Medium Term Plans for Mathematics (aligned with the 2014 National Curriculum) - Year Six (Spring Term)

Oral mental starters (ongoing, throughout the term) e.g:

- Count from (and back to) 0 in multiples of 3, 4, 6, 7, 8, 9, 11,12, 15, 25, 50, 100 and 1000
- Count from (and back to) 0 in multiples of 0.3, 0.4, 0.5, 0.6, 0.7, 0.8, 0.9, 0.25,1.1,1.2,1.5 (using known multiples and knowledge of place value)
- Recall and use multiplication and division facts for the 2, 3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 times tables (up to the 12^{th} multiple)
- Multiply decimal numbers (with up to two decimal places) by whole numbers, using knowledge of multiplication facts and place value
- Identify common factors, common multiples and prime numbers
- Undertake mental calculations (using all four operations) with increasingly large numbers and more complex calculations
- Read, write, compare and order numbers within 10,000,000
- Read, write, compare and order numbers with up to three decimal places; identify the value of each digit in numbers with up to three decimal places
- Round decimal numbers with one or two decimal places to the nearest whole number
- Round decimal numbers with two decimal places to one decimal place
- Use understanding of place value to multiply and divide whole numbers and decimals by 10, 100 and 1,000
- Use negative numbers in context and calculate intervals across zero
- Consolidate understanding of fraction, decimal and percentage equivalents e.g. know that 25% = 0.25 = 1/4 (25/100)
- Compare and order fractions (including those greater than one)
- Consolidate and use square numbers and the notation e.g. $9^2 = 81$; consolidate and use cube numbers and the notation e.g. $4^3 = 64$
- Calculate the mean average of a set of data
- Solve missing number problems using algebra e.g. 2n = 36 so n = 18; n x m = 60. What are the possible values of m and n?
- Convert between different units of measurement (including time), using decimal notation up to three decimal places if appropriate
- Read Roman numerals to 1,000 (M) and recognise years written in Roman numerals

Areas of Study	No of days	Statutory requirements and non-statutory guidance	Suggested Key Vocabulary
Number Number and place value	3-5	Read and write numbers to 10,000,000 Order and compare numbers within 10,000,000 Round numbers up to 10,000,000 to the nearest 10, 100, 1000, 10,000, 100,000 and 1,000,000 Identify the place value of each digit in a seven-digit number Partition seven-digit numbers into millions, hundred thousands, ten thousands, thousands, hundreds, tens and ones/units; continue to use place value cards and charts to support, if necessary Use knowledge of place value to solve number problems by adding and subtracting 10, 100, 1000, 10,000, 100,000 or 1,000,000 to any number up to 10,000,000	Partition, Place Value Digit, number Units/ones, Tens, Hundreds, Thousands, Ten thousands, Hundred thousands, Millions Order Compare More than, Less than, <, > Round

Week 1		e.g. A house in Chelsea is for sale for £1,365,000. The house next door is £100,000 cheaper. How much does the house next door cost? The population of London is approximately 8,300,000. If the population increases by 100,000 over the next year, what will the population be?	
Number Negative Numbers & Roman Numerals **Week 2**	3 2	Interpret and use negative numbers in context e.g. temperature or depth below sea level Respond to questions about negative numbers e.g. fill in the missing numbers on a number line; put these temperatures in order from coldest to warmest (8°C, 18°C, - 18°C , - 8°C, 0°C) Count forwards and backwards in steps through zero to include positive and negative whole numbers, e.g. 11, 7, 3, -1, -5 (describe the term to term rule) Calculate intervals including those across zero e.g. the average daily temperature in October was 15°C and in February it was - 3°C. How many degrees colder was it in February? Yesterday the temperature during the day was 8°C. It dropped by 10 degrees last night. What was the temperature during the night? A diver is swimming below the surface of the water at - 30m. He swims up 12m and then down 4 metres. Where is he now? **Consolidate** reading and writing Roman numerals to 1000 (M); recognise years written in Roman numerals e.g. How do you write this year in Roman numerals? Write the year of your birth in Roman numerals (taken from Y5 programmes of study) **Extend** with more challenging examples e.g. The Great Fire of London was in MDCLXVI - what year was this?	Positive, negative (numbers) Temperature, ° C degrees Celsius interval, depth Roman numerals I, V, X, L, C, D, M
Algebra **Week 3**	5	Use simple formulae using symbols and letters to represent variables and unknowns in mathematical situations throughout the year e.g. formula for finding perimeter and area Express missing number problems algebraically e.g.180 - n = 135, n = 45; 9n = 63, n = 7 Find pairs of numbers that satisfy an equation with two unknowns e.g. 9 x a = 20 + b, a = 3 and b = 7 Enumerate possibilities of combinations of two variables e.g. n x m = 48. What are the possible values of m and n? Recognise, generate and describe linear number sequences, first using words and then algebra e.g. describe and extend this sequence: 4, 8, 12, 16, 20, 24… (multiples of 4), in words (add 4 each time); write a formula for the nth term (4 x n or 4n) Solve mathematical **problems and puzzles** and describe rules using a formula, first in words then algebraically e.g. the handshake problem; the ice-cream problem; circles and squares	Algebra, symbol, represent, equation, formula, variable, unknown, n^{th} term Problem, puzzle, solution, rule

Number Multiplication **Week 4**	1 3 1	Consolidate recognising and using square numbers up to 12 x 12 and the notation for squared number (^{2}) Consolidate recognising and using cube numbers and the notation e.g. $4^3 = 4 \times 4 \times 4 = 64$; relate to volume of a cube and cm^3 Consolidate the formal written method of **short multiplication** to multiply a two-digit number, a three digit-number or a four-digit number by a single digit number; multiply decimal numbers by a single digit number, including in the context of money and measurement (See Calculation Policy for guidance on progression in methods) Consolidate the formal written method of **long multiplication** to multiply a two-digit number, a three-digit number or a four digit number by a two-digit number; multiply decimal numbers by a two-digit number, including in the context of money and measurement (See Calculation Policy for guidance on progression in methods) Solve word problems, which involve short and long multiplication, including money and measures problems	Square numbers (^{2}) Cube numbers (^{3}) volume Multiply, multiplication, times, product Thousands, hundreds, tens, ones/units, digit Formal method of short multiplication Formal method of long multiplication
Number Division **Week 5**	5	**Consolidate** all mathematical vocabulary related to division including the terms **divisor, dividend, quotien**t e.g. In this calculation, what is the divisor, the dividend and the quotient? 120 ÷ 12 = 10 **Consolidate** the formal written method of **short** division with and without remainders (See Calculation Policy for guidance on progression in methods); interpret remainders as whole number remainders, fractions or decimals depending on the context **Introduce** the formal written method of **long** division of three and four digit whole numbers by a 2-digit divisor (See Calculation Policy for guidance on progression in methods); interpret remainders as whole number remainders, fractions or decimals depending on the context Solve word problems, which involve short and long division, with and without remainders; interpret remainders appropriately for the context e.g. There are 972 children in our school. There are 36 classes and all classes have an equal number of children. How many children are in each class? (No remainder); Sixteen friends go out for a celebration meal. The bill comes to £460. How much do they each spend? (Decimal remainder in the context of money); A factory produces ribbon. It makes 2505m of ribbon this week. Each roll holds 75m. How many full rolls can be sent to the shop? (Rounding down) **NB** the short method of division is sometimes the most appropriate method when dividing by a two digit number but in most cases long division will need to be used (see Calculation Policy)	Divide, division, divisor, dividend, quotient, Short division, long division Formal layout $\overline{)}$ Round up/down, remainder

Number Fractions (including decimals and percentages) **Week 6**	5	**Consolidate** understanding of fractions from previous term/years in problem solving contexts e.g. I have saved £450 in my bank account. I spend 1/9 of my savings on new trainers. How much do my trainers cost? How much money do I have left? What fraction of my savings is this? Add and subtract fractions with different denominators and mixed numbers in problem solving contexts e.g. I have 1/2 a cheese and tomato pizza and 3/8 of a mushroom pizza How much pizza do I have on my plate? 1/2 + 3/8 = 4/8 + 3/8 = 7/8 (I have 7/8 of a pizza on my plate); There are 1¾ pizzas in the fridge and I eat 7/8 of a pizza. How much pizza is left for later? 1¾ = 7/4 (convert mixed number to improper fraction) 7/4 - 7/8 = 14/8 – 7/8 = 7/8 (I have 7/8 of a pizza left for later) Multiply simple pairs of proper fractions, writing the answer in its simplest form 2/3 x 1/2 = 2/6 = 1/3 (consider the use of diagrams to support understanding) **Introduce** dividing proper fractions by whole numbers e.g. 1/3 ÷ 2 = 1/6 (consider the use of diagrams to support understanding) **Consolidate** understanding of fraction, decimal and percentage equivalents e.g. know that 43% = 0.43 = 43/100 **Know** decimal equivalents of 1/2, 1/4, 3/4, 1/5, 2/5, 4/5 and those fractions with a denominator of a multiple of 10 or 25; associate fractions with division e.g. 3/4 = 0.75 because 3 ÷ 4 = 0.75 (use a calculator to support) **Extend** by calculating other decimal fraction equivalents e.g. 3/8 = 0.375 because 3 ÷ 8 = 0.375 (consider the use of a calculator, as appropriate)	Numerator, denominator Equivalent fractions, mixed number, improper fractions Common factors, common multiples Decimal, fraction, percentage equivalents
Ratio and proportion (including percentages)	2	Find **percentages** of whole number quantities e.g. 10% of £86 = £8.60; 20% of £86 = £17.20; 5% of £86 = £4.30; 1% of £86 = 86p; **extend** with e.g.15% of £86 = £8.60 + £4.30 = £12.90 Solve problems involving the calculation of percentages and the use of percentages for comparison e.g. A computer game costs £37. Today there is a 10% off sale. How much does the game cost today? What if there was a 15% off sale? Anthony scored 23/50 in a test. What was his percentage score? Emily scored 13/25 in a different test. Who did better, Anthony or Emily?	Per cent, percentage, %

Week 7	1 2	Consolidate **ratio** and understand that it is a comparison of part to part e.g. in this recipe, for every egg you need three spoonfuls of flour; use the notation 1:3 (a:b); describe ratio using words and notation e.g. Make a drink with 10ml of orange squash and 50ml of water. What is the ratio of orange squash to water in this recipe? Explain how to use integer multiplication or division to make larger or smaller amounts of drink? Introduce **proportion** as a way to express relationships using fractions e.g. in this tower there are 3 blue bricks and 5 green bricks. What proportion of the bricks is blue? 3/8. What proportion of the bricks is green? 5/8; Make a drink with 10ml of orange squash and 50ml of water. What proportion (fraction) of the drink is orange squash? (1/6) and what proportion is water? (5/6)	Ratio (:), proportion, fraction
Geometry Properties of shapes **Week 8**	1 3 1	**Consolidate** identifying, describing, comparing and classifying 2-D shapes, including all triangles and quadrilaterals, using the properties taught in previous years (acute/obtuse/reflex/right angle; regular/irregular; lines of symmetry/symmetric/symmetrical; 'pairs of parallel sides'); use conventional marking for parallel lines and right angles Use knowledge that angles in a straight line total 180º and that angles at a point total 360º to calculate missing angles on a straight line and at a point; express missing numbers **algebraically** Know the internal angles of a triangle total 180º and the internal angles of a quadrilateral total 360º; use a protractor to check; calculate a missing angle in triangles and quadrilaterals; express missing angles algebraically; **extend** with knowledge of internal angles of other polygons Know that **vertically opposite angles** are equal; use a protractor to check; calculate missing angles that are vertically opposite; express the missing angle algebraically Introduce the names of the **parts of a circle**: radius, diameter, circumference; know that the diameter is twice the radius; extend by expressing the relationship algebraically (d = 2 x r)	All relevant vocabulary from previous years Degrees º Internal angles, vertically opposite angles Radius, diameter, circumference
Measurement (perimeter, area and volume)	5	Solve problems involving similar shapes where the **scale factor** is known or can be found e.g. draw a rectangle with given dimensions. What is the perimeter? What is the area? Enlarge by a scale factor of two (double the lengths of the sides). What is the new perimeter? What is the new area? Understand that a scale factor of three means multiply the lengths by 3 **Extend** by calculating the area of triangles and then parallelograms by dissecting and relating to the area of a rectangle; understand and use the formula (in words and symbols) for the area of triangles and parallelograms	Scale factor, enlarge, Perimeter Area Square centimetres, cm^2, square metres, m^2, square millimetres, mm^2, square kilometres, km^2

Week 9		Consolidate understanding of **volume** and express the formula for finding the volume of a cube/cuboid in words using letters/symbols ; use the terms and standard units cubic centimetres, cm^3 and cubic metres m^3; extend to other units e.g. mm^3 Solve problems relating to volume e.g. A cereal box is 30cm tall, 6cm deep and 20cm wide. What is its volume? A $180cm^3$ cuboid is 12cm long and 3cm deep. What is its width?	Volume, cube, cuboid Cubic centimetres, cm^3, mm^3
Number Problem solving with all operations **Week 10**	5	Solve one-step, two-step and multi-step **word problems** (including money and measures problems), using all 4 operations, deciding which operation to use; use rounding and inverse operations to estimate and check answers to calculations e.g. There is space in the multi-storey car park for 17 rows of 30 cars on each of the 4 floors. How many cars can park? What if there were already 54 cars in the car park - how many spaces would be left? One toffee apple needs: 1 stick, 100g of sugar and 1 apple 50 sticks cost £6.50, 1kg of sugar costs £1.20 and 100 apples cost £22.50 Children make 100 toffee apples for charity. They sell them for £1 each. The profit goes to charity. Work out how much money goes to charity. Solve **problems and puzzles** relating to all 4 operations, some in a context and some not set in a context, including the use of brackets, order of operations (BODMAS), missing numbers/digits (Consider the use of the Primary Strategy documents: 'Problems and Puzzles'/ Mathematical Challenges for more able pupils'; Reasoning about numbers with challenges and simplifications)	word problems, puzzles, solution estimate, inverse, bracket, rounding
Geometry (3D shape) & **Statistics** (data handling and mean average)	2 2	**Consolidate** recognising and naming 3D shapes, from 2D representations; describe the properties of 3D shapes using vocabulary from previous years including parallel or perpendicular faces Build 3D shapes, including making nets e.g. cube, cuboid, triangular prism, tetrahedron; **Investigate** the different nets that would make given 2D representations of 3D shapes Interpret **and** construct **line graphs**, with a range of scales e.g. make a conversion chart for £s to euros and answer related questions; construct and interpret a line graph showing average temperature each month for a year Interpret pie charts and **extend** by **constructing** pie charts e.g. make a simple pie chart to show children's favourite way to eat potatoes (mash, roast, chips, boiled) **NB** connect work on angles, fractions and percentages to the interpretation of pie charts	All relevant vocabulary relating to 3D shapes from previous years, including: net Straight line graph, scale, conversion chart, pie chart

Week 11	1	Calculate and interpret the **mean** as an average for simple sets of discrete data in different contexts e.g. Tom has been keeping a record of his mental maths test scores each week. His scores are 12, 10, 14, 13, 12 and 11. What is his mean average score? Consider when it is appropriate to find the mean of a set of data	Mean average, set of data

Additional weeks

To be used for:

- assessment, consolidation and responding to AfL
- additional using and applying activities

Summer Term

- It is envisaged that the weeks leading up to SATs will be spent consolidating and responding to AfL and that plans will vary from class to class, according to needs
- A post SATs plan will be developed, including using and applying activities, maths trails and suggested activities that will prepare children for the transition to KS3