zero (A1) • read, write, numbers to at least 1 000 000 and determine the value of each digit (A1) • read Roman numerals to 1000 (M) and recognise years written in Roman numerals (A1)	**Place Value:** • Read, write, (numbers up to 10 000 000 and determine the value of each digit (A1) • use negative numbers in context, and calculate intervals across zero (A1)
Addition and Subtraction: • compare quantities using language 'more than' and 'fewer than' •	**Addition and Subtraction:** • Explore the composition of numbers to 10 • Automatically recall number bonds for number 0 to 5 and some to 10	**Addition and Subtraction:** • add and subtract one-digit and twodigit numbers to 20, including zero (A1/2)	**Addition and Subtraction:** • add and subtract numbers using concrete objects, pictorial representations, and mentally, including: Ø a two-digit number and ones Ø a two-digit number and tens Ø two two-digit numbers Ø adding three onedigit numbers (A1/2)	**Addition and Subtraction:** • add and subtract numbers mentally, including: Ø a three-digit number and ones Ø a three-digit number and tens Ø a three-digit number and hundreds (A1/2) • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction (A1/2)	**Addition and Subtraction:** • add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate (A1)	**Addition and Subtraction:** • add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) (A1) • add and subtract numbers mentally with increasingly large numbers (A1)	**Addition and Subtraction:** • perform mental calculations, including with mixed operations and large numbers (A1)
		Multiplication and Division:	**Multiplication and Division:**	**Multiplication and Division:**	**Multiplication and Division:** • recall multiplication and division facts for	**Multiplication and Division:** • identify multiples and factors, including finding all	**Multiplication and Division:**

		• Count numbers to 100 in numerals; count in multiples of twos, fives and tens (Su1)	• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers (Spr2)	• recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (A2)	multiplication tables up to 12 × 12 (A2/Spr1)	factor pairs of a number, and common factors of two numbers (A1/2) • know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers (A1/2) • recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) (A1/2)	• identify common factors, common multiples and prime numbers (A1)
		Fractions: • recognise, find and name a half as one of two equal parts of an object, shape or quantity (Su1) • recognise, find and name a quarter as one of four equal parts of an object, shape or quantity (Su1)	**Fractions:** • recognise, find, name and write fractions 1/3, $\frac{1}{4}$, 2/4 and $\frac{3}{4}$ of a length, shape, set of objects or quantity (Su1) • Recognise the equivalence of 2/4 and $\frac{1}{2}$ (Su1) • write simple fractions (Su1)	**Fractions:** • add and subtract fractions with the same denominator within one whole (Su1)	**Fractions:** • add and subtract fractions with the same denominator (Spr2) • recognise and write decimal equivalents of any number of tenths or hundredths (Spr2) • recognise and write decimal equivalents to $\frac{1}{2}$ $\frac{1}{4}$ $\frac{3}{4}$ (Spr2)	**Fractions:** • recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (A2) • add and subtract fractions with the same denominator and denominators that are multiples of the same number (A2) • multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams (Spr1) • read and write decimal numbers as fractions (Spr2) • 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 $\frac{1}{4}$ $\frac{1}{2}$ 1/5 2/5 4/5 and those fractions with a denominator of a multiple of 10 or 25 (Spr2)	**Fractions:** • add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions (A2) • multiply simple pairs of proper fractions, writing the answer in its simplest form (A2) • divide proper fractions by whole numbers (A2)

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		Ratio, Proportion and Algebra:	**Ratio, Proportion and Algebra:**	**Ratio, Proportion and Algebra:**	**Ratio, Proportion and Algebra:**	**Ratio, Proportion and Algebra:**	**Ratio, Proportion and Algebra:** • use simple formulae (A2/Spr1) • generate and describe linear number sequences (A2/Spr1)
		Measurement: • recognise and know the value of different denominations of coins and notes (Su2) • recognise and use language relating to dates, including days of the week, weeks, months and years (All year) • tell the time to the hour and half past the hour and draw the hands on a clock face to show these times (Su2)	**Measurement:** • 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 (Spr2) • recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value (Spr1) • 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 (Su1) • know the number of minutes in an hour and the number of hours in a day (Su1)	**Measurement:** • tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks (Su1/2) • know the number of seconds in a minute and the number of days in each month, year and leap year (Su1/2)	**Measurement:** • read, write and convert time between analogue and digital 12- and 24-hour clocks (Su1)	**Measurement:** • understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints (Su2)	**Measurement:** • 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 3 d.p. (A2) • convert between miles and kilometres (A2) • calculate the area of parallelograms and triangles (Spr2/Su1) • 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 (Spr2)
Geometry: • talk about and explore 2D and 3D shapes (for example, circles, rectangles,	**Geometry:** • Compose and decompose shapes so that children recognise a	**Geometry:** • recognise and name common 2-D shapes [for example, rectangles	**Geometry:** • identify and describe the properties of 2-D shapes, including the number of sides	**Geometry:** • recognise angles as a property of shape or a description of a turn (Su2)	**Geometry:** • identify lines of symmetry in 2-D shapes presented in different orientations (Su2)	**Geometry:** • distinguish between regular and irregular polygons based on reasoning about equal sides and angles. (Su1)	**Geometry:** • illustrate and name parts of circles, including radius, diameter and circumference and know

triangles and cuboids) using informal and mathematical language such as: sides, corners, straight, flat and round • discuss routes and locations using words like 'infront of' and 'behind' • talk about and identify the patterns around them, for example, stripes on clothes or designs on rugs or wallpaper • begin to describe a sequence of events, real or fictional, using words such as 'first' and 'then'	shape can have other shapes within it, as numbers can	(including squares), circles and triangles] (A2) • recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres (A2)	and line symmetry in a vertical line (A2) • identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid] (A2) • compare and sort common 2-D shapes and everyday objects (A2) • recognise and name common 3-D shapes [for example, cuboids (including cubes), pyramids and spheres] (A2) • 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) (Su2)	• 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 (Su2) • identify horizontal and vertical lines and pairs of perpendicular and parallel lines (Su2)	• identify acute and obtuse angles and compare and order angles up to two right angles by size (Su2) • describe positions on a 2-D grid as coordinates in the first quadrant (Su2) • describe movements between positions as translations of a given unit to the left/right and up/down (Su2)	• identify 3-D shapes, including cubes and other cuboids, from 2-D representations . (Su1) • know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles . (Su1) • identify: Ø angles at a point and one whole turn (total 360°) Ø angles at a point on a straight line and ! $ a turn (total 180°) Ø other multiples of 90° . (Su1) • 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 . (Su1)	that the diameter is twice the radius (Su1) • recognise, describe and build simple 3-D shapes, including making nets (Su1) • recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles (Su1) • describe positions on the full coordinate grid (all four quadrants) (Su1) • draw and translate simple shapes on the coordinate plane, and reflect them in the axes (Su1)
		Statistics:	**Statistics:** • interpret and construct simple pictograms, tally charts, block diagrams and simple tables (Su2)	**Statistics:** • interpret and present data using bar charts, pictograms and tables (Su2)	**Statistics:** • interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs (Su2)	**Statistics:** • complete, read and interpret information in tables, including timetables (Spr2)	**Statistics:** • interpret and construct pie charts and line graphs and use these to solve problems(Spr2) • calculate and interpret the mean as an average (Spr2)

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