Y6 Long Term Plan

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	
Aut.	Number and place Value / Addition and Subtraction		Formal Written Multiplication and Division			Multi. And Div. Patterns	Decimals (including conversion of measures)		Area and Perimeter	Volume	Fractions			Fractions continued / Roman Numerals	
Spr.	Fractions, decimals and percentages		Statistics and Mean Average		Scale Factor and Ratio	Order of Operations	Algebra	Geometry: position and direction	Geometry: properties of shapes		Contingency for overrun of units				
Sum.	Revision and Preparation for SATs			SATs Week	Consolidation of KS2 and Preparation for KS3										

Year 6 Medium Term Plan - Whole Overview 2023 - 2024

Number and Place Value / Addition and Subtraction

NC objectives:

- 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.

Key Vocabulary: numeral, placeholder, integer, multiple, digit, number, multiple, greater than, greatest, less than, more than, ascending, descending, increase, decrease, partition, negative, positive.

Each step below is not one lesson or one learning target. Breakdown steps into smaller learning targets, with one learning target per lesson. Use White Rose tasks where they fit alongside other appropriate tasks.

Revision LTs: revise written methods for the four operations as prior assessment for the calculation unit to assess starting point , Roman Numerals

Mini starters / prior learning required to achieve objective as a reminder: read, write and compare and order numbers up to 1,000,000 using equality and inequalities; counting forwards and backwards in 10s, 100s, 1000s, 5s, 50s using counting stick (including into negative numbers), class chanting, counting orchestra etc.; revise 10, 100, 1000, 10,000, 100,000 more or less.

Spine 1.30: Composition and Calculation – numbers up to 10,000,000

Building on segment 1.26, explore six-digit numbers that are not whole thousands, and then extend to seven-digit numbers; apply additive facts and strategies, including column algorithms, and rounding to these numbers.

1. **Spine 1.30 Teaching point 1** – Patterns seen in other powers of ten can be extended to the unit 1,000,000.

2. **Spine 1.30 Teaching point 2** – Seven-digit numbers can be written, read and ordered by identifying the number of millions, the number of thousands and the number of hundreds, tens and ones.
3. **Spine 1.30 Teaching point 3** – The digits in a number indicate its structure so it can be composed and decomposed.
4. **Spine 1.30 Teaching point 4** – Knowledge of crossing thousands boundaries can be used to work to and across millions boundaries.
5. **Spine 1.30 Teaching point 5** – Sometimes numbers are rounded as approximations to eliminate an unnecessary level of detail; rounded numbers are also used to give an estimate or average. At other times, precise readings are useful.
6. Recap formal written method for addition (column addition), especially with numbers with a different number of decimals and decimal places
7. Recap formal written method for subtraction (column subtraction), especially with numbers with a different number of decimals and decimal places
8. **Spine 1.30 Teaching point 6** – Fluent calculation requires the flexibility to move between mental and written methods according to the specific numbers in a calculation.
9. Recap mental additive facts and strategies. Use spine 1.18 and calculation policy to support with strategies children should know. Spend multiple lessons revising and extending the 'make 10 / 100 / 1000', redistribution, compensating and adjusting, same difference and small difference methods to larger numbers.
10. Solving a range of multi-step problems involving a combination of addition and subtraction (including decimals) with contexts such as time, measure and money.

Formal Written Multiplication and Division

The children have been taught the formal methods of short and long multiplication and short and long division. Use the following sessions to ensure that these methods are secure and identify children who will need additional support and CTG groups to work on these methods. Weekly home learning and mini arithmetic test should be used to develop the children's accuracy and efficiency in these methods.

1. Recap the method of short multiplication
2. Recap the method of long multiplication
3. Recap the method of short division

4. Generating unknown times tables using known factors. This is about creating a 'What I Know' list of times tables to support with dividing by 2 digit numbers but using doubling to generate 2x, 4x and 8x the number and then adding on to / subtracting from these to find the missing numbers.
5. Recap the method of long division

Spines 2.23 and 2.24 were taught in Y5. Use these as a starting point to fill any identified gaps. They are shown here for your convenience. You do not need to teach through these progressively again.

Spine 2.23: Multiplication strategies for larger numbers and long multiplication

Develop strategies for multiplying two numbers with two or more digits, including adjusting strategies when multiplying by a power of ten, partitioning followed by multiplication and addition of partial products, and long multiplication.

1. **Spine 2.23 Teaching point 1** – When multiplying two numbers that are multiples of 10, 100 or 1,000, multiply the number of tens, hundreds or thousands and then adjust the product using place value.
2. **Spine 2.23 Teaching point 2** – When multiplying two numbers where one number is a multiple of 10, 100 or 1,000, use short multiplication and adjust the product using place value.
3. **Spine 2.23 Teaching point 3** – Two two-digit numbers can be multiplied by partitioning one of the factors, calculating partial products and then adding these partial products. This method can be extended to multiplication of three-digit numbers by two-digit numbers.
4. **Spine 2.23 Teaching point 4** – 'Long multiplication' is an algorithm involving multiplication, then addition of partial products, which supports multiplication of two numbers with two or more digits.
5. **Spine 2.23 Teaching point 5** – Multiplication where one of the factors is a composite number can be carried out by multiplying one factor and then the other factor.

Spine 2.24: Division: dividing by two-digit divisors

Learn to divide by two-digit divisors, recording calculations using either the short or long division algorithm. Represent remainders in an appropriate way, according to the context, including using the short or long division algorithm to express remainders as decimal fractions.

1. **Spine 2.24 Teaching point 1** – Any two-or three-digit dividend can be divided by a two-digit divisor by skip counting in multiples of the divisor (quotient < 10); these calculations can be recorded using the short or long division algorithms.
2. **Spine 2.24 Teaching point 2** – Any three-or four-digit dividend can be divided by a two-digit divisor using the short or long division algorithms (including quotient ≥ 10).

3. **Spine 2.24 Teaching point 3** – When there is a remainder, the result can be expressed as a whole-number quotient and a whole-number remainder, as a whole-number quotient and a proper-fraction remainder, or as a decimal-fraction quotient.

Multiplication and Division Patterns

Spine 2.25: Using compensation to calculate

Learn how multiplication and division calculations are affected when one element of the calculation is multiplied or divided by a scale factor.

Use Y5 **Spine 2.18: Using equivalence to calculate** to recap concept of the impact of multiplicative increases and decreases within multiplication and division.

Develop efficiency in calculation by using equivalence, through adjusting the factors (in multiplication) and the dividend and divisor (in division).

1. **Spine 2.18 Teaching point 1** – For multiplication, if there is a multiplicative increase to one factor and a corresponding decrease to the other factor, the product stays the same.
2. **Spine 2.18 Teaching point 2** – For division, if there is a multiplicative change to the dividend and a corresponding change to the divisor, the quotient stays the same.
3. **Spine 2.25 Teaching point 1** –. For multiplication, if there is a multiplicative change to one factor, the product changes by the same scale factor.
4. **Spine 2.25 Teaching point 2** – For division, if there is a multiplicative change to the dividend and the divisor remains the same, the quotient changes by the same scale factor.
5. **Spine 2.25 Teaching point 3** – For division, if there is a multiplicative increase to the divisor and the dividend remains the same, the quotient decreases by the same scale factor; if there is a multiplicative decrease to the divisor and the dividend remains the same, the quotient increases by the same scale factor.

Decimals (including conversion of measures)

Spine 2.29: Decimal place-value knowledge, multiplication and division

Develop efficient calculation strategies, and connect knowledge of multiplying and dividing by 10/100/1,000 to understanding of place value, including application to conversion between metric units of measure.

1. **NC objective:** Solve problems which require answers to be rounded to specified degrees of accuracy (including decimals such as money which requires 2 decimal places e.g. £2.50 not £2.5)
2. **Spine 2.29 Teaching point 1** –. To multiply a number by 10/100/1,000, move the digits one/two/three places to the left; to divide a number by 10/100/1,000, move the digits one/two/three places to the right.
3. **Spine 2.29 Teaching point 2** – Measures can be converted from one unit to another using knowledge of multiplication and division by 10/100/1,000.

Application of taught skills:

1. Context based problems requiring a variety of different **mental multiplication and division strategies** (including decimals) in a range of contexts (including money and measures).
2. Context based problems requiring a variety of different **mental and written multiplication and division strategies** (including decimals) in a range of contexts (including money and measures). The difference between this objective and the previous one is that in the previous one children knew a mental method was needed but needed to deduce which one. In this session, this is expanded for the children to have to decide whether a mental or written method is required.

Area and Perimeter

Spine 2.30: Multiplicative contexts: area and perimeter 2

Build on earlier knowledge of area and perimeter. Learn to find the area of parallelograms and triangles by identifying the perpendicular height. Compare areas and perimeters and apply scale factors to side-length, perimeter and area.

See Y4 spine 2.16 (Multiplicative contexts: area and perimeter 1) for prior learning to be recapped / taught.

Use addition and multiplication to solve problems about the perimeter of irregular and regular 2D shapes, and to find the area of rectilinear and composite rectilinear shapes; use division to solve associated inverse problems.

1. Recap perimeter of regular and non-regular polygons.
2. Recap area of rectangles and composite shapes formed of multiple rectangles.

3. **Spine 2.30 Teaching point 1** –. The area of a parallelogram can be calculated by multiplying the base by the perpendicular height; all parallelograms with the same base and perpendicular height will have the same area.
4. **Spine 2.30 Teaching point 2** – The area of a triangle can be calculated by multiplying the base by the perpendicular height and then dividing by two.
5. **Spine 2.30 Teaching point 3** – Shapes with the same area can have different perimeters; shapes with the same perimeter can have different areas.
6. ~~**Spine 2.30 Teaching point 4** – When a shape has been transformed by a scale factor, the perimeter is also transformed by the same scale factor.~~ **This teaching point has been moved to after the teaching of scale factor.**

Volume

<mark>Not covered in Y5 in 22/23</mark>

<mark>Spine 2.20: Multiplication with three factors and volume</mark>

<mark>Use multiplication to calculate the volume of cuboids and shapes comprised of several cuboids; use division to solve associated inverse problems. Use associativity and commutativity to solve abstract multiplication problems with three factors.</mark>

1. <mark>**Spine 2.20 Teaching point 1** – Volume is the amount of space that something occupies.</mark>
2. <mark>**Spine 2.20 Teaching point 2** – Volume is measured in cubic units, such as cubic centimetres (cm^3) and cubic metres(m^3).</mark>
3. <mark>**Spine 2.20 Teaching point 3** – The volume of a cuboid can be calculated by multiplying the length, width and height.</mark>
4. <mark>**Spine 2.20 Teaching point 4** – Both the commutative law and the associative law can be applied when multiplying three or more numbers.</mark>
5. <mark>**Spine 2.20 Teaching point 5** – The choice of which order to multiply in can be made according to the simplest calculation.</mark>

Fractions

NC Objectives:

- 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, $\frac{1}{3} \div 2 = \frac{1}{6}$]

Key vocabulary: numerator, denominator, unit fraction, non-unit fraction, improper, proper, equal parts, quantity, equivalent, divisor, dividend, quotient, greater than, less than, factor, common factor, highest common factor, simplify, common multiples, lowest common multiple

NB: These steps are not one lesson or one learning target. Breakdown steps into smaller learning targets, with one learning target per lesson.

Revision starter questions – common factors and multiples (this is essential to be able to effectively generate equivalent fractions for addition and subtraction).

Start by recapping prior learning, shown in red below. Gaps in many of these skills will already have been identified from mini arithmetic papers.

1. Equivalent fractions
2. Simplify fractions
3. Recap: improper fractions to mixed numbers
4. Mixed numbers to improper fractions
5. Fractions on a number line
6. Compare and order related fractions
7. Compare and order unrelated fractions
8. Add and subtract fractions within 1
9. Add and subtract mixed numbers
10. Find Unit and Non unit fractions of amounts.
11. Mixed addition and subtraction problems
12. Multiplying fractions and mixed number fractions by a whole number

Spine 3.9: Multiplying fractions and dividing fractions by a whole number

1. **Spine 3.9 Teaching point 1** – When a fraction is multiplied by a proper fraction, it makes it smaller. To multiply two fractions, multiply the numerators and multiply the denominators.
2. **Spine 3.9 Teaching point 2** – When a fraction is divided by a whole number, it makers it smaller. To divide a fraction by a whole number, convert it to an equivalent multiplication.
3. **Spine 3.9 Teaching point 3** – A more efficient method can be used to divide a fraction by a whole number when the whole number is a factor of the numerator.

Roman Numerals

(approximately 3 lessons)

1. Read Roman numerals to 20 (I to XX) – Year 3 recap
2. Read Roman numerals to 100 (I to C) – Year 4 recap
3. Read Roman numeral to 1000 (M) and recognise years written in Roman numerals – Year 5 recap

Fractions, Decimals and Percentages

Spine 3.10: Linking fractions, decimals and percentages

This unit starts by linking the previously learnt ways of representing part of a whole (fractions and decimals). It then introduces percentages for the first time, including how to find a percentage of an amount (not covered by the spines). This then leads on to connecting this new learning about percentages to fraction and decimal equivalents.

Year 5 NC Objectives for percentages:

- Recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and write percentages as a fraction with a denominator of 100, and as a decimal
- Solve problems which require knowing percentage and decimal equivalents of ½, ¼, 1/5, 2/5, 4/5, and those with a denominator of a multiple of 10 or 25.

Year 6 NC Objective for percentages:

- Recall and use equivalence between simple fractions, decimals and percentages
- Solve problems involving the calculation of percentages [for example, of measures and such as 15% of 360] and the use of percentages for comparison

1. **Spine 3.10 Teaching point 1** – Some fractions are easily converted to decimals.
2. **Spine 3.10 Teaching point 2** – These fraction-decimal equivalents can be found throughout the number system.
3. **Spine 3.10 Teaching point 3** – Fraction-decimal equivalence can sometimes be used to simplify calculations.
4. **Spine 3.10 Teaching point 4** – '*Percent'* means number of parts per hundred. A percentage can be an operator on a quantity, indicating the proportion of a quantity being considered.
5. **Spine 3.10 Teaching point 5** – Percentages have fraction and decimal equivalents.
6. **Spine 3.10 Teaching point 6** – If the value of a whole is known, a percentage of that number or amount can be calculated.

Statistics

NC objectives:

- Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.
- Interpret and construct pie charts and line graphs and use these to solve problems.
- Calculate the mean as an average.

Key Vocabulary: tally, table, duration, difference, scale, intervals, continuous, discrete, value, x axis, y axis, estimate, radius, circumference, diameter, mean, average, pie chart, frequency

Use White Rose to support with planning and resourcing tasks.

Mini starters / prior learning required to achieve objective as a reminder: tally charts, bar graphs and simple line graphs, addition and subtraction to solve comparison problems, interpreting different scales and that scales have equal intervals, read analogue and digital clocks

Recap Prior Learning:

5. Read and interpret pie charts
6. Pie charts with percentages
7. Draw pie charts – save this until after protractors have been taught

Mean Average

Spine 2.26: Mean average and equal shares

Understand the concept of mean average and learn how to find the mean of a set of data. Use the mean to compare sets of data and learn when it is appropriate to use the mean.

1. **Spine 2.26 Teaching point 1** –. The mean is the size of each part when a quantity is shared equally.
2. **Spine 2.26 Teaching point 2** – The mean is defined as the sum of all the numbers in a set of data divided by the number of numbers/values that make up the set of data. If we know the mean of a set of data and the number of numbers/values in that set, we can calculate the total of the set. The mean of a set changes if the total value of the set changes or if the number of numbers/values in the set changes.
3. **Spine 2.26 Teaching point 3** – The mean can be used to compare data.
4. **Spine 2.26 Teaching point 4** – The mean is not always an appropriate representation of a set of data.

Scale Factor and Ratio

Spine 2.27: Scale factors, ratio and proportional reasoning

Use bar modelling and ratio grids to reason about multiplicative relationships between two or more cardinal quantities, and explore correspondence problems. Extend understanding of scaling measures to make and interpret maps and scale/compare the dimensions of similar shapes.

1. **Spine 2.27 Teaching point 1** –. Multiplication and division can be used to calculate unknown values in correspondence (cardinal comparison) problems.
2. **Spine 2.27 Teaching point 2** – Multiplication and understanding of correspondence can be used to calculate the number of possible combinations of items.
3. **Spine 2.27 Teaching point 3** – Scaling can be used to make and interpret maps.
4. **Spine 2.27 Teaching point 4** – There is a proportional relationship between the dimensions of similar shapes; if the scale factor and the dimensions of one of the shapes is known, the dimensions of the similar shape can be calculated; if the dimensions of both of the shapes are known, the scale factor can be calculated.
5. **Spine 2.30 Teaching point 4** – When a shape has been transformed by a scale factor, the perimeter is also transformed by the same scale factor. **This teaching point has been moved to after the teaching of scale factor from the unit on perimeter.**

Order of Operations

Spine 2.28: Combining division with addition and subtraction

Learn to combine division with addition or subtraction. Teach the use of brackets to change the order of operations. Build on knowledge of the distributive law.

1. Use Y5 spine 2.22 to introduce initial understanding of brackets and order of operations.
   Spine 2.22 Teaching point 1 – Multiplication can be combined with addition and subtraction; when there are no brackets, multiplication is completed before addition or subtraction; when there are brackets, the calculation within the brackets is completed first.
2. **Spine 2.28 Teaching point 1** –. Division can be combined with addition and subtraction; when there are no brackets, division is completed before addition or subtraction; when there are brackets, the calculation within the brackets is completed first.
3. **Spine 2.28 Teaching point 2** – When adding or subtracting division expressions that have a common divisor, the distributive law can be applied.
4. The order in which different operations are completed is fixed within maths and can be remembered with the acronym: BIDMAS

5. Four 4s investigation to apply BIDMAS understanding. Children to try and make the numbers from 1 – 20 using four of the digit 4 and any operations. Brackets can be used to determine the order of certain operations.

Algebra

Spine 1.31: Problems with Two Unknowns

Equip children with strategies for solving problems with two unknowns, including using the bar model to represent relationships between known numbers, and working systematically.

1. **Spine 1.30 Teaching point 1** – Problems with two unknowns can have one solution or more than one solution (or no solution). A relationship between the two unknowns can be described in different ways, including additively and multiplicatively.
2. **Spine 1.30 Teaching point 2** – Model drawing can be used to expose the structure of problems with two unknowns.
3. **Spine 1.30 Teaching point 3** – A problem with two unknowns has only one solution if the sum of the two unknowns and the difference between them is given ('sum-and-difference problems') or if the sum of the two unknowns and a multiplicative relationship between them is given ('sum-and-multiple problems').
4. **Spine 1.30 Teaching point 4** – Other problems with two unknowns have only one solution.
5. **Spine 1.30 Teaching point 5** – Some problems with two unknowns can't easily be solved using model drawing but can be solved by a 'trial-and-improvement' approach; these problems may have one solution, several solutions or an infinite number of solutions.

Geometry: Position and Direction

NC Objectives:

- describe positions on the full coordinate grid (all 4 quadrants)
- draw and translate simple shapes on the coordinate plane, and reflect them in the axes

Key vocabulary: translate, quadrant, co-ordinate, reflection, symmetry, symmetrical, x-axis, y-axis

NB: These steps are not one lesson or one learning target. Breakdown steps into smaller learning targets, with one learning target per lesson.

Use White Rose to support with planning and resourcing tasks.

1. The first quadrant
2. Four quadrants
3. Translations
4. Reflections without co-ordinates
5. Reflections on co-ordinates

Geometry: Properties of Shapes

NC objectives:

- Draw 2-D shapes using given dimensions and angles.
- Compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals and regular polygons.
- Recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles.
- Illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius.
- Recognise, describe and build simple 3-D shapes, including making nets.

Key Vocabulary: acute, obtuse, angle, polygon, isosceles, scalene, right angle, equilateral triangle, straight line, quadrilateral, regular shape, irregular shape, square, rectangle, rhombus, trapezium, kite, parallelogram, pentagon, hexagon, heptagon, octagon, parallel, perpendicular, vertex, sides, symmetry, symmetrical, properties, horizontal, vertical, diagonal lines, 2-D, 3-Dimensional, polyhedron, faces, edges, vertices,3-D shape names, planes, elevation, radius, diameter, circumference.

Use White Rose to support with planning and resourcing tasks.

1. Measuring with a protractor
2. Drawing angles and shapes with a protractor
3. <mark>Draw pie charts – moved from earlier statistics unit. This will serve as a recap of percentages.</mark>
4. Recap: types of triangles and their properties
5. Calculating angles within triangles

6. Calculating angles on a straight
7. Recap: types of quadrilaterals and their properties
8. Calculating angles within quadrilaterals
9. Calculating angles around a point
10. Vertically opposite angles
11. Properties of 3-D shapes –describe the properties of pyramids, prisms and other 3-D shapes
12. Draw and explore building nets of 3-D shapes
13. Mini Assessment