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

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

- Identify multiples and count from (and back to) 0 in multiples of 3, 4, 6, 7, 8, 9, 11,12, 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 (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)
- Find all factor pairs of a given number; find all common factors for a pair of numbers; identify common multiples
- Multiply and divide numbers mentally using known facts and a range of strategies, including the use of jottings
- Add and subtract numbers mentally using known facts and a range of strategies, including the use of jottings e.g. empty number lines
- Read, write, compare and order numbers within 5,000,000
- Read, write, compare and order numbers with up to three decimal places
- Multiply numbers by 10, 100 and 1000 and divide corresponding numbers by 10, 100 and 1000 (with up to three decimal places)
- Count forwards and backwards with positive and negative whole numbers, including through zero; calculate intervals across zero (in context)
- Recognise, describe and extend linear number sequences, including those involving decimals, e.g. 0.9, 1.8, 2.7; find the term to term rule
- Compare and order fractions, including those greater than one (consider the use of diagrams and fraction walls)
- Know and use the vocabulary of prime numbers and establish whether a number up to 100 is a prime number
- Recognise and use square numbers (up to 12 x 12) and the notation e.g. $9^2 = 81$
- Convert between different units of measurement (including time), using decimal notation up to three decimal places if appropriate

Areas of Study	No. of days	Statutory requirements and non-statutory guidance	Suggested Key Vocabulary
Number Number and place value **Week 1**	3-5	Consolidate recognising and writing 1,000,000 as one million Read and write numbers to at least 5,000,000 Order and compare numbers within 5,000,000 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 Round numbers up to 5,000,000 to the nearest 10, 100, 1000, 10,000, 100,000 and 1,000,000 Use knowledge of place value to solve number problems by adding and subtracting 10, 100, 1000, 10,000 or 100,000 to any number up to 5,000,000 e.g. A house in my road is for sale for £365,000. The house next door is £10,000 cheaper. How much does the house next door cost?	Partition, Place Value Digit, number Units/ones, Tens, Hundreds, Thousands, Ten thousands, Hundred thousands, Millions Order Compare More than, Less than, <, > Round

Number Decimals/ place value & Addition/ Subtraction **Week 2**	2 3	Read and write numbers with up to three decimal places Order and compare numbers with up to three decimal places (including in the context of money and measures) 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 Identify the place value of each digit in a decimal number with up to three decimal places (hundreds, tens, units/ones, tenths, hundredths, thousandths) Consolidate using the **formal written method of addition** to add two or more large numbers (with four or more digits), including decimal numbers (up to three decimal places), including in the context of money and measures **(See Calculation Policy - Y5 Guidance)** Consolidate the **formal written method of subtraction** to subtract two or more large numbers (with four or more digits), including decimal numbers (with up to three decimal places), including in the context of money and measures **(See Calculation Policy - Y5 guidance)** Solve addition and subtraction one-step, two-step and multi-step word problems (including money and measures problems, with up to three decimal places), deciding which operation to use; use rounding and inverse operations to estimate and check answers to calculations	Partition, Place value Digit, number, decimal, decimal place tenth, hundredth, thousandths Order Compare More than, greater than, less than, <, > Round Inverse operations Addition, plus, altogether, add, sum of, total, more than, increase Subtraction, subtract, minus, less than, decrease Estimate, check
Algebra **Week 3**	5	**Introduce** the use of symbols and letters to represent variables and unknown numbers or quantities Express missing number problems algebraically e.g. a + 58 = 100, a = 42; 6n = 42, n = 7 Find pairs of numbers that satisfy an equation with two unknowns e.g. a x 12 = 30 + b, a = 3 and b = 6 **Solve problems and number puzzles** using algebra e.g. n x m = 36. What are the possible values of m and n? If a = 7 and b = 9 what is the answer to: 3a + 9b; 4b +1; 8a – 3; $a^2 + b^2$? Pens cost 25p each. I buy n pens and it costs me £1.50. What is the value of n? The number of bean sticks needed for a row which is n metres long is 2n +1. How many bean sticks do you need for a row which is 60 metres long? **NB** continue to use algebra (simple formulae) throughout the year, as appropriate e.g. when expressing formula for perimeter; finding missing angles; when interpreting sequences, patterns and relationships (Possible links to Science curriculum)	Algebra, symbol, represent, equation Problem, puzzle, solution

Number Multiplication **Week 4**	5	Consolidate all mathematical vocabulary related to multiplication; use the term **product** e.g. What is the product of 9 and 7? (consider as mental/oral activities) Write and calculate mathematical statements for all multiplication tables (up to 12 x 12); include multiplying by 0; solve missing number problems, including expressing algebraically (consider as mental/oral activities) Consolidate recognising and using square numbers up to 12 x 12 and the notation for squared number (^{2}) Recognise and use simple cube numbers and the notation e.g. $10^3 = 10 \times 10 \times 10 = 1000$; relate to volume and cm^3 Solve problems using knowledge of square and cube numbers e.g. Last year my age was a square number. Next year it will be a cube number. How old am I? How long must I wait until my age is both a square number and a cube number? Use understanding of place value to multiply whole numbers and decimals by 10, 100 and 1,000 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 (with up to 2 decimal places) by a single digit number, initially in the context of money or measures (See Calculation Policy for guidance on progression in methods) Consolidate the formal written method of **long multiplication** to multiply a two-digit number and then a three-digit number by a two-digit number; multiply decimal numbers (with up to two decimal places) by a two-digit number, initially in the context of money or measures; extend with multiplication of a four- digit number by a two-digit number (See Calculation Policy for guidance on progression in methods) Solve word problems, which involve **short and long** multiplication e.g. Bags of apples cost £2.45. I buy seven bags. How much do I spend? There are 48 cars in each row of the car park and there are 37 rows. How many cars are in the car park? A bottle of orange squash contains 1.75 litres. I have bought 12 bottles for the school party, how much orange squash do I have?	Square numbers (^{2}) Cube numbers (^{3}) Multiply, multiplication, times, product Thousands, hundreds, tens, ones/units, tenths, thousandths, 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? 72 ÷ 9 = 8 Consolidate and apply tests of divisibility by 2, 3, 4, 5, 6, 9, 10 and 100 (consider as a mental/oral starter) Recall prime numbers up to 19; establish whether a number up to 100 is **prime**, using knowledge of multiplication and division facts, factors and multiples (consider using 'The sieve of Eratosthenes'); use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers Use understanding of place value to divide whole numbers and decimals by 10, 100 and 1,000 Consolidate the **formal method of short division** to divide numbers with up to four digits by a single digit number with whole number answers or with remainders, including expressing the remainder as a fraction **(See Y5 Calculation Policy**); divide decimal numbers (with up to 2 decimal places) by a whole single digit number, initially in the context of money or measures Use the formal method of short division to divide numbers with up to four digits by **a two digit number**, **where appropriate** e.g. 192 ÷ 12 = 16; 258 ÷ 12 (See Calculation Policy); use the formal method of short division where the answer has up to two decimal places **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 - long division will be covered in the spring term Solve **word problems**, which involve short division, with and without remainders; interpret remainders appropriately for the context e.g. A school has 336 pupils and an equal number of children in each of the 12 classes. How many children are in each class? I collect eggs from my hens and put them into boxes of one dozen (12). How many boxes do I need if I collect 135 eggs? In our school we are collecting tokens for free books. For every eight tokens we can have one book. We have collected 1134 tokens. How many books will we get for the library?	Prime number, composite number, prime factor Divide, division, divisor, dividend, quotient, divisible by, divisibility Short division Formal layout $\overline{)}$ Round up/down, remainder
Number Fractions	5	Consolidate understanding of **mixed numbers** and **improper fractions** and convert from one form to the other Consolidate understanding of **equivalent fractions**; name and write equivalent fractions of a given fraction (represented visually and supported by materials and diagrams if necessary) e.g. 1/3 = 2/6 = 3/9 = 4/12 etc	Whole Unit fraction, non-unit fraction Numerator, denominator Equivalent fractions, mixed number, improper fractions

Week 6		Use common factors to **simplify** fractions e.g. 4/6 = 2/3; 9/12 = 3/ 4 Use common multiples to express fractions in the same denomination e.g. 2/3 and 3/5 can be expressed as 10/15 and 9/15 Compare and order fractions, including fractions > 1 Add and subtract fractions with different denominators where the denominators are multiples of the same number e.g. 1/2 + 1/8 = 4/8 + 1/8 = 5/8; 7/8 – 1/2 = 7/8 – 4/8 = 3/8 **Extend** with examples where the denominators are not multiples of each other e.g.1/4 +2/3 = 3/12 + 8/12 = 11/12 ; 2/3 + 3/5 = 10/15 + 9/15 = 19/15 = 1 4/15 (the answer can be expressed as a mixed number) Multiply simple pairs of proper fractions, supported by materials and diagrams, **initially using pairs of unit fractions** e.g. 1/4 x 1/2 = 1/8; 1/2 x 1/10 = 1/20	Common factors, common multiples
Ratio and proportion (including percentages) **Week 7**	5	**Consolidate** understanding of **per cent** as number of parts per hundred and record fraction and decimal equivalents of 1%, 10%, 20%, 25%, 50% Find **percentages** of whole number quantities using and applying known fraction equivalences e.g. 10% of 140 = 14; 5% of 140 = 7; 20% of 140 = 28 Solve problems involving the calculation of percentages e.g. A football team played 40 games. They lost 20% of the matches. How many matches did they lose? How many matches did they win? There are 90 people in the park. 20% of them are adults, 50% of them are boys and the rest are girls. What percentage of people in the park are girls? How many girls are In the park? Introduce **ratio** and understand that it is a comparison of part to part e.g. I want to mix some orange paint. For every spoonful of red paint I need two spoonfuls of yellow paint; introduce the notation 1:2 (a:b); describe ratio using words and notation e.g. what is the ratio of red cubes to blue cubes in this tower of cubes Solve ratio problems involving the relative size of two quantities using integer multiplication and division e.g. Zara uses 8 tomatoes to make a litre of sauce. How many tomatoes does she need to make 3 litres of sauce? Half a litre of sauce? For every three boys at the gym club there are four girls. What is the ratio of boys to girls? Altogether there are 28 children at the club. How many are boys and how many are girls? Solve problems involving similar shapes where the **scale factor** is known e.g. using a given rectangle with sides of 8cm and 5.5cm, enlarge using a scale factor of two (double the length of the sides)	Per cent, percentage, % Ratio (:) Scale factor

Geometry Properties of shapes **&** **Statistics** (data handling) **Week 8**	3 2	**Consolidate** understanding of acute, obtuse, reflex and right angles; know that angles are measured in degrees º ; consolidate the use of the protractor to measure angles (including use of interactive resources); draw and measure given angles in degrees (to the nearest degree) Know that angles in a straight line total 180º and are equivalent to half a turn; know that angles at a point total 360º and are equivalent to one whole turn; know that three quarters of a turn is 270º; know that the angles in a triangle total 180º Calculate a missing angles on a straight line and at a point; calculate a missing angle in a triangle; extend with expressing missing numbers **algebraically** Draw 2-D shapes using given dimensions and angles **Introduce pie charts** as a way to represent data; **interpret** simple pie charts and answer questions (using knowledge of fractions, percentages and angles)	Acute, obtuse, reflex, right angle, turns Degrees º Pie chart
Measurement (perimeter, area and volume) **Week 9**	5	Consolidate understanding of **perimeter** and express the formula for finding the perimeter of a rectangle in words and then using letters/symbols (algebraically); calculate the perimeter of rectilinear shapes; calculate the perimeter of composite rectilinear shapes; solve perimeter problems with missing measurements (taken from Y5 programmes of study) Consolidate understanding of **area** and express the formula for finding the area of rectangles in words and then using letters/symbols (algebraically); use standard units for square centimetres (cm^2) and square metres (m^2); calculate the area of rectangles and of composite rectilinear shapes (taken from Y5 programmes of study) Estimate the area of irregular shapes by counting squares, including half squares and fractions of squares Recognise that shapes with the same area can have different perimeters and vice versa **Investigate** using area and perimeter e.g. Draw some rectangles with an area of $36cm^2$. How many different rectangles with this area can you draw? Which one has the longest/shortest perimeter? Consolidate understanding of **volume** and express the formula for finding the volume of a cube/ cuboid in words and then using letters/symbols; use the terms and standard units cubic centimetres (cm^3) and cubic metres(m^3); estimate, calculate and compare volume of cubes and cuboids	Perimeter Area Square centimetres, cm^2, square metres, m^2 Volume, cube, cuboid Cubic centimetres, cm^3

Number Addition, Subtraction, Multiplication and Division (Mental methods) **& Statistics** (mean average) **Week 10**	4 1	Consolidate **mental methods** of calculation from previous years, choosing the most efficient/ appropriate method for the numbers involved e.g. Solve the following using a mental method of your choice (with jottings as appropriate): 1258 + 999; 7 x 900; 2009 – 1985; 38 x 5; 88 + 75 + 12; 98 ÷ 7; 3.5 x 200; 4 x 16; 6004 – 19; 1/5 of 3000; 25% of £120; 8897 + n = 9000, what is the value of n? Explore the order of operations using brackets e.g. (3 + 2) x 7 = 35 and 3 + (2 x 7) = 17 Solve one step, two-step and multi-step word problems in context (including money and measures) deciding which operations and methods to use and why **Investigate and solve number puzzles** using mental calculation and written methods of calculation e.g. Choose any two **different** digits from 1-9 (for example 3 and 4). Use these digits to make four different two-digit numbers (34, 43, 33, 44). Add your four numbers together (34 + 43 + 33 + 44 = 154). Divide this total by the sum of the two digits you started with (154 ÷ 7 = ?). What is the answer? Try it with other sets of two digits? How many possible pairs of digits are there? What do you notice about the answers? **Introduce** the mean as an average. Calculate the mean average of a simple set of numbers e.g. 10, 8, 12, 7, 8, 9 (find the total of the set of numbers and divide by the number of numbers in the set)	All relevant vocabulary relating to mental calculation from previous years Investigate, investigation, solution Mean average
Measurement & **Statistics**	2 1 1	**Consolidate** converting between 12-hour digital clocks and 24-hour digital clocks e.g. What time on the 12-hour clock is 21:35? What time on the 24-hour clock is 3:25 pm? Solve problems involving duration of events, including reading timetables Convert between units of time e.g. How many seconds in twenty minutes? How many days altogether in the months beginning with J? How many hours in two weeks? How many months in a century? **Consolidate** reading, writing and converting between standard metric units, converting measurements of length, mass and capacity/volume from a smaller unit to a larger unit and vice versa, using decimal notation up to three decimal places e.g. How many ml in a 3 ¼ litre jug of juice? My brother is 185cm tall - how tall is he in metres? My parcel weighs 1,365g- how many kg does it weigh? A piece of ribbon measures 1650mm. How long is this in cm? How long is it in metres? The capacity of my mug is 300ml - what is the capacity in litres? **Consolidate** understanding of approximate equivalences between metric units and **common imperial units**, such as feet and inches, pounds and pints. Establish where we still see/use imperial units e.g. I bought 2 pints of milk, I am 5 feet and 2 inches tall, my cat weighs 8 pounds **(taken from Y5 programme of study)**	All relevant vocabulary from previous years relating to measures (including time) Metric measures, imperial measures

Week 11	1	Know that miles are an **imperial measurement** of length; **extend** by converting between miles and kilometres (one km = 5/8 mile) **Interpret a straight line graph** showing conversion from km to miles; know that intermediate values have meaning; answer related questions converting between miles and kilometres (and vice versa) e.g. I am going to Paris for the weekend. It is four miles from the Gare du Nord railway station to the Eiffel Tower - how far is this in kilometres? It is 37 kilometres from Paris to the Palace of Versailles - how far is this in miles?	Straight line graph, conversion
Geometry (position and direction) **Week 12**	5	**Consolidate** the names and properties of polygons, including all triangles and quadrilaterals (from previous years) Consolidate describing positions on a 2D grid as **co-ordinates in the first quadrant**; plot specified points and draw sides to complete a given polygon, naming the missing co-ordinates; introduce the **second quadrant** and the use of negative numbers to plot points and to draw sides to complete a given polygon Using **co-ordinates in the first and second quadrant** describe and represent a shape following a **translation** and know that the shape has not changed, e.g. sketch the position of a rhombus on a grid after it has moved 3 units to the left and 2 units down; describe the new position using co-ordinates Using **co-ordinates in the first and second quadrant,** reflect polygons in the y axis; describe the new position using co-ordinates **Extend** using the **full co-ordinate grid** (all four quadrants), including the use of negative numbers; plot specified points and draw sides to complete a given polygon Translate polygons on the **full co-ordinate grid**; reflect polygons in the axes (x and y); describe the new positions using co-ordinates (**Possible link to Christmas theme)**	Co-ordinate, first quadrant, four quadrants, negative numbers, position Translation, reflection

Additional weeks

To be used for:

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