

## The Welbeck federation

### Math Knowledge Progression Grid

	F1	F2	Y1	Y2	Y3	Y4	Y5	Y6
<b>Place Value: Counting</b>	<p>Verbally recite numbers beyond 5</p> <p>Know the last number reached when counting a small set of objects is the total (cardinal principle)</p>	<p>Verbally count beyond 20, recognising the pattern of the counting system.</p>	<p>Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number.</p> <p>Count numbers to 100 in numerals: count in multiples of 2 5 and 10s</p>	<p>Count in steps of 2,3 and 5 from 0, and in 10s forward and backward.</p>	<p>Count from 0 in multiples of 4, 8, 50 and 100.</p> <p>Find 10 or 100 more or less than a given number</p>	<p>Count in multiples of 6, 7, 9, 25 and 1000.</p> <p>Count backwards through zero to include negative numbers</p>	<p>Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000</p> <p>Count forwards and backwards with positive and negative whole numbers, including through zero</p>	
<b>Place Value: Represent</b>	<p>Show with fingers values up to 5</p> <p>Recognise numerals 0-5</p> <p>Link numerals to quantity</p> <p>Experiment with own symbols and marks to represent values as well as numbers</p>	<p>Have a deep understanding of number to 10, including the composition of each number.</p>	<p>Identify and represent numbers using objects and pictorial representations.</p> <p>Read and write numbers to 100 in numerals</p> <p>Read and write numbers from 1 to 20 in words and numerals</p>	<p>Read and write numbers to at least 100 in numerals and in words.</p> <p>Identify, represent, and estimate numbers using different representations, including on the number line</p>	<p>Identify, represent and estimate numbers using different representations</p> <p>Read and write numbers up to 1000 in numerals and words</p>	<p>Identify, represent and estimate numbers using different representations</p> <p>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</p>	<p>Read, write (order and compare) numbers to at least 1,000,000 and determine the value of each digit.</p> <p>Read Roman numerals to 1000 (M) and recognise years written in Roman numerals.</p>	<p>Read, write (order and compare) numbers to at least 10,000,000 and determine the value of each digit.</p>
<b>Place Value: Use PV and compare</b>	<p>Subitise up to 3 objects without having to count individually</p> <p>Compare quantities using language 'more than' and 'fewer than'</p> <p>Recognise when 2 small groups have the same number of objects</p>	<p>Subitise (recognise quantities without counting) up to 5.</p> <p>Compare quantities up to 10 in different contexts</p> <p>Recognising when one quantity is greater than, less than or the same as the other quantity.</p>	<p>When given a number, identify 1 more and 1 less.</p>	<p>Recognise the place value of each digit in a two-digit number (tens and ones)</p> <p>Compare and order numbers from 0 up to 100; use &lt;&gt; and = signs</p>	<p>Recognise the place value of each digit in a three-digit number (hundreds, tens and ones)</p> <p>Compare and order numbers up to 1000</p>	<p>Find 1000 more or less than a given number. Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones)</p> <p>Compare and order numbers beyond 1000</p>	<p>(Read, Write), order and compare numbers to at least 1,000,000 and determine the value of each digit.</p>	<p>(Read, Write), order and compare numbers to at least 10,000,000 and determine the value of each digit.</p>

<p><b>Place Value: Problems and rounding</b></p>				<p>Use place value and number facts to solve problems</p>	<p>Solve number problems and practical problems involving these ideas</p>	<p>Round any number to the nearest 10, 100 or 1000.</p> <p>Solve number and practical problems that involve all of the above with increasingly large positive numbers</p>	<p>Interpret negative numbers in context.</p> <p>Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10,000 and 100,000.</p> <p>Solve number problems and practical problems that involve all of the above</p>	<p>Round any whole number to a degree of accuracy.</p> <p>Use negative numbers in context and calculate intervals across zero.</p> <p>Solve number problems that involve all of the above.</p>
<p><b>Addition and subtraction: Recall, represent, use</b></p>		<p>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</p>	<p>Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.</p> <p>Represent and use number bonds and related subtraction facts within 20</p>	<p>Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.</p> <p>Show that addition of two numbers can be done in any order (Commutative) and subtraction of one number from another cannot.</p> <p>Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.</p>	<p>estimate the answer to a calculation and use inverse operations to check answers</p>	<p>estimate and use inverse operations to check answers to a calculation.</p>	<p>use rounding to check answers to calculations and determine in the context of a problem with levels of accuracy</p>	

<p style="text-align: center;"><b>Addition and Subtraction: Calculations</b></p>	<p>Solve real world mathematical problems with numbers up to 5</p>	<p>Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</p>	<p>add and subtract one digit and two- digit numbers to 20, including zero</p>	<p>add and subtract numbers using concrete objects, pictorial representations and mentally including: a two-digit number and ones a two-digit number and 10s two 2-digit numbers adding three one-digit numbers</p>	<p>add and subtract numbers mentally including: a 3-digit number and ones a 3-digit number and 10s a three-digit number and hundreds.</p> <p>Add and subtract numbers with up to three digits using formal written methods of columnar addition and subtraction</p>	<p>add and subtract numbers with up to four digits using formal written methods of columnar addition and subtraction where appropriate.</p>	<p>add and subtract whole numbers with more than 4 digits including using formal written methods (columnar addition and subtraction)</p> <p>Add and subtract numbers mentally with increasingly large numbers</p>	<p>perform mental calculations, including mixed operations and large numbers</p> <p>use their knowledge of the order of operations to carry out calculations involving the four operations.</p>
<p style="text-align: center;"><b>Multiplication and Division: Recall, Represent, Use</b></p>	<p>Solve real world mathematical problems with numbers up to 5</p>	<p>Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally.</p>		<p>Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables including recognising odd and even numbers</p> <p>show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot</p>	<p>recall and use multiplication and division facts for the three, four and eight multiplication tables</p>	<p>recall multiplication and division facts for multiplication tables up to 12 x 12</p> <p>use place value known and derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together 3 numbers</p> <p>recognise and use factor pairs and commutativity mental calculations</p>	<p>identify multiples and factors including finding all factor pairs of a number and common factors of 2 numbers</p> <p>know and use vocabulary of prime numbers, prime factors and composite (non-prime) numbers</p> <p>establish whether a number up to 100 is prime and recall prime numbers up to 19</p> <p>recognise and use square numbers and cube numbers. Use the notation for squared and cubed.</p> <p>recognise and use square numbers and cube numbers. Use the notation for squared and cubed.</p>	<p>identify common factors, common multiples and prime numbers</p> <p>use estimation to check answers to calculations and determine, in the context of a problem. an appropriate degree of accuracy.</p>

**Multiplication and Division: calculation**

calculate mathematical statements for multiplication and division within multiplication tables and write them using the multiplication division and equals signs

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 methods, progressing to formal written methods

multiply two digit and three-digit numbers by a one-digit number using formal written layout

multiply numbers up to four 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 four digits by a one-digit number using 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

multiply multi digit numbers up to four digits by a two-digit whole number using the formal written method of long multiplication

divide numbers up to four 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 four digits by a two-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

<b>Multiplication and Division: Solve Problems</b>			<p>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</p>	<p>solve problems involving multiplication and division using materials, arrays, repeated addition, mental methods, and multiplication and division facts including problems in contexts</p>	<p>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</p>	<p>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</p>	<p>solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes</p> <p>solve problems involving multiplication and division, including scaling by simple fraction and problems involving simple rates</p>	<p>solve problems involving addition subtraction multiplication and division</p>
<b>Multiplication and Division: Combined Operations</b>							<p>solve problems involving addition subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign</p>	<p>use their knowledge of the order of operations to carry out calculations involving the four operations</p>
<b>Fractions: Recognise and write</b>			<p>recognise find and name a half as one of two equal parts of an object shape or quantity</p> <p>recognise find and name a quarter as one of four equal parts of an object shape or quantity</p>	<p>recognise find name and write fractions <math>\frac{1}{3}</math>, <math>\frac{1}{4}</math>, <math>\frac{2}{4}</math> and <math>\frac{3}{4}</math> of a length, shape, set of objects or quantity.</p>	<p>count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers in or quantities by 10</p> <p>recognise find and write fractions of a</p>	<p>count up and down in hundredths; recognise that hundredths arise when dividing an object by 100 and dividing tenths by 10</p>	<p>identify name and write equivalent fractions of a given fraction, represented visually including tenths and hundredths</p> <p>recognise mixed numbers and improper fractions</p>	

					discrete set of objects: unit fractions and non-unit fractions with small denominators		and convert from one form to the other and write mathematical statements $>1$ as mixed number for example	
					recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators			
<b>Fractions: Compare</b>				recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$	recognise and show using diagrams, equivalent fractions with small denominators  compare and order unit fractions, and fractions with the same denominators	recognise and show using diagrams, families of common equivalent fractions	compare and order fractions whose denominators are all multiples of the same number	use common factors to simplify fractions; use common multiples to express fractions in the same denomination  fractions compare and under order fractions, including fractions $>1$
<b>Fractions: Calculations</b>				Write simple fractions for example, $\frac{1}{2}$ of 6 = 3	add and subtract fractions with the same denominator within one whole for example $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$			
<b>Fractions: Solve Problems</b>					solve problems that involve all of the above	solve problems involving increasingly hard fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number		

<p><b>Decimals: Recognise and write</b></p>							<p>recognise and write decimal equivalents of any number of tenths or hundredths</p> <p>recognise and write decimal equivalent to <math>\frac{1}{4}</math>, <math>\frac{1}{2}</math>, <math>\frac{3}{4}</math></p>	<p>read and write decimal numbers as fractions for example <math>0.71 = \frac{71}{100}</math></p> <p>recognise and use thousandths and relate them to tenths hundredths and decimal equivalents</p>	<p>identify the value of each digit in numbers given to three decimal places</p>
<p><b>Decimals: Compare</b></p>							<p>round decimals with one decimal place to the nearest whole</p> <p>compare numbers with the same number of decimal places up to two decimal places</p>	<p>round decimals with two decimal places to the nearest whole number and to one decimal place</p> <p>read, write, order and compare numbers with up to three decimal places</p>	

<p><b>Decimals: Calculations and Problems</b></p>							<p>find the effect of dividing a one- or two-digit number by 10 and 100 identifying the value of the digits in the answers as ones, tenths and hundredths</p>	<p>solve problems involving number up to three decimal places</p>	<p>multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places</p> <p>multiply 1-digit numbers with up to two decimal places by whole numbers</p> <p>use written division methods in cases where the answer has up to two decimal places</p> <p>solve problems which require answers to be rounded to specific degrees of accuracy</p>
<p><b>Fractions, Decimals and Percentages</b></p>							<p>solve simple measure and money problems involving fractions and decimals to two decimal places</p>	<p>recognise the percent symbol and understand that percent relates to number of parts per hundred and write percentages as a fraction with the denominator 100 and as a decimal</p> <p>Solve problems which require knowing percentage and decimal equivalents of <math>\frac{1}{2}</math>, <math>\frac{1}{4}</math>, <math>\frac{1}{5}</math>, <math>\frac{2}{5}</math>, <math>\frac{4}{5}</math> and those fractions with the nominator of a multiple of 10 or 25</p>	<p>associate a fraction with division and calculate decimal fraction equivalents for a simple fraction</p> <p>recall and use equivalence between simple fractions decimals and percentages including in different contexts</p>

Ratio and Proportion									<p>solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts</p> <p>solve problems involving the calculation of percentages and the use of percentages for comparison</p> <p>solve problems involving similar shapes where the scale factor is known or can be found</p> <p>solve problems involving unequal sharing and grouping using knowledge of fractions and multiples</p>
Algebra									<p>use simple formulae</p> <p>generate and describe linear number sequences</p> <p>express missing number problems algebraically</p> <p>find pairs of numbers that satisfy an equation with two unknowns</p> <p>enumerate possibilities of combinations of two variables</p>

Using Measure	<p>Make comparisons between objects relating to length</p> <p>Make comparisons between objects relating to weight and capacity</p>	Compare length Compare weight and capacity.	<p>Compare, describe and solve practical problems for: lengths and height mass/weight capacity and volume time</p> <p>measure and begin to record the following: lengths and height mass/weight capacity/volume time (hours, minutes, seconds)</p>	<p>choose and use appropriate standard units to estimate and measure length/ height in any direction mass temperature capacity to the nearest appropriate unit using rulers, scales, thermometers and measuring vessels</p> <p>compare and order Length, mass, volume/ capacity and record the results using &gt; &lt; and =</p>	Measure, compare, add and subtract lengths (m/cm/mm); mass (kg, g); volume/capacity (l/ml)	<p>convert between different units of measure</p> <p>estimate, compare and calculate different measures</p>	<p>convert between different units of metric measure</p> <p>understand and use approximate equivalence is between metric units and common imperial units such as inches pounds and pints</p> <p>use all four operations to solve problems involving measure using decimal notation including scaling</p>	<p>solve problems involving the calculation and conversion of units of measure using decimal notation up to three decimal places where appropriate</p> <p>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 notations up to three decimal places convert between miles and kilometres</p>
Measurement: Money			recognise and know the value of different denominations of coins and notes	<p>recognise and use the symbols for pounds (£) and pence (p) combine amounts to make a particular value</p> <p>find different combinations of coins that equal the same amount of money</p> <p>solve simple problems in a practical context involving addition and subtraction of money of the same unit including giving change</p>	add and subtract amount of money to give change using both pounds and pence in practical context	Estimate, compare and calculate different measures including money in pounds and pence	use all four operations to solve problems involving measure for example money	

**Measurement: Time**

	Describe a sequence of events using words such as first, next, finally	Describe a sequence of events using words such as first, next, after, finally	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 time to the hour and half past the hour and draw hands on the 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 the 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 hour and 24-hour clock estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, am/pm, morning, afternoon, noon and midnight 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 a particular event or task	read write and convert 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 larger unit and vice versa
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<p><b>Measurement: Perimeter, Area, Volume</b></p>					<p>measure the perimeter of simple 2D shapes</p>	<p>measure and calculate the perimeter of a rectilinear (including squares) in centimetres and metres</p> <p>find the area of rectilinear shapes by counting squares</p>	<p>measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres</p> <p>calculate and compare the area of rectangles including squares and including using standard units and estimate the area of irregular shapes</p>	<p>recognise that shapes with the same area can have different perimeters and vice versa</p> <p>recognise when it is possible to use formulae for area and volume of shapes</p> <p>calculate the area of parallelograms and triangles</p>
<p><b>Geometry: 2D shapes</b></p>	<p>Talk about 2D shapes using informal and mathematical language</p>	<p>Talk about 2D shapes knowing that shapes can have other shapes within them</p>	<p>recognise and name, 2D shapes for example rectangles (including squares), circles and triangles</p>	<p>identify and describe the properties of 2D shapes, including the number of sides and line of symmetry in a vertical line</p> <p>identify 2D shapes on the surface of 3D shapes) for example a circle on a cylinder and a triangle on a pyramid)</p> <p>compare and sort common 2D shapes and everyday objects</p>	<p>draw 2D shapes</p>	<p>compare and classify geometric shapes including quadrilaterals and triangles based on their properties and size</p> <p>identify lines of symmetry in 2D shapes presented on different orientations</p>	<p>distinguish between regular and irregular polygons based on reasoning about equal sides and angles</p> <p>use the properties of rectangles to associate related facts and find missing lengths and angles</p>	<p>draw 2D shapes using given dimensions and angles</p> <p>compare and classify geometric shapes based on their properties and sizes</p> <p>illustrate and name parts of circles including radius and diameter and circumference and know that the diameter is twice the radius</p>

<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Geometry: 3D shapes</b></p>	<p>Talk about 3D shapes using informal and mathematical language</p>	<p>Talk about 3D shapes using informal and mathematical language</p>	<p>recognise and name common 3D shapes for example cuboids including cubes pyramids and spheres</p>	<p>recognise and name common 3D shapes for example cuboids including cubes pyramids and spheres</p> <p>compare and sort common 3D shapes and everyday objects</p>	<p>make 3D shapes using modelling materials recognise 3D shapes in different orientations and describe them</p>		<p>identify 3D shapes including cubes and other cuboids from 2D representations</p>	<p>recognise describe and build simple 3D shapes including making nets</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"><b>Geometry: Angles and lines</b></p>					<p>recognise angles as a property of shape or a description of a turn</p> <p>identify right angles recognise that two right angles make half a turn three make 3/4 of a turn and four a complete turn; identify whether angles are greater than or less than a right angle</p> <p>identify horizontal and vertical lines and pairs of perpendicular and parallel lines</p>	<p>identify acute and obtuse angles and compare and order angles up to two right angles by size</p> <p>identify lines of symmetry in 2D shapes represented in different orientations</p> <p>complete a simple symmetrical figure with respect to a specific line of symmetry</p>	<p>know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles</p> <p>draw given angles, and measure them in degrees</p> <p>identify: angles at a point and one whole turn angles at a point on a straight line and half a turn</p> <p>other multiples of 90 degrees</p>	<p>find unknown angles in any triangles, quadrilaterals and regular polygons</p> <p>recognise angles where they meet at a point, on a straight line or are vertically opposite and find missing angles</p>

<b>Geometry: Position and Direction</b>			<p>describe position direction and movement, including whole, half, quarter and three-quarter turns</p>	<p>order and arrange combinations of mathematical objects in patterns and sequences</p> <p>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</p>		<p>describe positions on a 2D grid as coordinates in the first quadrant</p> <p>Describe movements between positions as translations of a given unit to the left/ right and up/ down</p> <p>plot specified points and draw sides to give to complete a given Polygon</p>	<p>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</p>	<p>Describe positions on the full coordinate grid all 4 quadrants</p> <p>draw and translate simple shapes on the coordinate plane, and reflect them in the axes</p>
<b>Statistics: Present and interpret</b>				<p>interpret and construct simple Pictograms, tally charts, block diagrams and simple tables</p>	<p>interpret and present data using bar charts, pictograms and tables</p>	<p>interpret and present discrete and continuous data using appropriate graphical methods including bar charts and time graphs</p>	<p>complete read and interpret information in tables including timetables</p>	<p>interpret and construct pie chart line graphs and use these to solve problems</p>
<b>Statistics: Solve Problems</b>				<p>ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity</p> <p>ask and answer questions about totalling and comparing categorical data</p>	<p>solve one step and two step questions (for example How many more? and How many fewer?) using information presented in scaled bar chart pictograms and tables</p>	<p>solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs</p>	<p>solve comparison, sum and difference problems using information presented in a line graph</p>	<p>calculate and interpret the mean as an average</p>