Mathematics Planning

National Curriculum 2014

Year 6

How to Use the Medium Term Planning

This planning document is intended to provide support for schools in adapting their curriculum to meet the statutory requirements of the new National Curriculum 2014 and to aid teachers in planning a progressive learning journey for children within Year 6.

National Curriculum Overview

The new National Curriculum is more similar in structure to the Framework for Mathematics than the National Curriculum 2000. To support schools and teachers in identifying elements of the curriculum that have remained the same and elements that have changed, objectives have been highlighted in the following way:

Objectives highlighted in blue are ones that are found in the Framework for Mathematics but not in National Curriculum 2000.

Objectives highlighted in yellow are ones that have moved down from a higher year group in the Framework for Mathematics.

Objectives highlighted in green are ones that are not in the Framework for Mathematics or in National Curriculum 2000.

Objectives that are not highlighted are in the same year group in the new National Curriculum as they are in the Framework for Mathematics.

Objectives that are in *italics* have been added by the Lancashire Mathematics Team, to support progression and enable children to develop a secure understanding of the mathematical concepts they are learning. Some of these objectives are consolidation of ones from the previous year.

Overview Document

The planning starts with an overview document. This identifies six half termly blocks of six weeks with focus areas of mathematics for each week. The units are designed to be cohesive and allow for application of learning and skills across the mathematics curriculum. The assess and review weeks can be used to gain information for teacher assessments or can be used to pick up elements that need further support. It is not designed to be used as an entire week of testing with no teaching. This is a suggested layout and teachers should adapt to meet the needs of their class as required.

Half Termly Planning Documents

The half termly planning documents have been compiled to the following principles:

- Each half term is predominantly learning about number.

- Almost all weeks are focused on one area of mathematics, giving children time to focus on a single area for a longer amount of time.

- The 'rationale' justifies why the objectives have been put together and how to enhance the teaching and learning during that week, e.g. number work is often given a context of data, measures, money or problem solving.

- The objectives are the end of year expectations and it is the decision of teachers whether to visit the whole objective more than once throughout the year or to organise progression within each objective.

- Every objective is covered at least twice within the year.

- The learning within each week are NOT in a prescribed order and teachers should use their discretion when organising progression within the unit.

The 'Starter' suggestions begin with consolidation of the previous year's work and develop over time to consolidate learning within the given year group. It is important that children have the opportunity to regularly revisit learning from all aspects of the mathematics curriculum, and the 'Starter' is an effective time in which this can occur.

Differentiation

The objectives are based on age related expectations. For purposes of differentiation, the National Curriculum 2014 suggests:

'Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.'

National Curriculum Documentation

At the end of this document is the National Curriculum 2014 programme of study for Year 6. This contains the objectives for Year 6 along with the non-statutory guidance to help with interpretation.

Year 6 Mathematics Yearly Overview

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Week 1	Place value incl. decimals	Fractions	Place value, sequences and coordinates	Mental and written addition and subtraction	Place value, decimals and fractions	Measurement – mass and volume / capacity
Week 2	Mental and written addition	Fractions, percentages, ratio and proportion	2D shape, coordinates, translation and reflection	Measurement, ratio and proportion	Mental and written calculation	Mental and written calculations
Week 3	Mental and written multiplication (time)	Geometry - angles Statistics – pie charts	Measurement – temperature, mean	2D and 3D shape	Calculating fractions, ratio and proportion	Fractions
Week 4	2D and 3D shape	Measurement – length, including perimeter and mass	Calculating with fractions	Area, perimeter and volume of shapes	Coordinates, translation and reflection	Place value and decimals
Week 5	Mental and written subtraction	Measurement – area and volume	Mental and written division	Statistics – line graphs and pie charts	Algebra and sequences	2D and 3D shape
Week 6	Mental and written division	Assess and review week	Mental and written multiplication	Assess and review week	Measurement (length and time) and statistics - mean	Assess and review week

	Year 6 Autumn 1	

Starter suggestions for Number
- Know by heart facts for all multiplication tables up to 12 x 12.
- Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1 or 10.
- To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1)
- Mentally multiply and divide two-digit and single-digit numbers.
- Use partitioning to double or halve any number.
- Mentally multiply and divide pairs of multiples of 10 and 100.
- Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U).
- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Order and compare whole numbers up to 1 000 000, negative numbers and decimals.
- Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal.
- Multiply and divide whole numbers and decimals 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 three 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 $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}, ...$).

Starter suggestions for Measurement, Geometry and Statistics
- Know and use standard metric units of measure.
- Estimate and calculate length (including perimeter), mass, volume/capacity and area.
- Convert between units by multiplying and dividing by powers of 10.
- Know metric and imperial equivalences of feet, inches, pints and pounds.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Find missing angles and lengths using properties of shape.
- Estimate and identify acute, obtuse and reflex angles.
- Describe positions on the first quadrant of a coordinate grid.
- Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

	Main learning	**Rationale**
Week 1 *Place value including decimals* Links to Framework for Mathematics Y6 – A1,A2,A3,B1, B2,B3	• *Identify, represent and estimate numbers using the number line.* • Read, write, order and compare numbers up to 10 000 000 and determine the value of each digit. • Round any whole number to a required degree of accuracy. • Use negative numbers in context, and calculate intervals across zero. • Count forwards or backwards in steps of integers, decimals or powers of 10 for any number. • Order and compare numbers including integers, decimals and negative numbers. • *Find 0.001, 0.01, 0.1, 1, 10 and powers of 10 more or less than a given number.* • *Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).* • *Round decimals with three places to the nearest whole number or one or two decimal places.* • *Identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving* • *answers up to three decimal places.* • Solve number and practical problems that involve all of the above.	Children extend their knowledge of the number system to larger numbers and further decimals. The Base 10 notion is centred around grouping in tens i.e. ten 1s are the same as one 10, ten 10s are the same as one 100 and so on and vice versa. Children learn that one is the same as ten $\frac{1}{10}$s, one $\frac{1}{10}$ is the same as $\frac{10}{100}$s and that $\frac{1}{100}$ is the same as $\frac{10}{1000}$s. Children understand how numbers relate to each other by ordering and comparing them on a number line, which supports the skill of rounding. This skill will be applied over the coming weeks when estimating calculations. When multiplying and dividing by 10, 100 and 1000, children recognise that this is scaling up and down by powers of 10 and is related to the Base 10 number system.
Week 2 *Mental and written addition* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Perform mental calculations, including with mixed operations and large numbers and decimals. • *Identify, represent and estimate numbers using the number line.* • *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 multi-step problems in contexts, deciding which operations and methods to use and why. • Solve problems involving addition. • Express missing number problems algebraically. • Find pairs of numbers that satisfy an equation with two unknowns. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • *Add whole numbers and decimals using formal written methods (columnar addition).* • Solve problems which require answers to be rounded to specified degrees of accuracy.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. 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.

	Main learning	**Rationale**
Week 3 *Mental and written multiplication in the context of time* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. • Multiply one-digit numbers with up to two decimal places by whole numbers. • Perform mental calculations, including with mixed operations and large numbers and decimals. • *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 addition, subtraction, multiplication and division. • Express missing number problems algebraically. • Find pairs of numbers that satisfy an equation with two unknowns. • Use, read, write and convert between standard units, converting measurements of time from a smaller unit to a larger unit, and vice versa. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • Solve problems which require answers to be rounded to specified degrees of accuracy.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. If schools are using grid method of multiplication, the written methods for addition in the previous week will be further applied this week. 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 *2D and 3D shape* Links to Framework for Mathematics Y6 – B1,B2,B3,D2	• Draw 2-D shapes using given dimensions and angles. • Recognise, describe and build simple 3-D shapes, including making nets. • Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. • *Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).*	Children gain practical experience of drawing and making shapes, in order to support their work on recognising, describing, comparing and classifying shapes. It is important that children see and use regular and irregular polygons and polyhedra and experience them in different orientations. Children should discover the angle sum of triangles and quadrilaterals and use this knowledge, and knowledge of the term 'regular' to find missing angles.
Week 5 *Mental and written subtraction* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Perform mental calculations, including with mixed operations and large numbers and decimals. • *Identify, represent and estimate numbers using the number line.* • *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 subtraction multi-step problems in contexts, deciding which operations and methods to use and why. • Solve problems involving subtraction. • Express missing number problems algebraically. • Find pairs of numbers that satisfy an equation with two unknowns. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy. • *Subtract whole numbers and decimals using formal written methods (columnar subtraction).* • Solve problems which require answers to be rounded to specified degrees of accuracy.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. 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 6 *Mental and written division* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Perform mental calculations, including with mixed operations and large numbers and decimals. • Divide numbers up to 4 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 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. • Use written division methods in cases where the answer has up 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).* • Solve problems involving division. • Solve problems which require answers to be rounded to specified degrees of accuracy. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. If schools are using chunking method of division, the written methods for subtraction in the previous week will be further applied this week. 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.

Year 6 Autumn 2

Starter suggestions for Number	Starter suggestions for Measurement, Geometry and Statistics
- Know by heart facts for all multiplication tables up to 12 x 12. - Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1, 10. - To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1). - Mentally multiply and divide two-digit and single-digit numbers. - Use partitioning to double or halve any number. - Mentally multiply and divide pairs of multiples of 10 and 100. - Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U). - Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents. - Order and compare whole numbers up to 1 000 000, negative numbers and decimals. - Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal. - Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places). - Multiply and divide whole numbers and decimals 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 three 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 $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}, ...$).	- Know and use standard metric units of measure. - Estimate and calculate length (including perimeter), mass, volume/capacity and area. - Convert between units by multiplying and dividing by powers of 10. - Know metric and imperial equivalences of feet, inches, pints and pounds. - Read, write and convert between units of time. - Identify and describe properties of 2D and 3D shapes, including regular and irregular. - Find missing angles and lengths using properties of shape. - Estimate and identify acute, obtuse and reflex angles. - Describe positions on the first quadrant of a coordinate grid. - Solve comparison, sum and difference problems using information presented in all types of graph. - Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

	Main learning	Rationale
Week 1 *Fractions* Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3	- Identify common factors, common multiples and prime numbers. - Compare and order fractions, including fractions >1 *(including on a number line)*. - Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. - Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$). - Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. - Solve problems involving fractions.	Children use knowledge of multiplication facts to identify factors and multiples of different numbers. In doing so, children can learn that prime numbers are ones whose only factors are themselves and 1. Prime numbers up to 100 can be derived using the Sieve of Eratosthenes. Children apply their knowledge of common factors to create equivalent fractions in order to compare, order and position on a number line. Children recognise that fractions, decimals and percentages are all ways of expressing a proportion. Decimals (decimal fractions) are ways of writing fractions in our Base 10 number system, so converting to tenths, hundredths and thousandths is essential understanding.
Week 2 *Fractions, percentages, ratio and proportion* Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3	- Recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. *Find simple percentages of amounts.* - Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. - Solve problems involving the calculation of percentages (for example, of measures, and such as 15% of 360) and the use of percentages for comparison. - Solve problems involving similar shapes where the scale factor is known or can be found. - Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	Children learn that percentage is a way of expressing a proportion as a fraction of 100. Links are made between scaling up or down to create fractions with a denominator that is 100. Links are also made between the equivalence that 10% is the same as $^1/_{10}$ and that to find $^1/_{10}$ of an amount you divide by 10. From finding 10%, other amounts can be found such as 5%, 40% etc. Children also learn how to share in unequal amounts by using ratios. Ratio can also be understood as comparing part to part. This can be applied to scaling up and down to draw similar shapes according to a given ratio.
Week 3 *Geometry – angles* *Statistics – pie charts* Links to Framework for Mathematics Y6 – D2,C1,C2,C3	- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. - Interpret and construct pie charts and line graphs and use these to solve problems. - Solve comparison, sum and difference problems using information presented in all types of graph.	Children's work on angles is extended to applying the understanding of relationships between different ones in order to calculate missing angles on a straight line (total 180˚), around a point (total 360˚) and that vertically opposite angles are equal. The knowledge of angles around a point is then combined with knowledge of percentages when constructing pie charts. Children become familiar with pie charts, understanding the purpose of presenting data in this way and solving problems by interpreting data in different presentations.
Week 4 *Measurement – length, including perimeter and mass* Links to Framework for Mathematics Y6 – C1,C2,C3,D1 D2,D3	- Solve problems involving the calculation and conversion of units of measure (including money and time), using decimal notation up to three decimal places where appropriate. - Use, read, write and convert between standard units, converting measurements of length and mass, from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. - Convert between miles and kilometres.	Children apply their understanding of the Base 10 number system and multiplying and dividing by powers of 10 in order to convert between units of measurement for length and mass. The learning of measurement should be practically based, and perimeter should be included in the learning of length as it is a measure of distance. Children are also introduced to the relationship between miles and kilometres i.e. that 8km is roughly equivalent to 5 miles, and use this to convert between these two units.

	Main learning	**Rationale**
Week 5 *Measurement – area and volume* Links to Framework for Mathematics Y6 – C1,C2,C3,D1 D2,D3	• Recognise that shapes with the same areas can have different perimeters and vice versa. • Calculate the area of parallelograms and triangles. • Use, read and write standard units using decimal notation to up to three decimal places. • Recognise when it is possible to use the formulae for area and volume of shapes. • Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³) and extending to other units (for example, mm³ and km³).	The work on perimeter from the previous week can be followed up by investigating shapes with the same perimeter having different areas and vice versa. Children learn how to find the area of triangles and parallelograms by relating their knowledge of finding the area of rectangles. Area of a triangle should be understood by children as $\frac{1}{2}$ (base x height). Area of a parallelogram should be related to area of a rectangle, with children cutting a parallelogram to create a rectangle. Children should learn and understand the formula for finding the area of these 2D shapes, and then relate this to finding the volume of prisms, including cubes and cuboids.
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 6 Spring 1

Starter suggestions for Number	Starter suggestions for Measurement, Geometry and Statistics
• Know by heart facts for all multiplication tables up to 10 x 10. • Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1, 10. • To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1). • Mentally multiply and divide two-digit and single-digit numbers. • Use partitioning to double or halve any number. • Mentally multiply and divide pairs of multiples of 10 and 100. • Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U). • Identify the multiples/factors of given numbers. • Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents. • Compare and order two or more different positive and/or negative integers and/or decimal numbers with up to 3 decimal places, say which is the least / greatest ;use the symbols <, > and = correctly and place on a number line. • Calculate differences in temperature, including those that involve a positive and negative temperature. • Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal. • Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places). • Multiply and divide whole numbers and decimals 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 three decimal places to the nearest integer or number of decimal places. • Count in fraction steps (e.g. of $\frac{1}{12}$, i.e. $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}$).	• Know and use standard metric units of measure. • Estimate and calculate length (including perimeter), mass, volume/capacity and area. • Convert between units by multiplying and dividing by powers of 10. • Know metric and imperial equivalences of feet, inches, pints and pounds. • Read, write and convert between units of time. • Identify and describe properties of 2D and 3D shapes, including regular and irregular. • Find missing angles and lengths using properties of shape. • Estimate and identify acute, obtuse and reflex angles. • Describe positions on the first quadrant of a coordinate grid. • Solve comparison, sum and difference problems using information presented in all types of graph. • Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

	Main learning	Rationale
Week 1 *Place value, sequences and coordinates* Links to Framework for Mathematics Y6 – B1,B2,B3,D2	• *Count forwards or backwards in steps of integers, decimals or powers of 10 for any number.* • *Describe and extend number sequences including those with multiplication and division steps, inconsistent steps, alternating steps and those where the step size is a decimal.* • Use simple formulae. • Generate and describe linear number sequences. • Describe positions on the full coordinate grid (all four quadrants).	Children link counting in steps of different size to sequences and describe and generate formulae for these sequences. A linear number sequence is one that increases or decreases by the same amount each time. The generalising of sequences is then related to the coordinate grid, where children recognise the values of the vertical and horizontal lines. They apply their knowledge of negative numbers to the second, third and fourth quadrants.
Week 2 *2D shape, coordinates, translation and reflection* Links to Framework for Mathematics Y6 – D2	• Describe positions on the full coordinate grid (all four quadrants). • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	Children combine their understanding of shapes and coordinates. When identifying the coordinates of missing corners of shapes, the coordinate grid should be on plain paper, so children are applying their knowledge of shapes, rather than simply counting squares. When reflecting and translating shapes, children should identify relationships between coordinates of the corners and use these relationships when identifying and checking the coordinates of the transformed shape.
Week 3 *Measurement, temperature and mean* Links to Framework for Mathematics Y6 – A1,A2,A3 C1,C2,C3	• Use negative numbers in context, and calculate intervals across zero. • *Order and compare numbers including integers, decimals and negative numbers.* • Calculate and interpret the mean as an average.	Children use and calculate with negative numbers using the context of temperature (as it is often very cold at this time of year). When ordering numbers from a set of data, they can be introduced to averages. The median could be found once the numbers have been ordered, then leading on to finding the mean, consolidating their addition and division skills.
Week 4 *Calculating with fractions* Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3	• Identify common factors, common multiples and prime numbers. • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. • Multiply simple pairs of proper fractions, writing the answer in its simplest form *(using diagram)* (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$). • Divide proper fractions by whole numbers *(using diagram)* (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$). • Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$).	Children use knowledge of multiplication facts to identify factors and multiples of different numbers. In doing so, they can learn that prime numbers are ones whose only factors are themselves and 1. Children apply their knowledge of common factors to create equivalent fractions in order to compare, order and position on a number line. Children apply their knowledge of common multiples in order to add and subtract fractions with different denominators, by converting to equivalent fractions. When multiplying and dividing fractions, it is essential that children use diagrams and knowledge of multiplication and division of whole numbers to understand the concept of calculating with fractions. Children recognise that fractions, decimals and percentages are all ways of expressing a proportion. Decimals (decimal fractions) are ways of writing fractions in our Base 10 number system, so converting to tenths, hundredths and thousandths is essential understanding.

	Main learning	**Rationale**
Week 5 *Mental and written division* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Divide numbers up to 4 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 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context. • Use written division methods in cases where the answer has up 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).* • Solve problems which require answers to be rounded to specified degrees of accuracy.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. 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 6 *Mental and written multiplication* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication. • Multiply one-digit numbers with up to two decimal places by whole 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 which require answers to be rounded to specified degrees of accuracy. • Enumerate possibilities of combinations of two variables.	Children learn when it is appropriate to use mental and written methods of calculation. Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries. Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers. Children should explore finding all possibilities problems when there are two variables e.g. using the two variables of colour and parts of a house, how many different houses are possible if the walls, roof and door can be either red, blue or yellow. When all combinations have been found, then the children should identify and generalise about the number of combinations and the choices for each variable. 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.

Year 6 Spring 2

<table>
<tr><th>Starter suggestions for Number</th><th>Starter suggestions for Measurement, Geometry and Statistics</th></tr>
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- Know by heart facts for all multiplication tables up to 10 x 10.
- Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1, 10.
- To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1)
- Mentally multiply and divide two-digit and single-digit numbers.
- Use partitioning to double or halve any number.
- Mentally multiply and divide pairs of multiples of 10 and 100.
- Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U).
- Identify the multiples/factors of given numbers.
- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Compare and order two or more different positive and/or negative integers and/or decimal numbers with up to 3 decimal places, say which is the least / greatest; use the symbols <, > and = correctly and place on a number line.
- Calculate differences in temperature, including those that involve a positive and negative temperature.
- Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal.
- Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Multiply and divide whole numbers and decimals 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 three decimal places to the nearest integer or number of decimal places.
- Count in fraction steps (e.g. of $\frac{1}{12}$, i.e. $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}$).

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- Know and use standard metric units of measure.
- Estimate and calculate length (including perimeter), mass, volume/capacity and area.
- Convert between units by multiplying and dividing by powers of 10.
- Know metric and imperial equivalences of feet, inches, pints and pounds.
- Convert between miles and kilometres using knowledge that 5 miles is roughly equivalent to 8km.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Find missing angles and lengths using properties of shape.
- Estimate and identify acute, obtuse and reflex angles.
- Describe positions on the first quadrant of a coordinate grid.
- Solve comparison, sum and difference problems using information presented in all types of graph.
- Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

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<table>
<tr><th></th><th>Main learning</th><th>Rationale</th></tr>
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Week 1
Mental and written addition and subtraction

Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3

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- *Identify, represent and estimate numbers using the number line.*
- *Add and subtract whole numbers and decimals using formal written methods (columnar addition and subtraction).*
- *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 addition and subtraction.
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Use their knowledge of the order of operations to carry out calculations involving the four operations.

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Children learn when it is appropriate to use mental and written methods of calculation.
Children make links with their knowledge of rounding numbers to estimate the answers to calculations. Calculations should be in contexts including, money, measures, real life problems and number enquiries.
Children should also explore missing number problems using algebraic notation, including pairs of numbers to satisfy and equation with two unknowns and generalising the relationship between the two numbers.

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.

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Week 2
Measurement, ratio and proportion

Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3

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- Solve problems involving similar shapes where the scale factor is known or can be found.
- Use, read, write and convert between standard units, converting measurements of length, mass, <mark>volume</mark> and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places.
- Solve problems involving the calculation and conversion of units of measure (including money and time), using decimal notation up to three decimal places where appropriate.
- Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts.
- Solve problems involving the calculation of percentages (for example, of measures, and such as 15% of 360) and the use of percentages for comparison.
- Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

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Children should use the context of measures to solve problems that involve knowledge of scaling up and down by a given scale factor. This should be done in the context of length when looking at shapes that are mathematically similar i.e. the sides are of equal proportion to each other such as a triangle with sides of 2cm, 3cm and 4cm is similar to a triangle of side 4cm, 6cm and 8cm.
Teachers should select from another measures context for children to explore proportion through scaling up and down, and converting between units of measure and using decimal notation.
Children should also consider ratio as unequal sharing and grouping, using real life contexts such as recipes.
Links should also be made with fractions and percentages as ways of describing proportions of amounts.

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Week 3
2D and 3D shape

Links to Framework for Mathematics Y6 – B1,B2,B3,D2

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- Draw 2-D shapes using given dimensions and angles.
- Recognise, describe and build simple 3-D shapes, including making nets.
- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, <mark>quadrilaterals, and regular polygons.</mark>
- *Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).*
- <mark>Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.</mark>
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

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Children gain practical experience of drawing and making shapes, in order to support their work on recognising, describing, comparing and classifying shapes.
It is important that children see and use regular and irregular polygons and polyhedra and experience them in different orientations.
Children's knowledge and understanding of circles is developed through the introduction of new language including radius, diameter and circumference, and understanding the relationships between any of these terms.
Children should discover the angle sum of triangles and quadrilaterals and use this knowledge, and knowledge of the term 'regular' to find missing angles.

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	Main learning	Rationale
Week 4 *Area, perimeter and volume of shapes* Links to Framework for Mathematics Y6 – D1,D3	• Recognise that shapes with the same areas can have different perimeters and vice versa. • Recognise when it is possible to use the formulae for area and volume of shapes. • Calculate the area of parallelograms and triangles. • Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3) and extending to other units (for example, mm^3 and km^3).	Children investigate how shapes of the same area can have different perimeters and vice versa. They relate finding the area of triangles and parallelograms to finding the area of rectangles. Once the area of a given shape has been found, children link this to finding the volume of prisms that have this shape at opposite ends. Children understand volume as 'solid' volume (the amount of three dimensional space occupied by an object) and understand why cubic units are used.
Week 5 *Statistics – line graphs and pie charts* Links to Framework for Mathematics Y6 – D1,D3,C1,C2,C3	• Convert between miles and kilometres. • Interpret and construct pie charts and line graphs and use these to solve problems. • *Solve comparison, sum and difference problems using information presented in all types of graph.*	Children explore line graphs further by creating conversion graphs for miles to kilometres and vice versa. They use this graph to convert between the two units of distance and apply this knowledge to numbers beyond those covered on the graph. Children continue to construct and interpret different graphs and charts, including pie charts, however, the majority of the time should be focused on interpreting the data and solving problems, rather than the construction of graphs and charts.
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 6 Summer 1

Starter suggestions for Number	Starter suggestions for Measurement, Geometry and Statistics
• Know by heart facts for all multiplication tables up to 10 x 10. • Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1, 10. • To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1) • Mentally multiply and divide two-digit and single-digit numbers. • Use partitioning to double or halve any number. • Mentally multiply and divide pairs of multiples of 10 and 100. • Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U). • Identify the multiples/factors of given numbers. • Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents. • Compare and order two or more different positive and/or negative integers and/or decimal numbers with up to 3 decimal places, say which is the least / greatest; use the symbols <, > and = correctly and place on a number line. • Calculate differences in temperature, including those that involve a positive and negative temperature. • Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal. • Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places). • Multiply and divide whole numbers and decimals 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 three decimal places to the nearest integer or number of decimal places. • Count in fraction steps (e.g. of $\frac{1}{12}$, i.e. $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}$).	• Know and use standard metric units of measure. • Estimate and calculate length (including perimeter), mass, volume/capacity and area. • Convert between units by multiplying and dividing by powers of 10. • Know metric and imperial equivalences of feet, inches, pints and pounds. • Convert between miles and kilometres using knowledge that 5 miles is roughly equivalent to 8km. • Read, write and convert between units of time. • Identify and describe properties of 2D and 3D shapes, including regular and irregular. • Find missing angles and lengths using properties of shape. • Estimate and identify acute, obtuse and reflex angles. • Describe positions on the first quadrant of a coordinate grid. • Solve comparison, sum and difference problems using information presented in all types of graph. • Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

	Main learning	Rationale
Week 1 *Place value, decimals and fractions* Links to Framework for Mathematics Y6 – A1,A2,A3,B1 B2,B3,E1,E2,E3	• *Count forwards or backwards in steps of integers, decimals or powers of 10 for any number.* • *Order and compare numbers including integers, decimals and negative numbers.* • *Identify, represent and estimate numbers using the number line.* • *Find 0.001, 0.01, 0.1, 1, 10 and powers of 10 more or less than a given number.* • *Round decimals with three places to the nearest whole number or one or two decimal places.* • Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. • Compare and order fractions, including fractions >1 *(including on a number line)*. • <mark>Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.</mark> • Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$)	Prior to end of year statutory assessments, it is useful to consolidate children's understanding of the number system as a whole and how numbers can be represented in different ways e.g. as precise values, as estimates when rounding, as fractions or decimals, on a number line, as a diagram etc.
Week 2 *Mental and written calculation* Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3	• Perform mental calculations, including with mixed operations and large numbers and decimals. • *Identify, represent and estimate numbers using the number line.* • *Add and subtract whole numbers and decimals using formal written methods (columnar addition and subtraction).* • *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. • Solve problems involving addition, subtraction, multiplication and division. • Use their knowledge of the order of operations to carry out calculations involving the four operations. • Multiply multi-digit numbers up to 4 digits by a two-digit whole number using <mark>the formal written method of long multiplication.</mark> • Divide numbers up to 4 digits by a two-digit whole number using <mark>the formal written method of long division</mark>, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context. • Divide numbers up to 4 digits by a two-digit number using <mark>the formal written method of short division</mark> where appropriate, interpreting remainders according to the context. • Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.	Prior to end of year statutory assessments, it is useful to consolidate children's understanding of calculations across all four operations. Children should continue to learn when it is appropriate to use mental methods and when to use written methods. Problems should be presented in a variety of real life and abstract situations, so children recognise clues that indicate the operation(s) to use. Children should therefore be given examples of mixed problems, rather than problems that are all the same operation. When solving problems, children should be encouraged to express their understanding of the context before trying to solve the problem.

	Main learning	**Rationale**
Week 3 *Calculating fractions, ratio and proportion* Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3	• Multiply simple pairs of proper fractions, writing the answer in its simplest form *(using diagram)* (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$). • Divide proper fractions by whole numbers *(using diagram)* (e.g. $\frac{1}{3} \times 2 = \frac{1}{6}$). • Solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts. • Solve problems involving the calculation of percentages (for example, of measures, and such as 15% of 360) and the use of percentages for comparison. • Solve problems involving similar shapes where the scale factor is known or can be found. • Solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.	Prior to end of year statutory assessments, it is useful for children to apply their knowledge of place value, multiplication and division in the context of fractions, ratio and proportion. When multiplying and dividing fractions, it is essential that children use diagrams and knowledge of multiplication and division of whole numbers to understand the concept of calculating with fractions. Teachers should select from different contexts for children to explore proportion through scaling up and down. Children should also consider ratio as unequal sharing and grouping, using real life contexts such as recipes.
Week 4 *2D shape, coordinates, translation and reflection* Links to Framework for Mathematics Y6 – B1,B2,B3,D2	• Draw 2-D shapes using given dimensions and angles. • Describe positions on the full coordinate grid (all four quadrants). • Draw and translate simple shapes on the coordinate plane, and reflect them in the axes.	Children combine their understanding of shapes and coordinates. When identifying the coordinates of missing corners of shapes, the coordinate grid should be on plain paper, so children are applying their knowledge of shapes, rather than simply counting squares. When reflecting and translating shapes, children should identify relationships between coordinates of the corners and use these relationships when identifying and checking the coordinates of the transformed shape.
Week 5 *Algebra and sequences* Links to Framework for Mathematics Y6 – B1,B2,B3,D1 D3	• *Describe and extend number sequences including those with multiplication and division steps, inconsistent steps, alternating steps and those where the step size is a decimal.* • Use simple formulae. • Generate and describe linear number sequences. • Convert between miles and kilometres.	Children can use the work from the previous week on to explore relationships between the coordinates of the corners of some 2D shapes, generalise and express relationships using formulae. Children extend their work to generalise, identify and create formulae for linear number sequences, including for use when converting miles to kilometres and vice versa using the knowledge that 5 miles is roughly equivalent to 8km.
Week 6 *Measurement (length and time) and statistics – mean* Links to Framework for Mathematics Y6 – C1,C2,C3,D1, D2,D3	• Solve problems involving the calculation and conversion of units of measure (including money and time), using decimal notation up to three decimal places where appropriate. • Use, read, write and convert between standard units, converting measurements of length and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places. • Calculate and interpret the mean as an average. • *Solve comparison, sum and difference problems using information presented in all types of graph.*	Children should use their performance in PE (athletics) to generate length and time measurements, for jumping, throwing and running. These measurements can be used to explore converting units of measure; scaling up and down; finding the mean measurement of a given selection; presenting data in different ways; solving problems when interpreting graphs presented in different ways.

Year 6 Summer 2

<table>
<tr><th>Starter suggestions for Number</th><th>Starter suggestions for Measurement, Geometry and Statistics</th></tr>
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- Know by heart facts for all multiplication tables up to 10 x 10.
- Find pairs of numbers with a sum of 100, decimals with a sum of 0.1, 1, 10.
- To derive related facts from those already known (e.g. 4 x 0.8 linked to 4 x 8 or 3 + 7 = 10 linked to 0.3 + 0.7 = 1)
- Mentally multiply and divide two-digit and single-digit numbers.
- Use partitioning to double or halve any number.
- Mentally multiply and divide pairs of multiples of 10 and 100.
- Mentally multiply and divide two-digit decimals by a single digit number, e.g., (U.t x U or U.t ÷ U).
- Identify the multiples/factors of given numbers.
- Read and write any integer and use decimal notation for tenths, hundredths and thousandths and know what each digit represents.
- Compare and order two or more different positive and/or negative integers and/or decimal numbers with up to 3 decimal places, say which is the least / greatest; use the symbols <, > and = correctly and place on a number line.
- Calculate differences in temperature, including those that involve a positive and negative temperature.
- Count forwards and backwards in steps of 0.001, 0.01, 0.1, 1, 10, 100, 1000, 25, 2.5, 0.2, 0.25 from any positive or negative integer or decimal.
- Recall and use addition and subtraction facts for 1 (with decimal numbers to two decimal places).
- Multiply and divide whole numbers and decimals 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 three decimal places to the nearest integer or number of decimal places.
- Count in fraction steps (e.g. of $\frac{1}{12}$, i.e. $\frac{1}{12}, \frac{1}{6}, \frac{1}{4}, \frac{1}{3}, \frac{5}{12}, \frac{1}{2}$).

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- Know and use standard metric units of measure.
- Estimate and calculate length (including perimeter), mass, volume/capacity and area.
- Convert between units by multiplying and dividing by powers of 10.
- Know metric and imperial equivalences of feet, inches, pints and pounds.
- Convert between miles and kilometres using knowledge that 5 miles is roughly equivalent to 8km.
- Read, write and convert between units of time.
- Identify and describe properties of 2D and 3D shapes, including regular and irregular.
- Find missing angles and lengths using properties of shape.
- Estimate and identify acute, obtuse and reflex angles.
- Describe positions on the first quadrant of a coordinate grid.
- Solve comparison, sum and difference problems using information presented in all types of graph.
- Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).

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<tr><th></th><th>Main learning</th><th>Rationale</th></tr>
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Week 1
Measurement – mass and volume/capacity

Links to Framework for Mathematics Y6 – C1,C2,C3,D1 D2,D3

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- Solve problems involving the calculation and conversion of units of measure (including money and time), using decimal notation up to three decimal places where appropriate.
- Use, read, write and convert between standard units, converting measurements of mass and volume from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places.
- Calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm³) and cubic metres (m³) and extending to other units (for example, mm³ and km³).

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Children should continue to work practically with the concepts of mass and volume, enhancing their understanding of both measures, including gaining a 'benchmark' measure to support estimation, as well as being able to accurately measure using different equipment and converting between units. When converting between units, children should relate this to their understanding of the Base 10 number system.

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Week 2
Mental and written calculations

Links to Framework for Mathematics Y6 – A1,A2,A3,D1 D2,D3,E1,E3

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- Perform mental calculations, including with mixed operations and large numbers and decimals.
- *Add and subtract whole numbers and decimals using formal written methods (columnar addition and subtraction).*
- *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.
- Solve problems involving addition, subtraction, multiplication and division.
- Use their knowledge of the order of operations to carry out calculations involving the four operations.
- Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication.
- Divide numbers up to 4 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 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.
- Use estimation and inverse to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

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During this final half term it is important that the children continue to consolidate and refine their calculation skills so that they are secure before transition to secondary school.

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	Main learning	**Rationale**
Week 3 *Fractions* Links to Framework for Mathematics Y6 – A1,A2,A3,E1 E2,E3	• Use common factors to simplify fractions; use common multiples to express fractions in the same denomination. • Compare and order fractions, including fractions >1 *(including on a number line)*. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions. • Multiply simple pairs of proper fractions, writing the answer in its simplest form *(using diagram)* (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$). • Divide proper fractions by whole numbers *(using diagram)* (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$).	During this final half term it is important that the children continue to consolidate and refine their understanding of and skills related to fractions so that they are secure before transition to secondary school.
Week 4 *Place value and decimals* Links to Framework for Mathematics Y6 – A1,A2,A3,B1, B2,B3	• *Count forwards or backwards in steps of integers, decimals or powers of 10 for any number.* • *Order and compare numbers including integers, decimals and negative numbers.* • *Calculate differences in temperature, including those that involve a positive and negative temperature.* • *Find 0.001, 0.01, 0.1, 1, 10 and powers of 10 more or less than a given number.* • *Round decimals with three places to the nearest whole number or one or two decimal places.* • *Describe and extend number sequences including those with multiplication and division steps, inconsistent steps, alternating steps and those where the step size is a decimal.*	During this final half term it is important that the children continue to consolidate and refine their understanding of the structure of the number system so that they are secure before transition to secondary school.
Week 5 *2D and 3D shape* Links to Framework for Mathematics Y6 – B1,B2,B3,D2	• Draw 2-D shapes using given dimensions and angles. • Recognise, describe and build simple 3-D shapes, including making nets. • Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons. • *Continue to complete and interpret information in a variety of sorting diagrams (including those used to sort properties of numbers and shapes).* • Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius. • Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.	Children gain practical experience of drawing and making shapes, in order to support their work on recognising, describing, comparing and classifying shapes. It is important that children see and use regular and irregular polygons and polyhedra and experience them in different orientations. Children's knowledge and understanding of circles is developed through the introduction of new language including radius, diameter and circumference, and understanding the relationships between any of these terms. Children should discover the angle sum of triangles and quadrilaterals and use this knowledge, and knowledge of the term 'regular' to find missing angles.
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 6 programme of study

Number – number and place value

Statutory requirements

Pupils should be taught to:
- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit;
- round any whole number to a required degree of accuracy;
- use negative numbers in context, and calculate intervals across zero;
- solve number and practical problems that involve all of the above.

Notes and guidance (non-statutory)
Pupils use the whole number system, including saying, reading and writing numbers accurately.

Number – addition, subtraction, multiplication and division

Statutory requirements

Pupils should be taught to:
- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication;
- divide numbers up to 4 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 4 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;
- identify common factors, common multiples and prime numbers;
- use their knowledge of the order of operations to carry out calculations involving the four operations;
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why;
- solve problems involving addition, subtraction, multiplication and division;
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

Notes and guidance (non-statutory)
Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division (see Mathematics Appendix 1).

They undertake mental calculations with increasingly large numbers and more complex calculations.

Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.

Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.

Common factors can be related to finding equivalent fractions.

Number – fractions (including decimals and percentages)

Statutory requirements

Pupils should be taught to:

- use common factors to simplify fractions; use common multiples to express fractions in the same denomination;
- compare and order fractions, including fractions > 1;
- add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions;
- multiply simple pairs of proper fractions, writing the answer in its simplest form [for example, $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$];
- divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$;
- associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$];
- identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places;
- multiply one-digit numbers with up to two decimal places by whole numbers;
- use written division methods in cases where the answer has up to two decimal places;
- solve problems which require answers to be rounded to specified degrees of accuracy;
- recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.

Notes and guidance (non-statutory)

Pupils should practise, use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. They should start with fractions where the denominator of one fraction is a multiple of the other (for example, $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$) and progress to varied and increasingly complex problems.

Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle.

Pupils use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if $\frac{1}{4}$ of a length is 36cm, then the whole length is 36 × 4 = 144cm).

They practise calculations with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators.

Pupils can explore and make conjectures about converting a simple fraction to a decimal fraction (for example, 3 ÷ 8 = 0.375). For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context. Pupils multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Pupils multiply decimals by whole numbers, starting with the simplest cases, such as 0.4 × 2 = 0.8, and in practical contexts, such as measures and money.

Pupils are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.

Pupils also develop their skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.

Ratio and proportion

Statutory requirements

Pupils should be taught to:
- solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts;
- solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison;
- solve problems involving similar shapes where the scale factor is known or can be found;
- solve problems involving unequal sharing and grouping using knowledge of fractions and multiples.

Notes and guidance (non-statutory)

Pupils recognise proportionality in contexts when the relations between quantities are in the same ratio (for example, similar shapes and recipes).

Pupils link percentages or 360° to calculating angles of pie charts.

Pupils should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. They might use the notation *a:b* to record their work.

Pupils solve problems involving unequal quantities, for example, 'for every egg you need three spoonfuls of flour', '$\frac{3}{5}$ of the class are boys'. These problems are the foundation for later formal approaches to ratio and proportion.

Algebra

Statutory requirements

Pupils should be taught to:
- use simple formulae;
- generate and describe linear number sequences;
- express missing number problems algebraically;
- find pairs of numbers that satisfy an equation with two unknowns;
- enumerate possibilities of combinations of two variables.

Notes and guidance (non-statutory)

Pupils should be introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as:
- missing numbers, lengths, coordinates and angles;
- formulae in mathematics and science;
- equivalent expressions (for example, *a + b = b + a*);
- generalisations of number patterns;
- number puzzles (for example, what two numbers can add up to).

Measurement

Statutory requirements

Pupils should be taught to:
- solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate;
- use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places;
- convert between miles and kilometres;
- recognise that shapes with the same areas can have different perimeters and vice versa;
- recognise when it is possible to use formulae for area and volume of shapes;
- calculate the area of parallelograms and triangles;
- calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm^3) and cubic metres (m^3), and extending to other units [for example, mm^3 and km^3].

Notes and guidance (non-statutory)

Pupils connect conversion (for example, from kilometres to miles) to a graphical representation as preparation for understanding linear/proportional graphs.

They know approximate conversions and are able to tell if an answer is sensible.

Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature.
They relate the area of rectangles to parallelograms and triangles, for example, by dissection, and calculate their areas, understanding and using the formulae (in words or symbols) to do this.

Pupils could be introduced to compound units for speed, such as miles per hour, and apply their knowledge in science or other subjects as appropriate.

Geometry – properties of shapes

Statutory requirements

Pupils should be taught to:
- draw 2-D shapes using given dimensions and angles;
- recognise, describe and build simple 3-D shapes, including making nets;
- compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons;
- illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius;
- recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.

Notes and guidance (non-statutory)

Pupils draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles.

Pupils describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.

These relationships might be expressed algebraically for example, $d = 2 \times r$; $a = 180 - (b + c)$.

Geometry – position and direction

Statutory requirements

Pupils should be taught to:
- describe positions on the full coordinate grid (all four quadrants);
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes.

Notes and guidance (non-statutory)

Pupils draw and label a pair of axes in all four quadrants with equal scaling. This extends their knowledge of one quadrant to all four quadrants, including the use of negative numbers.

Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. These might be expressed algebraically for example, translating vertex (a, b) to $(a - 2, b + 3)$; (a, b) and $(a + d, b + d)$ being opposite vertices of a square of side d.

Statistics

Statutory requirements

Pupils should be taught to:
- interpret and construct pie charts and line graphs and use these to solve problems;
- calculate and interpret the mean as an average.

Notes and guidance (non-statutory)

Pupils connect their work on angles, fractions and percentages to the interpretation of pie charts.

Pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects.

They should connect conversion from kilometres to miles in measurement to its graphical representation.

Pupils know when it is appropriate to find the mean of a data set.