Maths Mastery Curriculum - Year 5/6 overview

Key resources to use:

Nrich

These ideas are linked with National Curriculum objectives and may be a good place to start with introducing problem solving and reasoning when applying a learnt skill. Click on the link to take you to the activity where there are suggestions on how to extend and simplify the problem to make it suitable at all levels or give you ideas of how to set up your own problem. The letters after each of the activities means: G= game, P= problem and I= investigation.

Assessment

The NCETM mastery assessment documents give some really good ideas on activities that can be used to assess the level of mastery of the children within particular mathematical areas. These include mastery activities and mastery at greater depth so you can extend the higher achievers. These are designed as activities, not to be used as a test.

Models and images Yr 5 and Yr 6

These models and images gives ideas that can be used to support explanations of new concepts, as a fluency based starter or a game. In the folder, there are examples of the bar method that can be used to support the children in visualising what each of the four operations mean when working on extended problems.

Problem solving and reasoning books

These books were handed out towards the end of last year. They include 14 key strategies to develop reasoning within every lesson. These strategies can be used for starters, plenaries and as a whole class skill. They also include investigations to develop these skills and the disks include further ideas on how to develop this within your class as well as giving powerpoint examples of each problem.

Calculation policy

The Calculation Policy should be used when teaching calculations to ensure consistency and progression across the school and within phases. Whilst there may be methods that cover Year 3 and 4 for example, a discussion should take place between the teachers of the Year 3 class and the Year 4 class about the calculation used during units to ensure progression. Always go back as far as is needed for SEN or children that are struggling. The key is understanding rather than pushing a procedural method.

Unit overview

For each unit, it will be useful to plan out the progression of objectives across the period of a whole unit. The link above will take you to a blank layout for you to use to design the progression across a unit. This should make weekly planning easier as you come to do it.

Stepping stones document

This document can be useful in breaking an objective down into smaller steps to support the learning and development of the concept.

T e r m	Unit	Year 5 objectives	Year 6 objectives	Links with other mathematical concepts and contextualised themes
A u t u m n	Reasoning with number (including decimals)	- read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit - count forwards or backwards in steps of powers of 10 for any given number up to 1000 000 - round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 - solve number problems and practical problems that involve all of the above - interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers, including through zero - read, write, order and compare numbers with up to 3 decimal places Unit 1 factor pair, ≥ greater than or equal to, ≤ less than or equal to, ascending/ descending order, round to the nearest ten thousand,	- read, write, order and compare numbers up to 10 000 000 and determine the value of each digit - use negative numbers in context, and calculate intervals across zero - round any whole number to a required degree of accuracy - solve problems involving addition and subtraction - identify the value of each digit in numbers given to 3 decimal places - solve number problems and practical problems that involve all of the above Unit 1: degree of accuracy, digit total, digit value, round	Images SAT questions (Lucy)
	Problem solving with addition and subtraction	- add and subtract numbers mentally with increasingly large numbers - add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)	- 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	Images SAT questions

		● 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 <mark>Unit 2: estimate, inverse, column, problem solving, multi-step</mark>	● express missing number problems algebraically (begin to introduce algebra concept through the use of letters instead of an empty box or question mark) ● use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy <mark>Unit 2: inverse, algebraically, algebra</mark>	
	Problem solving with multiplication and division	● multiply and divide numbers mentally drawing upon known facts ● multiply and divide whole numbers by 10, 100 and 1000 ● 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 ● 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 ● identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers ● 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	● use their knowledge of the order of operations to carry out calculations involving the 4 operations ● multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication ● multiply one-digit numbers with up to two decimal places by whole numbers ● 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 ● 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 ● use written division methods in cases where the answer has up to two decimal places calculate and interpret the mean as an average	Images SAT questions

		- understanding the meaning of the equals sign - know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers - establish whether a number up to 100 is prime and recall prime numbers up to 19 - Inverse to check answers **Unit 3: multiples, factors, divisibility, square number, prime number, composite, cube number**	- identify common factors, common multiples and prime numbers - perform mental calculations, including with mixed operations and large numbers - solve problems which require answers to be rounded to specified degrees of accuracy **Unit 3: factor, multiples, common multiples, common factors, degree of accuracy, mixed operations**	
	Fractions	- compare and order fractions whose denominators are all multiples of the same number - 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, $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = 1\frac{1}{5}$] - identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths - read and write decimal numbers as fractions [for example, $0.71 = \frac{71}{100}$] - 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 - solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates	- 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, $\frac{1}{4} \cdot \frac{1}{2} = \frac{1}{8}$] - divide proper fractions by whole numbers [for example, $\frac{1}{3} \div 2 = \frac{1}{6}$] - associate a fraction with division and calculate decimal fraction equivalents [for example, 0.375] for a simple fraction [for example, $\frac{3}{8}$]	Images SAT questions

		Unit 1 proper / improper fraction, equivalent, reduced to , cancel, thousandths, in every, for every, denominator, numerator, common factors, common multiples, equivalence, decimal fraction, scaling	● recall and use equivalences between simple fractions and decimals, including in different contexts Unit 1 factorise, prime factor, digit total, simplest form,	
	Decimals and measures	● 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 ● solve problems involving number up to three decimal places ● multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 ● 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) Unit 2: decimal equivalents, conversion, kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre	● 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 ● 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 and mass 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 Unit 2: decimal fraction, conversion, miles, kilometres, decimal places	SAT Questions
S p r i	Percentages and statistics (link with calculations)	● recognise the per cent symbol (%) and understand that per cent relates to 'number of parts per hundred', and	● recall and use equivalences between simple fractions, decimals and percentages, including in different contexts	

n g		write percentages as a fraction with denominator 100, and as a decimal ● solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25 ● solve comparison, sum and difference problems using information presented in a line graph Unit 1: percentage, decimal equivalent, fraction equivalent, per cent %, database, bar line chart, line graph, maximum/ minimum value, outcome	● solve problems involving the calculation of percentages [for example, of measures, and such as 15% of 360] and the use of percentages for comparison ● interpret and construct pie charts and line graphs and use these to solve problems equivalence, pie chart, mean (mode, median, range as estimates for this), statistics, distribution	SAT Questions
	Algebra	There are no specific algebra objectives stated in the national curriculum and therefore this does not need to be taught as a whole unit and move straight on to the next unit of learning.. However, missing number problems in Yr 5 should also include representations using letters instead of an empty box or a question mark. The concept of algebra can be further explored within the unit on area and perimeter.	● generate and describe linear number sequences including with fractions ● express missing number problems algebraically across a range of operations ● find pairs of numbers that satisfy an equation with two unknowns ● use simple formulae ● enumerate possibilities of combinations of two variables Unit 2: linear, algebraically, algebra, expression, equation, formula, unknown, enumerate number of possibilities,	
	Problem solving with ratio and proportion (links with calculations)	● solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes ● solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates Unit 2: factors, multiples, squares and cubes, scaling problems	● 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 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	SAT questions

			Unit 3: ratio, proportion, relative, integer, scaling,	
	Volume, area and perimeter (links with calculations)	• 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 • estimate volume [for example, using 1 cm³ blocks to build cuboids (including cubes)] and capacity [for example, using water] • measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres **Unit 1** square metre (m²) square millimetre (mm²), area, perimeter, volume, cubic, cm³ Estimate, composite, rectilinear	• 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 • use simple formulae • 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] • use, read, write and convert between standard units, converting measurements of 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 **Unit 1** centilitre, cubic centimetres (cm³), cubic metres (m³), cubic millimetres (mm³), cubic kilometres (km³), formula,	[SAT questions](#)
	Geometry and algebra (with calculation links)	• 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 360°); angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°); other multiples of 90°	• recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. • express missing number problems algebraically • compare and classify geometric shapes based on their properties and sizes and find unknown angles in any	[Images](#) https://www.studyladder.co.uk/games/activity/angles-on-a-straight-line-13131?lc_set= [SAT Questions](#)

		• use the properties of rectangles to deduce related facts and find missing lengths and angles **Unit 2** <mark>angles, degrees, turn, missing number, acute, obtuse, reflex,</mark>	triangles, quadrilaterals, and regular polygons **Unit 2** <mark>formula, equation, unknown, variable, reflex angle,</mark>	
	Properties of shape	• distinguish between regular and irregular polygons based on reasoning about equal sides • 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 **Unit 3** <mark>radius, Diameter, congruent, axis of symmetry, reflective symmetry, x-axis, y-axis, quadrant, explain your reasoning</mark>	• describe positions on the full coordinate grid (all four quadrants) • enumerate possibilities of combinations of two variables • draw 2-D shapes using given dimensions and angles • draw and translate simple shapes on the coordinate plane, and reflect them in the axes. • recognise, describe and build simple 3-D shapes, including making nets • illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius • solve number and practical problems that involve all of the above **Unit 3** <mark>circumference, concentric arc, net, open, closed, ,intersecting, intersection, plane kite, dodecahedron, net, open, closed</mark>	Images SAT questions
S u m m e r	Calculation problems	• 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	• use their knowledge of the order of operations to carry out calculations involving the four operations • express missing number problems algebraically	SAT Questions

		 ● **solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign** ==Unit 1: explain your reasoning, problem solving, application,==	● 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 ==**Unit 1**: application, estimate, problem solve, reasoning==	
	Conversions (links with calculations)	● complete, read and interpret information in tables, including timetables ● solve problems involving converting between units of time ● understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints ● read Roman numerals to 1000 (M) and recognise years written in Roman numerals ==**Unit 2:** imperial unit, conversions, equivalence, interpret, timetable, inches, pounds, pint, gallon==	● use, read, write and convert between standard units, converting measurements of length and mass from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places ● use simple formulae ● express missing number problems algebraically ==**Unit 2** yard, foot, feet, inch, inches, miles, tonne, pound, ounce==	SAT Questions
	Fractions and scaling (links with calculations)	● solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates ● identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers ==Vocabulary: (as previous unit)== ==Unit 2: proper / improper fraction, equivalent, reduced to, cancel, thousandths, in every, for every, scaling, factors, multiples, common factors, factor pairs, lowest common factor, lowest common multiple==	● 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 ==**Year 6**: scale factor, equal, unequal sharing, grouping knowledge, multiples, represent, interpret, hypotheses==	Images SAT Questions www.tes.com/teaching-resource/harry-potter-ratios-scaling-potion-recipes-6451203

			http://www.chandag-jun.bathnes.sch.uk/index_files/Scaling%20up%20and%20down.pdf
Application of skills through extended project	Links with areas of specific weakness.	Business Enterprise style project. **Problem Solving and Reasoning**: ● Represent and interpret numerical and symbolic patterns and relationships. ● Solve mathematical problems and puzzles involving numbers or shapes. ● Suggest and test hypotheses involving numbers or shapes. ● Solve multi-step problems involving whole numbers, decimals, fractions and percentages, in the context of numbers or measurements, including money and time.	