Maths Long Term Plan Year 6

Year 6 Maths	
National Curriculum Objectives for Year 6	**Key Links**
Pupils should be taught: 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.	https://resources.whiterosemaths.com/resources/year-6 https://www.mathletics.com/uk/ **Recap knowledge:** Continue times tables beyond x12 Continuous practice of written methods + - x ÷ Inverse operations Estimating & Rounding + Topic dependent and based upon over-learning needs

Topics		Working towards	Expected progress	Greater depth / extension	Key vocabulary
Autumn 1	Number: Place Value	• Read and write numbers up to 1 000 000 • Identify the value of each digit in a number up to 1 000 000 • Identify the value of a digit in numbers with two decimal places • Order numbers up to 1 000 000 • Compare numbers using the greater than and less than symbols • Round numbers to a required degree of accuracy using a number line • Calculate intervals across zero using a number line	• Read and write numbers up to 10 000 000 • Identify the value of each digit in a number up to 10 000 000 • Identify the value of a digit in numbers with three decimal places • Order numbers up to 10 000 000 • Compare numbers by working out calculations • Round numbers to a required degree of accuracy • Calculate intervals across zero • Solve problems involving negative numbers in context	•Solve calculations to read and write numbers up to 10 000 000 • Compare and order numbers, explaining the difference between numbers • Solve trickier reasoning problems involving place value, rounding and negative numbers.	Ones, millions, thousands, hundreds, tens, zero, place value, greater than, less than, order, round, rounded, negative, partition, digit, interval, sequence, linear

		• Compare and order negative numbers • Solve simple problems involving negative numbers in context • Solve simple reasoning problems using all of the above.	• Solve reasoning problems using all of the above.		
	Number: Addition, Subtraction, Multiplication and Division	• Perform one-step mental calculations with increasingly large numbers • Correctly use the order of operations to carry out calculations • Add and subtract whole numbers using a formal written method • Solve two-step problems involving addition and subtraction. • Multiply numbers by a one-digit number using long multiplication • Solve reasoning questions using the formal method of long multiplication • Divide numbers by a two-digit number using long division • Divide four-digit numbers by a two-digit number using short division without remainders • Solve reasoning questions involving mental addition, subtraction, multiplication and division • Round numbers to a specified degree of accuracy • Use rounding to check answers to problems • Solve one-step division problems, rounding the answer depending on the context	• Practise mental calculations with increasingly large numbers using all four operations • Perform mental calculations with mixed operations • Perform two-step mental calculations with increasingly large numbers • Add and subtract numbers, including decimals, using a formal written method • Solve multi-step problems involving addition and subtraction • Multiply numbers by a two-digit number using long multiplication • Divide using a formal written method and use rounding depending on the context • Divide four-digit numbers (with decimals) by a two-digit number using short division • Solve two-step division problems, rounding the answer depending on the context • Round a number taking into account the context • Solve two-step problems and check their answer using estimation • Identify missing brackets within a calculation	• Solve missing digit problems involving long multiplication • Divide using a formal written method and use rounding depending on the context in multi-step calculations • Solve missing digit problems involving long division • Create comparison sentences involving long division calculations • Create their own word problems involving addition, subtraction, multiplication and division •Solve multi-step problems and check their answer using estimation •Sort and solve one, two and multi-step problems in a Venn diagram •Solve complex multi-step problems.	Add, total, make, plus, sum, more, altogether, difference, leave, subtract, difference, between, less, minus, takeaway, mentally, orally, column addition, column subtraction, estimate, inverse operation, solve problems, number facts, place value, complex

		• Explore the order of operations using brackets • Find missing numbers using the inverse • Select the correct operation/s to use and solve a problem, checking the answer using estimation • Solve one-step problems and check their answer using estimation • Sort one-step problems in a sorting diagram	• Sort one and two-step problems in a Venn diagram		
Progression ***from Year 5*** 	**Year 5 expectations:** **Number: Place Value -** •Read and write most numbers up to 1 000 000 •identify the value of most digits in numbers up to 1 000 000 •use concrete, visual and abstract representations to help identify numbers with two decimal places •order most numbers up to 1 000 000 •compare most numbers up to 1 000 000 using the greater than and less than symbols •round numbers up to 1 000 000 to the nearest 10, 100, 1000, 10 000 or 100 000 using a number line •count backwards and forwards across zero using number lines •compare and order negative numbers •solve age appropriate problems involving negative numbers •count forwards and backwards in steps of powers of 10 •read Roman numerals up to 1000 (M) •identify years written in Roman numerals •solve reasoning problems using all of the above. **Number: Addition and Subtraction -** •Add and subtract numbers with at least 5 digits using mental and written methods •round numbers to the nearest 10, 100, 1000, 10 000 •use inverse operations to check answers to addition and subtraction calculations •mentally round numbers to check answers to calculations and determine, in the context of a problem, levels of accuracy •choose a sensible way of calculating when solving a problem •solve one-step and two-step word problems •independently choose appropriate methods for mental calculation •practise mental calculation with increasingly large numbers. **Number: Multiplication and Division -** •Find factor pairs and identify the common factors of two or more numbers •recall the prime numbers up to 20 and be able to find the prime numbers up to 100 using their multiplication tables knowledge •multiply numbers up to four digits by one or two-digit numbers using short and long multiplication •multiply and divide numbers mentally using known facts e.g. doubling, halving, partitioning and recombining and beginning to use known facts to multiply and divide decimals •use the formal method of short division to divide numbers up to four digits by a one-digit number •interpret remainders as whole numbers, decimals and simple fractions and begin to choose the best way to express remainders, depending on the context of the problem •multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 •identify and use square numbers, cube numbers and powers •recognise that the equals sign indicates equivalence and make equations balance •solve a wide range of multiplication and division problems, applying their mental and written methods including scaling, exchange rate and speed problems.				
Cross curricular links / examples	**Life skills – Going to the shops** **Science – Data handling in investigative work**				
<u>Autumn 2</u>	**Fractions**	• Compare and order fractions using a fraction wall to support then	• Compare and order fractions using the method of finding a common denominator	• Compare and order fractions using the method of finding a common numerator	Numerator Denominator Proper fraction

		• Add and subtract fractions with unlike denominators using resources to support them • Multiply proper fractions or mixed numbers by whole numbers using resources to support • Divide a fraction by a whole number that is a divisor of the numerator • Understand per cent and give percentage and decimal equivalents for half, quarters, fifths, tenths, twentieths, twenty-fifths, fiftieths and hundredths fractions.	• Add and subtract fractions with unlike denominators using the method of finding a common denominator • Multiply pairs of proper fractions using resources to support • Divide a fraction by any whole number • Use fraction, percentage and decimal equivalents to solve problems.	• Subtract fractions with unlike denominators using regrouping • Divide a proper fraction by another proper fraction • Use written methods of division to calculate decimal equivalents of fractions.	Improper, factor, common multiple, equivalents, decimal equivalent, simplify, simplest form, mixed number, whole number
	Geometry: Position and Direction	• Describe coordinate positions in the first quadrant • Translate shapes on a 2D grid using the vocabulary left, right, up and down • Reflect and draw shapes over mirror lines.	• Describe coordinate positions in all four quadrants • Translate shapes on coordinate axes using coordinate translation • Reflect and draw shapes on coordinate axes	• Describe coordinate positions in all four quadrants, including using decimal half coordinates • translate shapes on coordinate axes using coordinate translation, and identify missing vertices • reflect and draw shapes on coordinate axes, and identify missing vertices.	Translate Translation, Reflect, reflection, up, down, right, left, coordinates, quadrant, x-axis, y-axis, horizontal, vertical
Progression	**Year 5 expectations –** **Fractions –** • Compare and order fractions using multiplication to find equivalent fractions • identify equivalent improper fractions and mixed numbers • convert between improper fractions and mixed numbers to add and subtract fractions with the same denominator • add and subtract proper fractions with different denominators • multiply proper fractions or mixed numbers by whole numbers by drawing diagrams • use place value to convert between decimal and fraction tenths and thousandths • give percentage and decimal equivalents for half, quarters, fifths and fractions with a denominator of a multiple of 10 or 25. **Geometry: Position and Direction -** • Draw a translated shape • draw a reflected shape • begin to recognise and work with co-ordinate.				
Cross curricular	**Science – Data handling in investigative work** **DT – Creating flexigon fraction walls**				

links / examples					
Spring 1	**Number: Decimals**	• Round a number with three decimal places to a specified degree of accuracy using a number line to support • understand per cent and give percentage and decimal equivalents for half, quarters, fifths, tenths, twentieths, twenty-fifths, fiftieths and hundredths fractions.	• Round a number with three decimal places to a specified degree of accuracy • use fraction, percentage and decimal equivalents to solve problems.	• Solve reasoning and problem solving tasks including fractions, decimals and percentages. Converting accurately between.	partitioning, decimal place, decimal fraction, recurring, equivalent, tenth, sharing, partitioning, exchanging, rounding, hundredth, thousandth, equal to, remainder, grouping
	Number: Percentages	• Recognises that 100% is equal to the whole. • Can use mental or written methods to find 10%, 50%, 5% and 1%	• Use their multiplication and division knowledge to calculate, 10% and 1% and then using these as a basis to find percentages of an amount. • Recognising that 50% is equal to a half and therefore the whole about divided by 2 and 25% is equal to a quarter and therefore divided by 4	• Solve problems involving the calculation of percentages of whole numbers or measures such as 15% of 360 and the use of percentages for comparison	Percentage Discount, equivalent fraction, equivalent decimal, convert, compare, order, the whole
	Number: Algebra	•Use simple formulae in relation to previous learning of missing numbers. •With support (discussion or manipulatives) find pairs of numbers that satisfy number sentences involving two unknowns	•Express missing number problems algebraically eg. missing number, lengths, coordinates and angles problems - equivalent expressions (a + b = b + a) •Use simple formulae •Find pairs of numbers that satisfy number sentences involving two unknowns •With discussion, enumerate all possibilities of combinations of two variables •Recognise when it is possible to use **formulae** for area and volume of shapes (copied from Measurement)	•Express missing number problems algebraically •Applying formulae knowledge to solve algebraic problems •Efficiently find pairs of numbers that satisfy number sentences involving two unknowns. •Enumerate all possibilities of combinations of two variables	Term to term rule, variable, unknown, expression, equation, formula, one-step equation, two-step equation, substation, pairs of unknowns, enumerate

			•Generate and describe linear number sequences	•Apply formulae for area and volume of shapes.	
Progression 	**Year 5 expectations -** **Number: Decimals and percentages -** • Use place value to convert between decimal and fraction tenths and thousandths • compare and order numbers with up to three decimal places when they have different numbers of decimal places • give percentage and decimal equivalents for half, quarters, fifths and fractions with a denominator of a multiple of 10 or 25.				
Cross curricular links / examples	**Geography – Percentage increases in population /climate statistics**				

Spring 2	**Measurement: Converting Units** **Measurement: Perimeter, Area and Volume**	• Convert from larger to smaller metric units of length, mass and volume, up to two decimal places • Convert from smaller to larger metric units of length, mass and volume, up to two decimal places • Convert units of time – whole and half units • Solve simple problems involving conversion and calculation of metric units of length, mass and volume • Calculate the difference between negative and positive temperatures within a range of 15˚ • Convert between miles and kilometres (whole units) • Use conversion graphs to convert between miles and kilometres (multiple of five units) • Find all possible rectangles and squares with a given area by counting squares, using cm2 • Find all possible rectangles and squares with a given perimeter, using cm • Use a formula to calculate the area of triangles up to 75cm2 • Use a formula to calculate the area of parallelograms up to 150cm2 • Identify shapes which have enough information to use a	• Convert from larger to smaller metric units of length, mass and volume, up to three decimal places • Convert from smaller to larger metric units of length, mass and volume, up to three decimal places • Convert units of time – whole, half, quarter and three-quarter units • Solve reasoning style problems involving conversion and calculation of metric units of length, mass and volume • Calculate the difference between negative and positive temperatures within a range of 40˚ • Create and use conversion graphs to convert between miles and kilometres (multiples of five units) • Find all possible rectangles and squares with a given area using mm2 • Find all possible rectangles and squares with a given perimeter, using cm and mm • Use a formula to calculate the area of triangles up to 200cm2 • Use a formula to calculate the area of parallelograms up to 600cm2 • Subdivide two composite rectilinear shapes to calculate area, some with unknown side measurements • Calculate the volume of a composite shape made up of two cuboids • Find the measurement of an unknown dimension of a cuboid, given the surface area of one face and the volume.	• Solve more complex problems involving conversion and calculation of metric units of length, mass and volume • Calculate the difference between negative and positive temperatures within a range of 60˚ • Create and use conversion graphs to convert between miles and kilometres (multiples of one unit) • Find all possible rectangles and squares with a given perimeter, using m and mm • Use a formula to calculate the area of triangles over 200cm2, including half units • Use a formula to calculate the area of parallelograms up to 3000cm2, including half units • Calculate the volume of cubes and cuboids, using measurements of cubic centimetres and cubic metres (up to one decimal place).	Mass, gram, kilogram, capacity, volume, mililitre, litre, centimetre, millimetre, kilometre, foot, inch, ounce, pound, stone, pint, gallon, miles, yards

		formula to calculate the area of squares, rectangles and composite shapes • Calculate the volume of cubes and cuboids, using measurements of cubic centimetres and cubic metres (whole units) • Estimate the volume of cuboids • Identify shapes and nets of shapes which have enough information to use a formula to calculate the volume.			
	Number: Ratio & Proportion	• Enlarge a simple shape by a given whole number scale factor • Solve simple fraction problems either with fractions in the problem or using fractions to solve the problem, where the numerators of fractions are 1 • Write a ratio statement to compare two values • Solve simple problems involving calculating ratio • Solve simple problems involving calculating proportion • Calculate 5%, 10% and multiples of 10% of quantities	• Enlarge a simple shape by a given whole and fractional number scale factor • Calculate the length of missing sides after enlargement on simple shapes • Enlarge a cuboid to a given scale factor • Solve fraction problems either with fractions in the problem or using fractions to solve the problem, where there are several steps required to answer the problem • Solve two-step problems involving calculating ratio • Solve two-step problems involving calculating proportion • Write a ratio in its simplest form • Recognise and write equivalent ratios • Calculate any percentage of a numbers including money up to 10 000 • Convert percentages to numbers in a pie chart.	• Calculate the length of missing sides after enlargement on simple and composite shapes • Calculate the surface area of an enlarged cuboid • solve fraction problems either with fractions in the problem or using fractions to solve the problem, using a higher level of reasoning to answer the problem • Solve multi-step problems involving calculating ratio • Solve multi-step problems involving calculating proportion • Compare sets of data on two pie charts • Calculate any percentage of a numbers including money over 1 000 000.	Ratio, proportion, ''forevery…there are…'' part whole, scale factor, enlargement, similar shapes, length, width, perimeter

Progression 	**Year 5 expectations -** **Measurement: Converting units -** · Solve reasoning-style problems involving conversion of metric units of measurements · convert 12 hour times to 24 hour and 24 hour to 12 hour (5minute intervals) · convert between minutes and seconds using measurements up to 1 decimal place · solve reasoning-style problems involving conversion of time units, including interpreting timetables. **Measurement: Volume -** · Apply knowledge to solve problems involving volume **Measurement: Perimeter and Area -** · Calculate the perimeter of composite rectilinear shapes in centimetres and metres; calculating the length of any unknown sides · choose a formula to calculate the perimeter of rectangles · find the area of rectangles, multiplying the length by the width.				
Cross curricular links / examples	**DT – recipes and measuring out using scales**				
<u>Summer 1</u>	**Statistics**	· Interprets and, with support, constructs pie charts and line graphs · Recognises the difference between discrete and continuous data · Begins to recognise when information is presented in a misleading way, e.g. compares two pie charts where the sample sizes are different · Through discussion - begins to decide which representation of data is most appropriate and why · With support and modelling calculates and interprets the mean as an average	· Interprets and constructs pie charts and line graphs and uses these to solve problems · Begins to connect work on angles, fractions and percentages to the interpretation of pie charts · Recognises the difference between discrete and continuous data · Recognises when information is presented in a misleading way, e.g. compares two pie charts where the sample sizes are different · When drawing conclusions, identifies further questions to ask - begins to decide which representation of data is most appropriate and why · Calculates and interprets the mean as an average – with some understanding of when it is appropriate to find the mean median and mode of a data set	· Accurately reads data and can decide how to represent this, constructing pie charts and line graphs with accuracy (as well as varied scaling). · Uses these to solve problems - connects work on angles, fractions and percentages to the interpretation of pie charts · Calculates and interprets the mean as an average - knows when it is appropriate to find the mean median and mode of a data set	Bar chart, pictogram, frequency table, tally chart, pie chart, discrete data, continuous data, line graph, sum, difference, comparison, interpret, mean average

	Geometry: Properties of Shape	• Use a ruler to draw a 2D shape to a given measurement • Construct a 3D shape from a given shape net • Compare and classify geometric shapes • Recognise different types of angle • Draw circle using a pair of compasses.	• Draw 2D shapes to given dimensions of length and angle • Draw their own net of a simple 3D shape including construction tabs • Measure and calculate unknown angles in 2D shapes and around a point or on a straight line • Label the parts of a circle including radius and diameter.	• Confidently use a protractor to accurately draw 2D shapes to within 1° of the given dimension • Draw their own net of more complex 3D shapes including construction tabs • Use more complex reasoning to work out missing angles in 2D shapes and around a point or on a straight line • Understand the relationship between radius and diameter using algebraic representation.	Angle, right angle, acute, obtuse, reflex, protractor, horizontal, vertical, parallel, perpendicular, polygon, regular, irregular, two-dimensional, 3-dimensional, flat face, curved surface, edge, curved edge, vertex, vertices, apex, radius, diameter, circumference
Progression 	**Year 5 expectations –** **Statistics -** · Interpret data presented in a double line graph · answer comparison, sum and difference questions about data presented in a double line graph; interpret information in a range of tables · answer questions about information presented in timetables, applying their knowledge of time. **Geometry: properties of Shape -** · Reason about 2D shapes based on lengths and angles · identify the nets of a range of 3D shapes · estimate acute, obtuse and reflex angles · measure angles using a protractor · begin to draw angles using a protractor • find angles at a point and one whole turn.				
Cross curricular links / examples	**Enterprise – creating boxes for selling items** **DT - Theme Park Project – creating ride models** **Geography – Climate change statistics**				
<u>Summer 2</u>	**Teacher initiated interventions / misconceptions addressed / gap analysis to be class and cohort dependent.** **Mathematical problem solving and reasoning skills to be further developed in identified areas.**				