

Year 5 Autumn I

Starter suggestions for Number

- Read and write any integer and use decimal notation for tenth and hundredths and know what each digit represents.
- Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, 1000 from any positive integer or decimal.
- Count forwards and backwards in equal steps and describe any patterns in the sequence.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places.
- Know by heart facts for all multiplication tables up to 12×12 .
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers).
- Find pairs of numbers with a sum of 100.
- Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$)
- Find doubles and halves of decimals each with units and tenths.
- Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc.
- Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places.

Starter suggestions for Measurement, Geometry and Statistics

- Convert between metric units of measure by multiplying and dividing by powers of 10.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes).
- Identify angles which are acute, obtuse and reflex.
- Compare and classify geometric shapes based on their properties.
- Read scales to an appropriate degree of accuracy.

	Main learning	Rationale
Week 1 <i>Place Value</i> Links to Framework for Mathematics Y5 - A1, A2, A3 E1, E2, E3	<ul style="list-style-type: none"> • Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit. • <i>Identify, represent and estimate numbers using the number line.</i> • Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000. • <i>Describe and extend number sequences including those with multiplication and division steps and those where the step size is a decimal.</i> • 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. • <i>Find 1, 10, 100, 1000 and other powers of 10 more or less than a given number than a given number.</i> 	Understanding of the number system is necessary pre-requisite knowledge for any number work. Children should understand the Base 10 notion in which there are 10 numerals (0-9) and these can be organised in different ways to form any number. This is based on grouping in tens i.e. ten 1s are the same as one 10; ten 10s are the same as one 100; ten 100s are the same as one 1000 and so on. And vice versa. Children should experience numbers in many different ways (both practically and visually) and understand which model to use in which situation e.g. when rounding numbers it is useful to use or imagine the numbers on a number line.
Week 2 <i>Place Value (Decimals)</i> Links to Framework for Mathematics Y5 - A1, A2, A3, E1, E2, E3 Y6 - A1, A2, A3	<ul style="list-style-type: none"> • <i>Identify, represent and estimate numbers using the number line.</i> • Recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents. • <i>Identify the value of each digit to three decimal places.</i> • Read, write, order and compare numbers with up to three decimal places. • <i>Find 0.01, 0.1, 1, 10, 100, 1000 and other powers of 10 more or less than a given number than a given number.</i> • <i>Count forwards and backwards in decimal steps.</i> • <i>Describe and extend number sequences including those with multiplication and division steps and those where the step size is a decimal.</i> • Round decimals with two decimal places to the nearest whole number and to one decimal place. • Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Solve problems involving number up to three decimal places. 	Children's understanding of the Base 10 number system is extended to include decimals. Children learn that decimals are a way of expressing fractions within the structure of our Base 10 number system. It is important that children see practical and visual models to understand the meaning and size of units/ones, tenths and hundredths. When introducing thousandths, it is useful to use measures contexts such as kg and g or litre and ml. Children should be able to relate the numbers they are using to a context, including measurement. When multiplying and dividing by 10, 100 and 1000, it is important that children see this as scaling up and down (making amounts 10 times larger or smaller) rather than repeated addition and repeated subtraction.
Week 3 <i>Written addition and subtraction (including problem solving)</i> Links to Framework for Mathematics Y5 - A1, A2, B1, B3, D1, D2, D3, E1, E3 Y6 - A2, A3, D1, D2, D3, E1, E3	<ul style="list-style-type: none"> • Add and subtract whole numbers with more than 4 digits and decimals with two decimal places, including using formal written methods (columnar addition and subtraction). • <i>Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method).</i> • <i>Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.</i> • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. 	Children learn and explain when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to the nearest 10, 100 and 1000 to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.
Week 4 <i>Geometry (angles)</i> Links to Framework for Mathematics Y5 - D2, D3 Y6 - D2	<ul style="list-style-type: none"> • Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. • Draw given angles and measure them in degrees ($^{\circ}$). 	Pupils should use their knowledge of measuring and drawing lines and angles to help them accurately construct shapes. They should use this knowledge of angles to help them identify angles within shapes.
Week 5 <i>Geometry and measures</i>	<ul style="list-style-type: none"> • Distinguish between regular polygons based on reasoning about equal sides and angles. • Use the properties of rectangles to deduce related facts and find 	Children apply their developing understanding of the properties of shapes to classify and name them. The terms regular and irregular should be used to describe shapes that have equal sides and angles

<p>(perimeter)</p> <p>Links to Framework for Mathematics Y5 – D1, D2, D3</p>	<p>missing lengths and angles.</p> <ul style="list-style-type: none"> • Measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres. 	<p>and those that do not.</p> <p>They can then use these shapes to identify those that are rectilinear (are made of straight lines meeting at right angles). Children solve problems involving calculating the perimeter of shapes by applying their knowledge of the properties of shapes.</p>
<p>Week 6</p> <p>Addition and subtraction (statistics)</p> <p>Links to Framework for Mathematics Y5 – C1, C2, C3</p>	<ul style="list-style-type: none"> • Solve comparison, sum and difference problems using information presented in a line graph. • Add and subtract numbers mentally with increasingly large numbers and decimals to two decimal places. • <i>Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method).</i> • <i>Select a mental strategy appropriate for the numbers involved in the calculation.</i> 	<p>Children should connect their work on scales to their interpretation of line graphs, including intermediate points on the scale.</p> <p>They should identify when it is appropriate to use mental methods to solve number problems. The problems they are given should be a selection of some which can be solved mentally and some which cannot to enable children to make a choice.</p> <p>They should relate their calculation methods to answering questions about line graphs, including finding the difference between two readings as well as finding, for example, how long the cyclist stopped to rest, when there were two or more rest breaks contained in the line graph.</p>

Year 5 Autumn 2

Year 5 Autumn 2		
<p>Starter suggestions for Number</p> <ul style="list-style-type: none"> • Read and write any integer and use decimal notation for tenth and hundredths and know what each digit represents. • Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, 1000 from any positive integer or decimal. • Count forwards and backwards in equal steps and describe any patterns in the sequence. • Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places. • Know by heart facts for all multiplication tables up to 12 x 12. • Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers). • Find pairs of numbers with a sum of 100. • Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$) • Find doubles and halves of decimals each with units and tenths. • Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc. • Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places. 	<p>Starter suggestions for Measurement, Geometry and Statistics</p> <ul style="list-style-type: none"> • Convert between metric units of measure by multiplying and dividing by powers of 10. • Read, write and convert between units of time. • Identify and describe properties of 2D and 3D shapes, including regular and irregular. • Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes). • Identify angles which are acute, obtuse and reflex. • Compare and classify geometric shapes based on their properties. • Read scales to an appropriate degree of accuracy. 	
Main learning		Rationale
<p>Week 1 <i>Mental multiplication and division</i></p> <p>Links to Framework for Mathematics Y6 – B1, B2, B3</p> <p>Y5 – A1, A2, B1, E1</p>	<ul style="list-style-type: none"> • 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. • Establish whether a number up to 100 is prime. • Recognise and use square numbers and the notation for squared (2). • Use partitioning to double or halve any number, including decimals to two decimal places. • Multiply and divide numbers mentally drawing upon known facts. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Select a mental strategy appropriate for the numbers involved in the calculation. • Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes. 	<p>Children should link their knowledge of tables to enable them to identify multiples and factors. They should be able to identify factor pairs, and this can be supported through the use of practical equipment. There should be a discussion about numbers where there is only one factor pair (prime) and those numbers that have a factor pair made up of the same number (square numbers). They use their knowledge of partitioning numbers in different ways to support their mental calculations (e.g. 24×3 as (20×3) and (4×3) or $98 \div 7$ as $(70 \div 7)$ and $(28 \div 7)$).</p>
<p>Week 2 <i>Division including problems</i></p> <p>Links to Framework for Mathematics Y5 – A3, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Solve problems involving division. 	<p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p> <p>When solving problems, these include those involving remainders and children should identify whether the answer is rounded up or down, depending on the context.</p>
<p>Week 3 <i>Fractions (comparison, order and equivalence)</i></p> <p>Links to Framework for Mathematics Y6 – E1, E2, E3 Y5 – E1, E2, E3</p>	<ul style="list-style-type: none"> • Count on and back in mixed number steps such as $1\frac{1}{2}$. • Read and write decimal numbers as fractions. • Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths. • Compare and order fractions whose denominators are all multiples of the same number (including on a number line). • Solve problems involving fractions. 	<p>The learning of fractions is an extension in understanding of the number system. Children should relate the fractions tenths and hundredths to our Base 10 number system and link their knowledge of decimal numbers to fractions where a denominator of tenths, hundredths or thousandths is required.</p> <p>The understanding of equivalent fractions should be learned and developed through practical experiences and pictorial representations. Children should use their knowledge of factors and multiples to recognise equivalent fractions and simplify where appropriate.</p>
<p>Week 4 <i>Multiplication and measures (area)</i></p> <p>Links to Framework for Mathematics Y5 – A3, D1, D2, D3, E1, E3 Y6 – A2, A3, D1, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known or related fact, calculate mentally, use a jotting, written method). • 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. 	<p>Children should consolidate their understanding of linking area to arrays and multiplication.</p> <p>Children make links with their knowledge of rounding numbers to the nearest 10, 100 and 1000 to estimate the answers to calculations. Calculations should also be in contexts including, money, measures, real life problems and number enquiries.</p> <p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>

	Main learning	Rationale
Week 5 Statistics and measures (time) Links o Framework for Mathematics Y5 – D1 , D3	<ul style="list-style-type: none"> • Continue to read, write and convert time between analogue and digital 12 and 24-hour clocks. • Complete, read and interpret information in tables, including timetables. • Solve problems involving converting between units of time. 	Children's understanding of reading time to the nearest minute and converting between different time systems (analogue and digital) and different units of time is consolidated from Year 4. Children should be able to solve problems which require them to convert between units of time, for example, between seconds and minutes or weeks and days.
Week 6	Assess and review week	It is useful at regular intervals for teachers to consider the learning that has taken place over a term (or half term), assess and review children's understanding of the learning and use this to inform where the children need to go next.

Year 5 Spring 1

Starter suggestions for Number

- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, 1000 from any positive integer or decimal.
- Count forwards and backwards in equal steps and describe any patterns in the sequence.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places.
- Know by heart facts for all multiplication tables up to 12×12 .
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers).
- Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place).
- Derive and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$).
- Use partitioning to double or halve any number, including decimals to two decimal places.
- Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc.
- Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places.
- Count in fraction steps and convert equivalent fractions (e.g. count in steps of $\frac{1}{12}$ converting to $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}, \dots$).

Starter suggestions for Measurement, Geometry and Statistics

- Convert between metric units of measure by multiplying and dividing by powers of 10.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes).
- Identify angles which are acute, obtuse and reflex.
- Estimate the size of angles.
- Compare and classify geometric shapes based on their properties.
- Read scales to an appropriate degree of accuracy.
- Read and plot coordinates in the first quadrant.
- Read and interpret information in all types of graph and table, including line graphs and timetables.

	Main learning	Rationale
<p>Week 1 Place value (Counting including negative numbers)</p> <p>Links to Framework for Mathematics Y5 – A1, A2, A3</p>	<ul style="list-style-type: none"> • Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero. • Calculate difference in temperature, including those that involve a positive and negative temperature. • Describe and extend number sequences including those with multiplication and division steps and those where the step size is a decimal. • Continue to order temperatures including those below 0°C. • Read Roman numerals to 1000 (M) and recognise years written in Roman numerals. 	<p>Children's understanding of negative numbers is developed from Year 4. It is useful to introduce these in ways children can easily identify, such as floors below ground level in a building or steps into a swimming pool some above and some below the surface of the water. This understanding can then be applied to more abstract concepts such as temperature. Children should use number lines to support their understanding of moving through zero. All work on reading and recognising Roman numerals could be carried out in History lessons on this period.</p>
<p>Week 2 Addition and subtraction including problem solving</p> <p>Links to Framework for Mathematics Y5 – A1, A2, A3, B1, B3, D1, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Add and subtract numbers mentally with increasingly large numbers and decimals to two decimal places. • Add and subtract whole numbers with more than 4 digits and decimals with two decimal places, including using formal written methods (columnar addition and subtraction). • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Calculate difference in temperature, including those that involve a positive and negative temperature. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Select a mental strategy appropriate for the numbers involved in the calculation. • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • Use all four operations to solve problems involving measure (for example, length, mass, volume, money) using decimal notation. 	<p>Children learn and explain when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to the nearest 10, 100 and 1000 to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries.</p> <p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>
<p>Week 3 Mental and written multiplication</p> <p>Links to Framework for Mathematics Y5 – A1, A2, A3, E1, E3</p>	<ul style="list-style-type: none"> • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. • Multiply and divide numbers mentally drawing upon known facts. • Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Select a mental strategy appropriate for the numbers involved in the calculation. • Solve problems involving multiplication including using their knowledge of factors and multiples, cubes and squares. • Solve problems involving multiplication, including scaling by simple fractions and problems involving simple rates. 	<p>Children should be given a variety of calculations and encouraged to select the most appropriate method for finding a solution, whether that is relying on multiplication facts, using a mental method or using a written method. They should apply their knowledge of multiplication facts up to 12×12 to larger numbers. When learning about multiplication, children need to maintain the understanding that it is repeated addition or scaling up or down i.e. making an amount a number of times larger (if the scale factor is a fraction then the amount will decrease in size).</p> <p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>

	Main learning	Rationale
<p>Week 4 <i>Measurement (length, mass and capacity)</i></p> <p>Links to Framework for Mathematics Y5 – C1, C2, C3, D1, D2, D3</p>	<ul style="list-style-type: none"> • Use, read and write standard units of length and mass to a suitable degree of accuracy. • Estimate (<i>and calculate</i>) capacity. • Multiply and divide numbers and those involving decimals by 10, 100 and 1000. • Convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre). 	<p>Children's work in Measurement should be predominantly practical and purposeful. It can be linked to other areas of the curriculum e.g. science, DT, PE or other real life situations.</p> <p>Pupils use their knowledge of place value and multiplication and division to convert between standard units.</p> <p>Children should be taught precise definitions of terms so that they are able to distinguish between mass and weight. This may fit in when children learn about Earth and Space or Forces in science.</p>
<p>Week 5 <i>Geometry (shape, reflection and translation)</i></p> <p>Links to Framework for Mathematics Y5 – B2, D1, D2, D3</p>	<ul style="list-style-type: none"> • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • Describe positions on the first quadrant of a coordinate grid. • Plot specified points and complete shapes. • 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>Children should compare lengths and angles to decide if a polygon is regular or irregular. They then apply this knowledge (as well as other knowledge about the properties of shapes) when plotting coordinates of the corners of 2-D shapes in the first quadrant, and also when reflecting and translating shapes. Reflection should be in lines parallel to the axes.</p>
<p>Week 6 <i>Geometry (angles)</i></p> <p>Links to Framework for Mathematics Y6 – D2 Y5 – D2, D3</p>	<ul style="list-style-type: none"> • Know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles. • Draw given angles, and measure them in degrees ($^{\circ}$). • Identify angles at a point and one whole turn (total 360°). • Identify angles at a point on a straight line and a turn (total 180°). • Identify other multiples of 90°. 	<p>Building on their knowledge that an angle is a measure of a turn and can be static or dynamic, pupils become accurate in measuring with a protractor. They use conventional markings for right angles.</p> <p>Pupils use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools including the ITP Fixing Points.</p> <p>Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems. The ITP Calculating Angles can be used for this.</p> <p>When calculating angles around a point, children could explore this when finding shapes that tessellate.</p>

Year 5 Spring 2

Starter suggestions for Number

- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, 1000 from any positive integer or decimal.
- Count forwards and backwards in equal steps and describe any patterns in the sequence.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places.
- Know by heart facts for all multiplication tables up to 12 x 12.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers).
- Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place).
- Derive and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$)
- Use partitioning to double or halve any number, including decimals to two decimal places.
- Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc.
- Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places.
- Count in fraction steps and convert equivalent fractions (e.g. count in steps of $\frac{1}{12}$ converting to $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}, \dots$).

Starter suggestions for Measurement, Geometry and Statistics

- Convert between metric units of measure by multiplying and dividing by powers of 10.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes).
- Identify angles which are acute, obtuse and reflex.
- Estimate the size of angles.
- Compare and classify geometric shapes based on their properties.
- Read scales to an appropriate degree of accuracy.
- Read and plot coordinates in the first quadrant.
- Read and interpret information in all types of graph and table, including line graphs and timetables.

	Main learning	Rationale
Week 1 <i>Mental and written division</i> Links to Framework for Mathematics Y5 – A1, A2, B1, E1	<ul style="list-style-type: none"> • Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. • Divide numbers mentally drawing upon known facts. • Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. • <i>Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method).</i> • <i>Select a mental strategy appropriate for the numbers involved in the calculation.</i> • Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. • Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	They should use and understand the terms factor, (numbers that divide exactly into another number) multiple and prime, square and cube numbers. They should apply their knowledge of multiplication and division facts up to 12 x 12 to larger numbers. When learning about division, children need to maintain the understanding that it is sharing, repeated subtraction (grouping) or linked to scaling down i.e. making an amount a number of times smaller (if the scale factor is a fraction then the amount will decrease in size). Children should interpret remainders in different ways, including as whole numbers, as fractions, as decimals and rounding up or down appropriate to the context. Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.
Week 2 <i>2D and 3D shape including sorting</i> Links to Framework for Mathematics Y5 – B1, B2, B3	<ul style="list-style-type: none"> • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • Use the properties of rectangles to deduce related facts and missing lengths and angles. • Identify 3-D shapes, including cubes and other cuboids, from 2-D representations. • Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes. 	Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, and trapezium). This will include irregular shapes and shapes in different orientations. When children classify shapes, they should discuss the properties that are the same and different and use these to determine the features of a given shape.
Week 3 <i>Calculating with fractions</i> Links to Framework for Mathematics Y5 – E1, E2, E3	<ul style="list-style-type: none"> • Recognise mixed number and improper fractions and convert from one form to the other. • Add and subtract fractions with the same denominator and denominators that are multiples of the same number (using diagrams). • Write mathematical statements > 1 as a mixed number, e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$. 	Children build on their understanding of fractions, applying their knowledge of mixed numbers and equivalence to convert between forms. When adding and subtracting fractions, children should be supported by diagrams to see that $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$. They should use knowledge of equivalent fractions to add and subtract fractions in which one denominator is a multiple of the other e.g. $\frac{2}{5} + \frac{9}{10} = \frac{4}{10} + \frac{9}{10} = \frac{13}{10} = 1\frac{3}{10}$
Week 4 <i>Measurement (area and volume)</i> Links to Framework for Mathematics Y5 – D2, D3 Y6 – D1, D3	<ul style="list-style-type: none"> • Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes. • <i>Understand the difference between liquid volume, including capacity and solid volume.</i> • Estimate (and calculate) volume (for example, using 1cm³ blocks to build cuboids (including cubes)). 	Children's understanding of volume develops to include 'solid' volume and that this means the amount of space occupied by a 3-D shape whereas capacity is the maximum amount a container holds and if the container is not full then we are considering the volume of liquid it is holding. Children should learn that 1cm ³ is equal to 1ml. Children should make links between the area of a rectangle (including squares) and the volume of cuboids (including cubes). They could explore how different cuboids can have the same volume much like rectangles with different dimensions can have the same area.

	Main learning	Rationale
<p>Week 5 <i>Statistics, measures and calculation</i></p> <p>Links to Framework for Mathematics Y5 – A1, A2, C1, C2, C3, E1</p>	<ul style="list-style-type: none"> • Use, read and write standard units of length and mass to a suitable degree of accuracy. • Estimate and calculate capacity. • <i>Calculate and interpret the mode, median and range.</i> • Add and subtract numbers mentally with increasingly large numbers and decimals to two decimal places. • Add and subtract whole numbers with more than 4 digits and decimals with two decimal places, including using formal written methods. • <i>Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method).</i> • <i>Select a mental strategy appropriate for the numbers involved in the calculation.</i> • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. 	<p>By placing calculation and statistics into a measures context, it enables children to use and apply their skills. The concepts of mode, median and range can be taught through the measures or alternative data. It is important that children understand that mode and median are forms of average. Identifying the median will consolidate children's ordering skills, and the range will support with the concept of subtraction finding the difference. Children's work on averages and measurement should reflect their ability in other number work in place value and calculation.</p>
Week 6	Assess and review week	It is useful at regular intervals for teachers to consider the learning that has taken place over a term (or half term), assess and review children's understanding of the learning and use this to inform where the children need to go next.

Year 5 Summer I

Starter suggestions for Number

- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, and 1000 from any positive integer or decimal.
- Count forwards and backwards in equal steps and describe any patterns in the sequence.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places.
- Know by heart facts for all multiplication tables up to 12 x 12.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers).
- Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place).
- Derive and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$)
- Use partitioning to double or halve any number, including decimals to two decimal places.
- Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc.
- Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places.
- Count in fraction steps and convert equivalent fractions (e.g. count in steps of $\frac{1}{12}$ converting to $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{1}{2}, \frac{5}{12}, \frac{1}{2}, \dots$).

Starter suggestions for Measurement, Geometry and Statistics

- Convert between metric units of measure by multiplying and dividing by powers of 10.
- Know approximate metric and common imperial equivalences.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes).
- Identify angles which are acute, obtuse and reflex.
- Estimate the size of angles.
- Calculate missing angles around a point.
- Compare and classify geometric shapes based on their properties.
- Read scales to an appropriate degree of accuracy.
- Read and plot coordinates in the first quadrant.
- Read and interpret information in all types of graph and table, including line graphs and timetables.

	Main learning	Rationale
<p>Week 1 Place value including decimals</p> <p>Links to Framework for Mathematics Y5 – A1, A2, A3</p>	<ul style="list-style-type: none"> • Identify, represent and estimate numbers using the number line. • Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit. • Identify the value of each digit to three decimal places. • Read, write, order and compare numbers with up to three decimal places. • Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000. • Count forwards and backwards in decimal steps. • Describe and extend number sequences including those with multiplication and division steps and those where the step size is a decimal. • Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000. • Round decimals with two decimal places to the nearest whole number and to one decimal place. • Solve number problems and practical problems that involve all of the above. • Find 0.01, 0.1, 1, 10, 100, 1000 and other powers of 10 more or less than a given number than a given number. 	<p>Pupils identify the place value in large whole numbers. They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far. They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule. They should recognise and describe linear number sequences (for example, $3, 3\frac{1}{2}, 4, 4\frac{1}{2}, \dots$), including those involving fractions and decimals, and find the term-to-term rule in words (for example, add $\frac{1}{2}$).</p> <p>All place value work should be presented in contexts such as measurement, statistics or other real life scenarios.</p>
<p>Week 2 Fractions</p> <p>Links to Framework for Mathematics Y5 – E1, E2, E3</p>	<ul style="list-style-type: none"> • Recognise mixed numbers and improper fractions and convert from one form to another. • Compare and order fractions whose denominators are all multiples of the same number (including on a number line). • Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths. • Add and subtract fractions with the same denominator and denominators that are multiples of the same number (using diagrams). • Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams. 	<p>Children consolidate their understanding of fractions through identifying, writing, comparing, ordering and calculating equivalent fractions, all supported through practical and visual approaches. Children's calculating with fractions involves addition and subtraction and continues to develop to include multiplying proper fractions by whole numbers e.g. $\frac{2}{5} \times 7$. All of the calculating with fractions should be supported through practical and pictorial methods.</p>
<p>Week 3 Measures (time and converting units) and statistics</p> <p>Links to Framework for Mathematics Y5 – C1, C2, C3, D1, D3 Y6 – D1, D3</p>	<ul style="list-style-type: none"> • Continue to read, write and convert time between analogue and digital 12 and 24-hour clocks. • Complete, read and interpret information in tables, including timetables. • Solve problems involving converting between units of time. • Understand and use approximate equivalences between metric and common imperial units such as pints. • Solve comparison, sum and difference problems using information presented in all types of graph including a line graph. 	<p>Pupils use all four operations in problems involving time, including conversions (for example, days to weeks, expressing the answer as weeks and days). They use their knowledge of the 7x table to convert days to weeks, and apply this in different contexts. Children could use their work in science or PE (athletics) to generate times to use in maths lessons. Children apply their knowledge of calculation in the context of statistics, using all types of graph. They use line graphs as a way of converting between metric and imperial units and then use these line graphs to solve problems relating to metric and everyday imperial units.</p>

	Main learning	Rationale
<p>Week 4 Geometry</p> <p>Links to Framework for Mathematics Y5 – B1, B2, B3, D1, D2, D3</p>	<ul style="list-style-type: none"> • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • Use the properties of rectangles to deduce related facts and missing lengths and angles. • Identify 3-D shapes, including cubes and other cuboids, from 2-D representations. • Compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes. • Distinguish between regular and irregular polygons based on reasoning about equal sides and angles. • Describe positions on the first quadrant of a coordinate grid. • Plot specified points and complete shapes. • 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>Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, and trapezium). This will include irregular shapes and shapes in different orientations.</p> <p>When children classify shapes, they should discuss the properties that are the same and different and use these to determine the features of a given shape.</p> <p>Children should compare lengths and angles to decide if a polygon is regular or irregular. They then apply this knowledge (as well as other knowledge about the properties of shapes) when plotting coordinates of the corners of 2-D shapes in the first quadrant, and also when reflecting and translating shapes. Reflection should be in lines parallel to the axes.</p>
<p>Week 5 Addition and subtraction</p> <p>Links to Framework for Mathematics Y6 – A2, A3, D1, D2, D3, E1, E3 Y5 – A3, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Add and subtract whole numbers with more than 4 digits and decimals with two decimal places, including using formal written methods (columnar addition and subtraction). • Add and subtract numbers mentally with increasingly large numbers and decimals to two decimal places. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Select a mental strategy appropriate for the numbers involved in the calculation. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. 	<p>Children learn when it is appropriate to use mental and written methods of calculation.</p> <p>Children make links with their knowledge of rounding numbers to the nearest 10, 100 and 1000 to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries.</p> <p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>
<p>Week 6 Multiplication and division</p> <p>Links to Framework for Mathematics Y5 – A3, D2, D3, E1, E2, E3</p>	<ul style="list-style-type: none"> • Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. • Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000. • Recognise and use square numbers and cube numbers, and the notation for squared (²) and cubed (³). • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Select a mental strategy appropriate for the numbers involved in the calculation. • Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. 	<p>They should apply their knowledge of multiplication and division facts up to 12 x 12 to larger numbers. Children need to understand what multiplication and division are and how they apply in real life situations, including scaling up and down.</p> <p>Children should interpret remainders in different ways, including as whole numbers, as fractions, as decimals and rounding up or down appropriate to the context.</p> <p>Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>

Year 5 Summer 2

Starter suggestions for Number

- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Count forwards and backwards in steps of 0.01, 0.1, 1, 10, 100, 1000 from any positive integer or decimal.
- Count forwards and backwards in equal steps and describe any patterns in the sequence.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals with up to two decimal places.
- Know by heart facts for all multiplication tables up to 12 x 12.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers).
- Recall and use addition and subtraction facts for 1 and 10 (with decimal numbers to one decimal place).
- Derive and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Derive related facts from those already known (e.g. 4×0.8 linked to 4×8 or $3 + 7 = 10$ linked to $0.3 + 0.7 = 1$).
- Use partitioning to double or halve any number, including decimals to two decimal places.
- Multiply and divide whole numbers and decimals with up to two decimal places mentally by 10 or 100, and integers by 1000 and use this to convert between units of measurement, e.g. cm to m, g to kg etc.
- Round whole numbers to the nearest 10, 100, 1000 or a number with up to two decimal places to the nearest integer or number of decimal places.
- Count in fraction steps and convert equivalent fractions (e.g. count in steps of $\frac{1}{12}$ converting to $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}, \dots$).

Starter suggestions for Measurement, Geometry and Statistics

- Convert between metric units of measure by multiplying and dividing by powers of 10.
- Know approximate metric and common imperial equivalences.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Complete and interpret information in a variety of sorting diagrams (including those used to sort properties of shapes).
- Identify angles which are acute, obtuse and reflex.
- Estimate the size of angles.
- Calculate missing angles around a point.
- Compare and classify geometric shapes based on their properties.
- Read scales to an appropriate degree of accuracy.
- Read and plot coordinates in the first quadrant.
- Read and interpret information in all types of graph and table, including line graphs and timetables.

	Main learning	Rationale
<p>Week 1 Place value</p> <p>Links to Framework for Mathematics Y5 – A1, A2, A3, D1, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit. • Count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000. • Describe and extend number sequences including those with multiplication and division steps and those where the step size is a decimal. • Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero. • Continue to order temperatures including those below 0°C. • 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. 	<p>Pupils identify the place value in large whole numbers which includes the position of numbers within the number system. They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far. They should recognise and describe linear number sequences, including those involving fractions, decimals and negative numbers and find the term-to-term rule. They should recognise and describe linear number sequences (a sequence in which the steps are equal) including those involving fractions and decimals, and find the term-to-term rule in words (for example, subtract $1\frac{1}{2}$).</p> <p>Place value work should be carried out in a variety of contexts including measurement, statistics and real life.</p>
<p>Week 2 Written calculations including problem solving.</p> <p>Links to Framework for Mathematics Y 6 - A2, A3, D1, D2, D3, E1, E3 Y5 – A1, A2, A3, B1, B3, D1, D2, D3</p>	<ul style="list-style-type: none"> • Add and subtract whole numbers with more than 4 digits and decimals with two decimal places, including using formal written methods (columnar addition and subtraction). • Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers. • Divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context. • Choose an appropriate strategy to solve a calculation based upon the numbers involved (recall a known fact, calculate mentally, use a jotting, written method). • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign. 	<p>Ensure children are given opportunities to make decisions when problem solving. These decisions will be based on the children's conceptual understanding of the four operations and may include contextual or vocabulary clues. Children should learn which would be the most efficient way to carry out a calculation, choosing mental or written methods, depending on the size of the numbers involved. Written methods should be agreed by the school and shared in the progression in written calculations policy. Efficient written methods are required to be taught by the end of Key Stage 2.</p>
<p>Week 3 Fractions (rounding and percentages and problem solving)</p> <p>Links to Framework for Mathematics Y6 – E1, E3 Y5 – A1, A2, A3, E1, E2, E3</p>	<ul style="list-style-type: none"> • Round decimals with two decimal places to the nearest whole number and to one decimal place. • Solve problems involving number up to three decimal places. • Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with denominator 100, and as a decimal. • Solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25. 	<p>Number lines are a very effective resource for teaching the ordering and rounding of decimals. The ITP Decimal Number Line allows you to zoom in on a number line and position fractions accurately. The number line allows children to understand that there are numbers between numbers. Children should experience other models of decimals, including money. Understanding of place value with decimals builds on children's general understanding of our base 10 number system and can be seen in contexts such as money and measurement. However, the learning about decimals should not be confined to these two contexts.</p>

	Main learning	Rationale
<p>Week 4 Measures (mass, volume, capacity and time)</p> <p>Links to Framework for Mathematics Y5 - A2, A3, D1, D2, D3, E1, E3</p>	<ul style="list-style-type: none"> • Solve problems involving converting between units of time. • Use all four operations to solve problems involving measure (for example, mass, capacity and volume) using decimal notation, including scaling. • Understand the difference between liquid volume, including capacity and solid volume. • Understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints. 	<p>Pupils use their knowledge of place value and multiplication and division to convert between standard units. When converting between metric and common imperial units, children apply their knowledge of multiplication by scaling or previous work using conversion line graphs.</p> <p>Pupils use all four operations in problems involving time, including conversions (e.g. minutes to hours and minutes).</p> <p>Problems involving time require children to understand that they are no longer working in base 10. This may involve learning number bonds to 60 and using number lines to show the passage of time.</p>
<p>Week 5 Area and volume of shapes</p> <p>Links to Framework for Mathematics Y6 - D1, D3 Y5 - D1, D2, D3</p>	<ul style="list-style-type: none"> • Calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm²) and square metres (m²) and estimate the area of irregular shapes. • Understand the difference between liquid volume, including capacity and solid volume. • Estimate volume (for example, using 1 cm³ blocks to build cuboids (including cubes)) and capacity (for example, using water). 	<p>Children should understand that area is a measure of surface within a given boundary and the convention is to cover the surface with any tessellating shape (usually squares, giving rise to square units). Children should learn to calculate the area from scale drawings using given measurements.</p> <p>Children's understanding of volume develops to include 'solid' volume and that this means the amount of space occupied by a 3-D shape whereas capacity is the maximum amount a container holds and if the container is not full then we are considering the volume of liquid it is holding. Children should learn that 1 cm³ is equal to 1 ml.</p> <p>Children should make links between the area of a rectangle (including squares) and the volume of cuboids (including cubes). They could explore how different cuboids can have the same volume much like rectangles with different dimensions can have the same area.</p>
<p>Week 6</p>	<p>Assess and review week</p>	<p>It is useful at regular intervals for teachers to consider the learning that has taken place over a term (or half term), assess and review children's understanding of the learning and use this to inform where the children need to go next.</p>

Year 5 programme of study

Number – number and place value

Statutory requirements

Pupils should be taught to:

- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit;
- count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000;
- interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero;
- round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000;
- solve number problems and practical problems that involve all of the above;
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Notes and guidance (non-statutory)

Pupils identify the place value in large whole numbers.

They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far.

They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule.

They should recognise and describe linear number sequences (for example, $3, 3\frac{1}{2}, 4, 4\frac{1}{2}, \dots$), including those involving fractions and decimals, and find the term-to-term rule in words (for example, add $\frac{1}{2}$).

Number – addition and subtraction

Statutory requirements

Pupils should be taught to:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction);
- add and subtract numbers mentally with increasingly large numbers;
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy;
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. (*from Year 6*)

Notes and guidance (non-statutory)

Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see Mathematics Appendix 1).

They practise mental calculations with increasingly large numbers to aid fluency (for example, $12\,462 - 2300 = 10\,162$).

Statutory requirements

Pupils should be taught to:

- 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; (from Year 6)
- establish whether a number up to 100 is prime and recall prime numbers up to 19; (from Year 6)
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers; (from Year 6)
- multiply and divide numbers mentally drawing upon known facts;
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context;
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000;
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3);
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes;
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign;
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Notes and guidance (non-statutory)

Pupils practise and extend their use of the formal written methods of short multiplication and short division (see Mathematics Appendix 1). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = \frac{98}{4} = 24$ r 2 = $24 \frac{1}{2} = 24.5 \approx 25$).

Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.

Distributivity can be expressed as $a(b + c) = ab + ac$.

They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$).

Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5 \times \square$).

Number – fractions (including decimals and percentages)

Statutory requirements

Pupils should be taught to:

- compare and order fractions whose denominators are all multiples of the same number; (from Year 6)
- 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, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1 \frac{1}{5}$];
- add and subtract fractions with the same denominator and denominators that are multiples of the same number;
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams;
- read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$];
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents; (from Year 6)
- 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; (from Year 6)
- solve problems involving number up to three decimal places; (from Year 6)
- 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 $\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25.

Notes and guidance (non-statutory)

Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.

They extend their knowledge of fractions to thousandths and connect to decimals and measures.

Pupils connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.

Pupils connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1 .

Pupils practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number.

Pupils continue to practise counting forwards and backwards in simple fractions.

Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities.

Pupils extend counting from year 4, using decimals and fractions including bridging zero, for example on a number line.

Pupils say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems.

They mentally add and subtract tenths, and one-digit whole numbers and tenths.

They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, $0.83 + 0.17 = 1$).

Pupils should go beyond the measurement and money models of decimals, for example, by solving puzzles involving decimals.

Pupils should make connections between percentages, fractions and decimals (for example, 100% represents a whole quantity and 1% is $\frac{1}{100}$, 50% is $\frac{50}{100}$, 25% is $\frac{25}{100}$) and relate this to finding 'fractions of'.

Measurement

Statutory requirements

Pupils should be taught to:

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre);
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints; (from Year 6)
- 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; (from Year 6)
- estimate volume [for example, using 1 cm^3 blocks to build cuboids (including cubes)] and capacity [for example, using water];
- solve problems involving converting between units of time;
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.

Notes and guidance (non-statutory)

Pupils use their knowledge of place value and multiplication and division to convert between standard units.

Pupils calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths. Missing measures questions such as these can be expressed algebraically, for example $4 + 2b = 20$ for a rectangle of sides 2 cm and b cm and perimeter of 20cm.

Pupils calculate the area from scale drawings using given measurements.

Pupils use all four operations in problems involving time and money, including conversions (for example, days to weeks, expressing the answer as weeks and days).

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:

- identify 3-D shapes, including cubes and other cuboids, from 2-D representations;
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles; (from Year 6)
- draw given angles, and measure them in degrees ($^{\circ}$);
- identify:
 - angles at a point and one whole turn (total 360°); (from Year 6)
 - angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°);
 - other multiples of 90° ;
- use the properties of rectangles to deduce related facts and find missing lengths and angles;
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Notes and guidance (non-statutory)

Pupils become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.

Pupils use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools.

Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.

Geometry – position and direction

Statutory requirements

Pupils should be taught to:

- 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.

Notes and guidance (non-statutory)

Pupils recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.

Statistics

Statutory requirements

Pupils should be taught to:

- solve comparison, sum and difference problems using information presented in a line graph;
- complete, read and interpret information in tables, including timetables.

Notes and guidance (non-statutory)

Pupils connect their work on coordinates and scales to their interpretation of time graphs.

They begin to decide which representations of data are most appropriate and why.