Maths Long Term Plan – Year 6

Year 6 Maths	
National Curriculum Objectives Year 6	Key Links
The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio. At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them. By the end of year 6, pupils should be fluent in written methods for all four operations, including long multiplication and division, and in working with fractions, decimals and percentages. Pupils should read, spell and pronounce mathematical vocabulary correctly.	Year 6– White Rose Maths Maths Guidance Year 6 (Gov.uk) Mathematics Programmes of Study: Key Stage 1 and 2 (Gov.uk)

Topics		N.C Objectives	Small Steps	Key Vocabulary
Autumn 1	Number: Number and Place Value	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.	• Numbers to ten million • compare and order and number • round any number • negative numbers	ones (1s), tens (10s), hundreds (100s), thousands (1,000s), ten thousands (10,000s), hundred thousands (100,000s), millions (1,000,000s), ten million (10,000,000) place value partition/partition ed/partitioning interval estimate compare/comparison/comparing order/ordering less than (<), greater than (>), equal to (=) rounding/rounded/ round up/round down/rounds negative, positive odd, even accurate/accurately, exactly, approximately

<u>Maths Progression:</u>

Year 4:

- count in multiples of 6, 7, 9, 25 and 1000
- find 1000 more or less than a given number
- count backwards through zero to include negative numbers
- recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
- order and compare numbers beyond 1000
- identify, represent and estimate numbers using different representations
- round any number to the nearest 10, 100 or 1000
- solve number and practical problems that involve all of the above and with increasingly large positive numbers.
- read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value

Year 5:

- 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
- interpret negative numbers in context, and calculate intervals across zero
- solve number and practical problems that involve all of the above.
- read Roman numerals to 1000 (M) and recognise years written in Roman numerals.

Topics		N.C Objectives	Small Steps	Key Vocabulary
Autumn 1 and Autumn 2	Addition, Subtraction, Multiplication and Division	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 • 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.	• Add and subtract integers • multiply up to 4-digit number by 2-digit number • short division • division using factors • long division • common factors • common multiples • primes to 100 • squares and cubes • order of operations • mental calculations and estimation • reason from known facts	add, subtract, sum, total, difference method, column, columnar, multiply, multiplication, product, approximation divide, division, short division, long division factor, multiple, divisor, dividend,

<u>Maths Progression:</u>

Year 5:

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Topics		N.C Objectives	Small Steps	Key Vocabulary
Autumn 2	Fractions	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, 1/4 × 1/2 = 1/8] • divide proper fractions by whole numbers [for example, 1/3 ÷ 2 = 1/6] • associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, 3/8] • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts.	• simplify fractions • fractions on a number line • compare and order (denominator) • compare and order (numerator) • add and subtract fractions • add fractions • subtract fractions • mixed addition and subtraction • multiply fractions by integers • multiply fractions by fractions • divide fractions by integers • four rules with fractions • fraction of an amount • fraction of an amount - find the whole	whole, part numerator, denominator, common denominator equivalent simplify, simplest form factor, highest common factor, lowest common multiple compare, order, ascending, descending, less than, greater than, proper fraction, improper fraction, mixed number, convert

<u>Maths Progression:</u>

Year 5: (fractions)

- compare and order fractions whose denominators are all multiples of the same number
- identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (for example, 2/5 + 4/5 = 6/5 = 1 and 1/5)
- add and subtract fractions with the same denominator and denominators that are multiples of the same number
- multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- read and write decimal numbers as fractions [for example, 0.71 = 71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred'
- write percentages as a fraction with denominator 100, and as a decimal
- solve problems which require knowing percentage and decimal equivalents of 1/2 , 1/4 , 1/5, 2/5 , 4/5 and those fractions with a denominator of a multiple of 10 or 25.

Topics		N.C Objectives	Small Steps	Key Vocabulary
Autumn 2/Spring 1	Position and Direction	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.	• the first quadrant • four quadrants • translations • reflections	plotting, coordinates, quadrant, point, axis, x-axis, y-axis, grid, x-coordinate, y-coordinate vertices, vertex, square, side, rectangle, triangle, equilateral, oblong, shape, irregular, hexagon, identical, similar, parallelogram perimeter, metre (m), distance, length, long horizontal, vertical halfway,
	Properties of Shapes	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.	• measure with a protractor • introduce angles • calculate angles • vertically opposite angles • angles in a triangle • angles in a triangle - special cases • angles in a triangle - missing angles • angles in special quadrilaterals • angles in regular polygons • draw shapes accurately • draw nets of 3D shapes	line, properties, value, reason negative, positive translation, reflection, original, down, up, right, mirror, away, diagonal degrees, measurement, length angle, obtuse, acute, reflex, right angle, interior protractor, baseline, crosshairs, scale vertex, edge, face parallel properties triangle, isosceles, equilateral, scalene regular, polygon, quadrilateral, parallelogram, kite, rhombus, trapezium diameter, radius, circumference, concentric, centre perimeter pyramid, tetrahedron, cylinder, prism, cuboid, cube

<u>Maths Progression:</u>

Year 5:

- identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed.
- identify 3-D shapes, including cubes and other cuboids, from 2-D representations
- know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- draw given angles, and measure them in degrees
- identify: angles at a point and one whole turn (total 360o) angles at a point on a straight line and 1/2 a turn (total 180o) other multiples of 90o
- use the properties of rectangles to deduce related facts and find missing lengths and angles
- distinguish between regular and irregular polygons based on reasoning about equal sides and angles.

Topics		N.C Objectives	Small Steps	Key Vocabulary
Spring 1/2	Measure: Converting Units Measurement: Perimeter, Area and Volume	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 (cm3) and cubic metres (m3), and extending to other units [for example, mm3 and km3].	• metric measures • convert metric measures • calculate with metric measures • miles and kilometres • imperial measures • Shapes - same area • area and perimeter • area of triangle • area of parallelogram • volume - counting cubes • volume of a cuboid	units (of measure/ment), metric, imperial, length, mass, volume, capacity, distance measure, convert, equal, equivalent, approximate, smaller (unit), larger (unit), for every, ratio millimetres (mm), centimetres (cm), metres (m), kilometres (km), grams (g), kilograms (kg), millilitres (ml), litres (l) inches (in), feet ( ), ounces (oz), pounds (lbs), pints, miles, gallons, yards digits, decimal conversion table, conversion graph. perimeter, distance, area, space, volume centimetres (cm), metres (m), square centimetres (cm2), square metres (m2), cubic centimetres (cm3), cubic metres

				(m3) rectangle, square, triangle, rectilinear shape, sides, length, width, parallelogram, cube, cuboid measure, combine, total,

Maths Progression:

Year 5:

- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres
- calculate and compare the area of rectangles (including squares), and including using standard units, square centimetres (cm2) and square metres (m2) and estimate the area of irregular shapes
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
- convert between different units of metric measure (for example, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre)
- understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints
- solve problems involving converting between units of time
- use all four operations to solve problems involving measure [for example, length, mass, volume, money] using decimal notation, including scaling.
- estimate volume [for example, using 1 cm3 blocks to build cuboids (including cubes)] and capacity [for example, using water]

Topics		N.C Objectives	Small Steps	Key Vocabulary
Spring 1/Spring 2	Number: Decimals	Pupils should be taught to: • 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	• three decimal places • multiply by 10, 100 and 1,000 • divide by 10, 100 and 1,000 • multiply decimals by integers • divide decimals by integers • division to solve problems • decimals as fractions • fractions to decimals	multiply (×), divide (÷) decimal placeholder place value, tenths, hundredths, thousandths factor, multiple, product group, share numerator, denominator convert, simplify, equivalent

		• recall and use equivalences between simple fractions, decimals and percentages, including in different contexts		divisor, dividend, quotient, remainder

Maths Progression:

Year 5:

- read and write decimal numbers as fractions [for example, 0.71 = 71/100]
- recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents
- round decimals with two decimal places to the nearest whole number and to one decimal place
- read, write, order and compare numbers with up to three decimal places
- solve problems involving number up to three decimal places
- solve problems which require knowing percentage and decimal equivalents of 1/2, 1/4 , 1/5, 2/5 , 4/5 and those fractions with a denominator of a multiple of 10 or 25.

Topics		N.C Objectives	Small Steps	Key Vocabulary
Summer 1	Number: Percentages	Pupils should be taught to: • recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	• fractions to percentages • equivalent FDP • order FDP • percentage of an amount • percentages - missing values	per cent (%), percentage parts, whole decimal fraction, equivalent fraction, tenth, hundredth, half, quarter less than (<), greater than (>) divide (÷), share, multiply (×) convert, compare, order, simplify

Maths Progression:

Year 5:

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

Topics		N.C Objectives	Small Steps	Key Vocabulary
Summer 1/2	Algebra	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.	• find a rule - one step • find a rule - two step • forming expressions • substitution • formulae • forming equations • solve simple one-step equations • solve two-step equations • find pairs of values • enumerate possibilities	pattern, growing pattern sequence, rule term, algebra, algebraic expression formula, formulae substitute generalise operation calculation, calculate equation inverse solution represent value

Maths Progression:

Year 5:

- Topic starts in Year 6.

Topics		N.C Objectives	Small Steps	Key Vocabulary
Summer 2	Number: Ratio	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.	• using ratio language • ratio and fractions • introducing the ratio symbol • calculating ratio • using scale factors • calculating scale factors • ratio and proportion problems	reflection, translation mirror-line coordinate, horizontal coordinate, vertical coordinate horizontal axis, vertical axis
Maths Progression: Year 5: • Topic starts in Year 6.				

Topics		N.C Objectives	Small Steps	Key Vocabulary
Summer 2	Statistics	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.	• read and interpret line graphs • draw line graphs • use lines graphs to solve problems • circles • read and interpret pie charts • pie charts with percentages • draw pie charts • the mean	average, mean, set, share, pie chart, segment, whole, section, degree, angle, right angle, tally chart, bar chart, fraction, percentage, line graph, axis/axes, estimate, accurate, interpret, increase, above, below, zero (0), value, x-axis, y-axis, minus (–), between, plot, point, vertical, horizontal, construct, convert/conversion, straight, equivalent, predict, curve more, equal,

				even, size, total, share, great(er/est), calculate, divide, highest, compare, lowest, group, data, represent, balance, odd, different/difference, least, inverse, operation, advantages, disadvantages, largest, half, scale, quarter, frequency, smallest, part, same, more, category, results, exact

<u>Maths Progression:</u>

Year 5:

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

Key Texts	The Number Devil by Hans Magnus Enzensberger Sir Cumference and the Off-the-Charts Dessert by Cindy Neuschwander Multiplying Menace: The Revenge of Rumplestiltskin by Pam Calvert Recommendations from MathsThroughStories.org - for specific topics