Mathematics Teaching sequence – Year 6

Children should engage with appropriate number and practical problems **throughout each topic**.

Statements highlighted in yellow have been identified as 'ready to progress' objectives: key concepts which are essential building blocks for the next steps in learning. These objectives must be embedded across the year so that children are fluent.
Resources to support teaching of these specific objectives can be found here:
https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1017683/Maths_guidance_KS_1_and_2.pdf
https://www.ncetm.org.uk/classroom-resources/exemplification-of-ready-to-progress-criteria/

Year 6	**Key vocab for topic**
Autumn Term	
Number and Place value (2 weeks) • Determine the place value of each digit in numbers, including up to 10,000,000 including representing/partitioning numbers in different ways e.g. part-whole, number line). • Count forwards and backwards in powers of 10 for numbers up to 1,000,000. • Read and write numbers up to 10,000,000. • Reason about the location of any number up to 10 million, comparing and ordering numbers up to 10,000,000. • Understand the relationship between powers of 10 from 1 hundredth to 10 million, and use this to make a given number 10, 100, 1,000, 1 tenth, 1 hundredth or 1 thousandth times the size (multiply and divide by 10, 100 and 1,000). • Round any whole number up to 10,000,000 to any required degree of accuracy. • Use negative numbers in context. • Calculate intervals across zero. **Four operations (2 weeks)** **Include appropriate reasoning using learnt facts/methods throughout, including solving problems with two unknowns e.g. 5 x ? = 8 + ?.** • Solve addition (with crossing the boundary) multi-step problems in contexts, deciding which operations and methods to use and why.	Place value Tens of millions Millions Hundreds of thousands Tens of thousands Thousands Hundreds Tens Ones Place holder Roman numerals Greater than Less than Equals to Ascending Descending Positive Negative Place value vocab, including: *Decimal point* *Tenths* *Hundredths* *Thousandths* Move digits to the right x number of places Move digits to the left x number of places Powers of 10 Multi-step

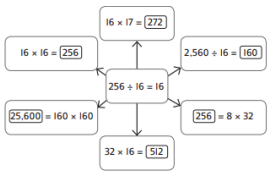
- Solve subtraction (with exchange) multi-step problems in contexts, deciding which operations and methods to use and why.
- Use a given additive calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding)
- Identify common factors and common multiples.
- Recognise prime numbers up to 100.
- Multiply numbers up to 4 digits by a 2-digit number using the formal written method of long multiplication.
- Express relationship between two given numbers additively or multiplicatively; use this representation in reasoning and problem solving e.g. to calculate a missing numbers in measures and statistics contexts.

E.g. Holly has cycled 20km. Lola has cycled 60km. Relationship between the distances can be described additively (L cycled 40km further than H) or multiplicatively (L cycled x3 further).

- 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.
- Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division.
- Interpret remainders of division calculations (based on the context) as whole number remainders, fractions, or by rounding.
- Use written division methods where answers have up to 2 dp.
- Use estimation to check answers to calculations, in the context of a problem, an appropriate degree of accuracy.
- Solve problems, involving the four operations; decide the most appropriate operation.
- Perform calculations, which include mixed operations and large numbers, mentally, reasoning from known facts; use a given multiplicative calculation to derive or complete a related calculation, using arithmetic properties, inverse relationships, and place-value understanding)

e.g. 300 x 60 =1,800

- ÷ 21 → 300 ÷ 3 = 100 then 100 ÷ 7 = 14 r2.



<u>Order of operations (1 week)</u>

- Know that calculations which include mixed operations should be completed in a particular order (brackets, indices, division & multiplication, addition & subtraction):

- Complete multiplication & division before addition & subtraction no matter where it is located in the calculation: 3 + 2 x 7 ***Complete 2 x7 = 14 then 14 +3 = 17***

- Complete operations within brackets of a calculation first:

E.g. 10 – (2 x 3) → 10 – 6 = 4

Addition vocab: sum, totals, altogether, combine, plus, more
Subtraction: finding the difference, minus, less than, left, take away
Crossing the boundary
Exchange
Language associated with multiplication: product, repeated addition, groups/lots of
Language associated with division: share, split equally, equal groups, dividend, divisor, quotient, division bracket

Place value columns
Operations
Most efficient
Mental
Formal (written)
Short multiplication
Long multiplication
Short division
Long division
Remainders
Decimal places
Fractions
Rounding
To the nearest…
Most/least accurate
Estimation
Mixed operations
Known facts
Factor pairs
Common factor
Common multiples
Prime number
Prime factor
Composite number

Fractions (3 weeks) • Know that fractions are simplified to increase efficiency of calculating with fractions. • Recognise when fractions can be simplified and use common factors (of numerator and denominator) to simply. • Know that common multiples are used to express fractions in the same denomination. Use this to compare fractions similar in value: • Identify the lowest common multiple (LCM) of fractions to compare fractions, including fractions >1. • Identify the lowest common multiple (LCM) of fractions to order fractions, including fractions >1. • Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions and identification of LCM. • Add and subtract mixed numbers, choosing the most efficient method according to context e.g. wholes and parts separately or converting to improper fractions. • Multiply proper fractions by whole numbers, writing the answer in its simplest form (supported by concrete resources and diagrams). • Divide proper fractions by whole numbers e.g. $^1/_3 \div 2 = {}^1/_6$ **Percentages (1 week)** • To find percentages of amounts **Statistics – (2 weeks)** • Divide powers of 10, from 1 hundredth to 10 million, into 2, 4, 5 and 10 equal parts, and read scales/number lines with labelled intervals divided into 2, 4, 5 and 10 equal parts. • Know that data can be represented in many ways, including a line graph and pie chart. • Interpret information from a line graph, including solving comparison problems and questions involving the four operations. • Construct line graphs. • Interpret information from a pie chart, including solving comparison problems and questions involving the four operations. • Construct pie charts. • To know that the mean is an average of a data set. • To calculate and interpret the mean by finding the sum of the data set and dividing this total by how many numbers there are (sum divided by count. **Autumn Term review (1 week)**	Simplify Numerator Denominator LCM Mixed numbers Proper fractions Improper fractions Equivalent fractions Line graph Pie chart Data set Interpret Data representation Construct Comparison Four operations Mean Average Sum Divide
Spring Term **FDP (2 weeks)** • Identify the value of each digit in numbers given to three decimal places.	Parts Whole Denominator Numerator Unit fraction Non-unit fraction

• Multiply numbers by multiples of 10, giving answers up to three decimal places. • Divide numbers by multiples of 10, giving answers up to three decimal places. • Multiply 1-digit numbers (with up to two decimal places) by whole numbers. • Recall and use equivalences between simple fractions, decimals and percentages in different contexts. • Associate fractions with division to calculate equivalences e.g. (0.375 = $\frac{3}{8}$) • Solve problems which require answers (with up to 2 decimal places) to be rounded to specified degrees of accuracy. • Use equivalences between simple fractions, decimals and percentages ($\frac{1}{2}, \frac{1}{4}, \frac{1}{5}, \frac{2}{5}, \frac{4}{5}$ and fractions with denominator of a multiple of 10 and 25), including in different contexts. E.g. 25% of £36 = finding ¼ of £36. • Find missing values with percentages e.g. 50% of ? 3.75. Calculate by applying multiplication of decimals (3.75 x 2) • Convert fractions to percentages. • Use percentages to make comparisons. **<u>Measurement– metric and imperial measures (2 weeks)</u>** • Recognise and decide to use the most appropriate unit of measure, according to what is being measured. • Use, read, write and convert between standard units of measure: • Know that to compare measurements, first convert them into the same unit of measure. • Convert between metric units of measure e.g. length, mass, capacity and time, applying knowledge of what one unit is worth. • Multiply to convert from a larger to smaller unit of measure, including using decimal notation up to 3 d.p. • Divide to convert from a smaller to larger unit of measure, including using decimal notation to 3 d.p. • Know that you can convert between metric and imperial units of measure, and between imperial – imperial e.g. 12 inches = 1 foot. • Know that miles = an imperial unit of measure used to measure long distances. • Know that 8 km = 5 miles to convert between kilometres and miles (metric and imperial respectively). • Convert between imperial and metric units using approximate equivalences e.g. 1 pint 550ml. ≈ **<u>Measurement (1.5 weeks) – perimeter and area</u>**	Simplifying Equivalent Vinculum (fraction line) Specified degrees of accuracy Associate fraction line with division Mixed numbers Proper fractions Improper fractions Convert Greater than 1 Multiples Common denominator Lowest common multiple Highest common multiple Operator Scaling Per cent Out of 100 Multiples Same unit of measure Compare/Convert Metric Length Millimetres/Centimetres Metres/Kilometres Mass Grams/Kilograms Capacity Litres Millilitres Four operations Decimal notation Money Scaling Estimate Non-standard Imperial units Approximate Inch Feet Pounds Gallon Pints Kilometres/Miles Formulae

• Identify shapes with the same and different perimeters. • Identify shapes with the same and different areas. • Recognise when it is possible to use the formulae for the area of shapes. • Recognise that shapes can have different perimeters and the same area. • Recognise that shapes with the same areas can have different perimeters. • Know that a parallelogram is a 2D quadrilateral with opposite sides are parallel and equal in length. • Know that the perpendicular height is the distance from the base to the top of the shape. • Calculate area of a parallelogram using base x perpendicular height. • Know that area of a triangle can be calculated using number of squares (non-standard unit of measure). • Calculate area of a triangle using the formula: $\frac{base\ x\ height}{2}$ • Know that volume is the amount of space a solid shape takes up and that it is often measured in cubic centimetres (cm^3). • Recognise when it is possible to use formulae for calculating volume of shapes. • Calculate volume of a cuboid using formula length x width x height. • Estimate and compare volume of cubes and cuboids using standard units, including centimetre cubed (cm^3) and cubic metres (m^3), and extending to other units [eg: mm^3 and km^3]. **Review – 1 week** **Ratio and proportion (1 week)** • Know that ratio compares two or more parts of a whole e.g. for every adult there are three children. • Know that : represents 'to' in ratio e.g. 1:3 • Use ratio to express relationships. • Solve problems involving ratio relationships: -the relative sizes of two quantities, where missing values can be found by using integer multiplication and division facts. -unequal sharing and grouping using knowledge of fractions and multiples. • Solve problems involving the calculation of percentages [eg: of measures such as 15% of 360] and the use of percentages for comparison. • Solve problem involving similar shapes where the scale factor is known or can be found **Geometry – angles & properties of shapes (2 weeks)** • Use knowledge of shape properties and angles to classify shapes	Perimeter 2D shape Shape properties Parallel sides Equal sides Sum of sides/lengths Standard measurement units: centimetres, metres. Composite, rectilinear shapes Compound shapes Non-standard units: squares, half squares Square centimetres (cm^2) Square metres (m^2) Area Area of a rectangle = Base x Height Area of a triangle Perpendicular height Estimate Parallelogram Volume Cubic centimetres Cubic metres Cuboid Cubes Parts Whole Ratio Integer Relative sizes Quantities Relationships Unequal sharing Equal sharing Percentages Compare Scale factor Shape properties Angles

E.g. Equilateral triangles (regular polygon); isosceles triangles (2 equal angles; 2 equal sides) Sum of interior angles in a quadrilateral is 360^o; parallelograms have opposite angles that are equal; a trapezium has one pair of parallel sides. • Compare geometric shapes based on their properties and sizes. • Accurately measure and draw angles using a protractor. • Draw 2D shapes accurately using given properties e.g. dimensions, area and angles. • Know that the sum of angles in a triangle = 180^o; quadrilateral = 360^o. • Using given angles, calculate unknown angles in any triangles, quadrilaterals and any other regular polygons. • Recognise angles where they meet at a point, on a straight line, or are vertically opposite. • Calculate missing angles from given angles, applying knowledge of e.g. angles on a straight line (180^o), angles around a point (360^o) and opposite angles (equal). • Name parts of a circle: radius, diameter and circumference. 1. Know that radius is a straight line from the centre to the circumference of a circle. 2. Know that the diameter of a circle is the distance from one side of a circle to the other through the centre. 3. Know that the diameter is twice the radius. 4. Know that the circumference is the distance around the circle. • Illustrate parts of a circle using given measurements e.g. calculate the radius when given the diameter (÷2). **Review & assess – 3 weeks.**	Classify Equivalences Regular polygon Isosceles triangles Equal angles Equal sides Sum Interior angles Opposite angles Trapezium Protractor Measure Draw Dimensions Degrees Quadrilateral Unknown angles Angles at a point Straight line Vertically opposite Opposite angles equal Circle Radius Diameter Circumference Straight line Twice Distance Illustrate
Summer Term	
Algebra (2 weeks) • Know that algebra can involve using letters to represent a value we do not know for certain or that can change. • Find and write algebraic rules using given information. • Express missing number problems algebraically e.g. write algebraic expressions 5 x n as 5n. • Use simple formulae to calculate missing values. • Know that when a specific value is given for n, substitute the value for n into the rule. E.g. n = 13 so 5n = 5 x 13 =65. • Generate and describe linear number sequences. • Find pairs of numbers that satisfy an equation with two unknowns. • Enumerate possibilities of combinations of two variables. **Revision of content (2 weeks)**	Algebra Letters Value Algebraic rules Substitute Expressions Formulae N = number Linear number sequences Equation Variables

SATS week (1 week) **Co-ordinates (2 weeks)** • Know that a co-ordinate grid has four quadrants. • Recognise that co-ordinates describe the position of a point on a grid. • Know that co-ordinates have positive and negative values. • Know that two quadrants on the co-ordinate grid have negative numbers on one or both of the X or Y axes. • Know that points on a co-ordinate grid are described and plotted in the format (x, y). • Describe positions on the full co-ordinate grid (all four quadrants). • Know that the first number (x) counts along the x-axis and the second number (y) counts up/down the y-axis. • Plot co-ordinates on all four quadrants. • Draw shapes, by plotting points, on a co-ordinate grid and apply knowledge of 2-D shape properties to identify the shape. • Translate simple shapes on the co-ordinate plane by plotting the co-ordinates of the translated shape. • Reflect simple shapes in the axes by plotting the co-ordinates of the reflected shape. • Read translations and reflections on a co-ordinate grid.	Quadrants Co-ordinates Position Grid Plot data X axis Y axis Translate Reflect
Residential (1 week) **Geometry – 3D shapes (1 week)** • Recognise and describe 3-D shapes. • Build simple 3D shapes, including making nets of 3D shapes. • Know a net is a 3D shape opened out flat. **4 weeks assess and review with application of skills in all content areas.**	3D shapes Vertices Edges Faces Nets Flat Curved Regular polygons Equal length sides Parallel lines Perpendicular lines Cubes Cuboids