Maths Mastery Curriculum

Year ¾ overview

Key resources to use:

Nrich activities

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 3 and Yr 4

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

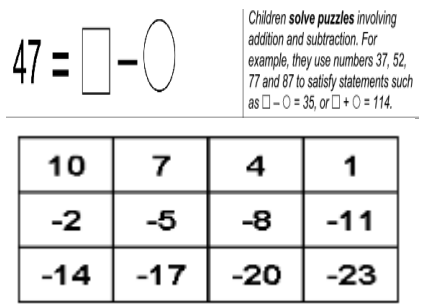
The Calculation Policy should be used when teaching calculations to ensure consistency and progression across the school and within phases. Whilst there may be methods that cover Year 3 and 4 for example, a discussion should take place between the teachers of the Year 3 class and the Year 4 class about 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.

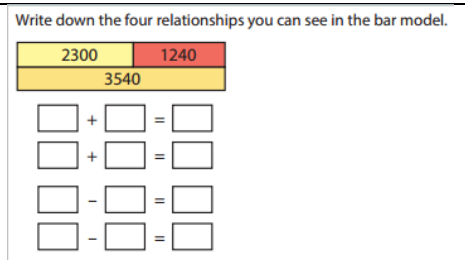
Unit overview

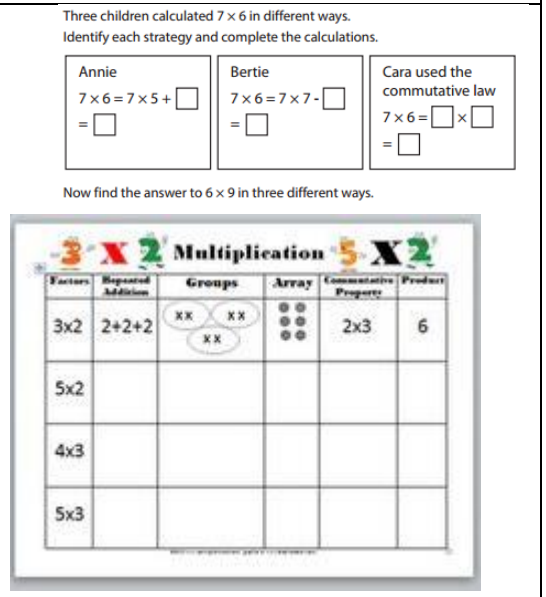
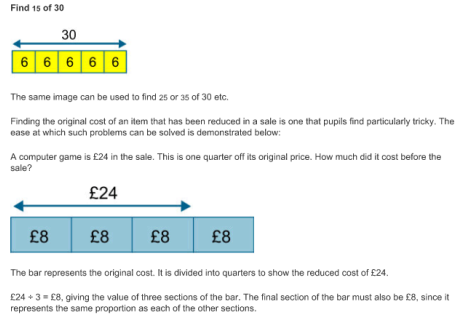
For each unit, it will be useful to plan out the progression of objectives across the period of a whole unit. The link above will take you to a blank layout for you to use to design the progression across a unit. This should make weekly planning easier as you come to do it.

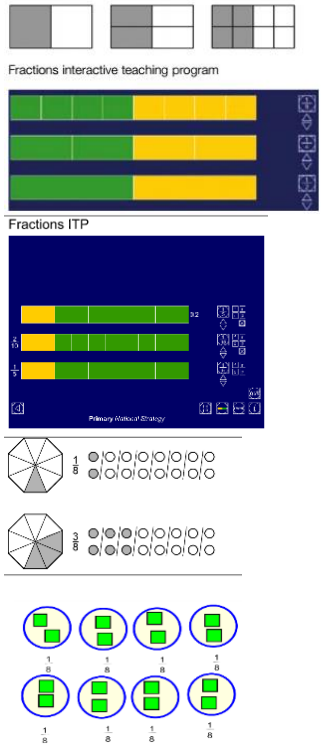
Stepping stones document

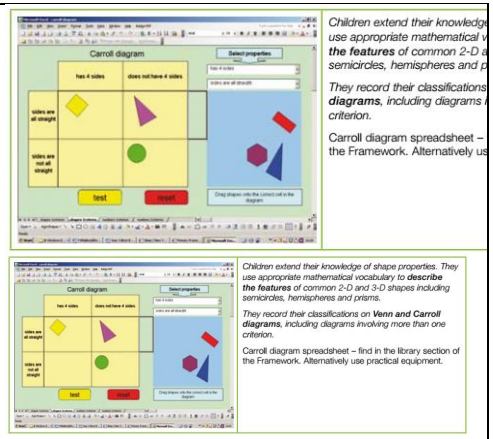
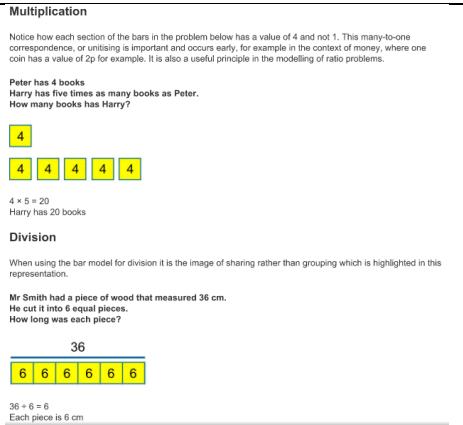
This document can be useful in breaking an objective down into smaller steps to support the learning and development of the concept.

Term	Unit	Year 3 objectives	Year 4 objectives	Examples of reasoning and problem solving
Autumn	Reasoning with number (4 weeks)	• find 10 and 100 more or less than a given number • recognise the place value of each digit (hundreds, tens, ones), • compare and order 3 digit numbers • Count on or back in single-digit steps or multiples of 10 from any given number. • Count on or back in steps of 10, 50 or 100 from any given number. • • read and write numbers up to 1000 in numerals and in words • solve number problems and practical problems involving these ideas • identify, represent and estimate numbers using different representations, including the number line and partitioning in different ways • count from 0 in multiples of 4, 8, 50 and 100 • using Roman numerals from I to XII, and 12-hour and 24-hour clocks • Round two and three digit whole numbers to the nearest 10 VOCAB ones, tens, hundreds, digit, compare, order, greater than, less than, equal to, **equivalent to**, place, place value, represents,	• find 1000 more or less than a given number • recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) • order and compare numbers beyond 1000 (up to 10 000) • solve number and practical problems that involve all of the above and with increasingly large positive numbers • round any number to the nearest 10, 100 or 1000 • 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 • count in multiples of 6, 7, 9, 25 and 1000 • identify, represent and estimate numbers using different representations • Count backwards through zero including negative numbers • Recognise odd and even numbers to at least 1000. VOCAB ones, tens, hundreds, thousands, digit, compare, order, greater than, less than, equal to, equivalent to, place, place value, represents, exchange, count on in factor of, multiples,	Nrich activities Assessment opportunities Models and images  Other models/images/resources: Number line(mental addition and subtraction) Place value counters Digit cards

		exchange, **count on in eights, fifties, to hundreds…** **factor of, multiples,** **relationship,** Roman numerals, rounding, partition, estimate, estimation, numerals, approximate, round up, round down, nearest	relationship, Roman numerals, rounding, partition, estimate, estimation, numerals, approximate, round up, round down, nearest ten, **thousand, hundred thousand, million,** **next** **consecutive, integer, positive, negative,** **above/below zero** **minus, negative numbers** **Bold vocabulary is <u>new</u> vocabulary**	
	Problem solving with addition and subtraction (3 weeks)	• add and subtract two-digit numbers mentally • add and subtract numbers mentally, including: a three-digit number and ones; a three-digit number and tens; a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction VOCAB Addition, add, make, sum, total altogether, increase, more, plus subtract, difference, minus, less, decrease, take away equals, is the same as, **inverse**, tens/**hundreds boundary**, exchange, missing number, near double, half, halve,	• add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate • estimate and use inverse operations to check answers to a calculation • solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why VOCAB Addition, add, make, sum, total altogether, increase, more, plus subtract, difference, minus, less, decrease, take away equals, is the same as, inverse, tens/hundreds boundary, exchange, missing number, near double, half, halve,	 Nrich activities

		Bold vocabulary is <u>new</u> vocabulary		
	Multiplication and division (3 weeks)	• recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects VOCAB Divide, divided by, divided into, share, share equally, left, left over, equal groups of, row, column, multiplication table, multiplication fact, division fact Factor, product, remainder, scaling, missing number, inverse, fact families, describe the pattern, mental calculation	• recall multiplication and division facts for multiplication tables up to 12 × 12 • solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as *n* objects are connected to *m* objects • recognise and use factor pairs and commutativity in mental calculations VOCAB (as Yr 3 plus the vocabulary below) Inverse, square, squared, cube, cubed	 Nrich activities
	Fractions (3-4 weeks)	• add and subtract fractions with the same denominator within one whole *[for example,* $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$ *]* • recognise and show, using diagrams, equivalent fractions with small denominators • count up and down in tenths • recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10	• add and subtract fractions with the same denominator • recognise and show, using diagrams, families of common equivalent fractions • count up and down in hundredths; • recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten • solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number	• Nrich activities • Fraction bars 

		• recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators • recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators • compare and order unit fractions, and fractions with the same denominators • solve problems that involve all of the above VOCAB equivalent fraction, mixed number, numerator, denominator, two halves, two quarters, three quarters, one third, two thirds, one of three equal parts, sixths, sevenths, eigths, tenths… unit fraction, non-unit fraction	• Compare and order fractions with the same denominators and unit fractions VOCAB (as Yr 3 plus the vocabulary below) Hundredths, decimal, decimal fraction, decimal point, decimal place, decimal equivalent, proportion	
Spring	Investigating shape (with calculation links) (3 weeks)	• measure the perimeter of simple 2-D shapes • continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed … and simple equivalents of mixed units (for example, 5m = 500cm) • recognise angles as a property of shape or a description of a turn • identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle	• measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres • convert between different units of measure [for example, kilometre to metre] • find the area of rectilinear shapes by counting squares • compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes • identify acute and obtuse angles and compare and order angles up to two right angles by size VOCAB (as Yr 3 with the following vocabulary) two dimensional, oblong, rectilinear, equilateral triangle, isosceles triangle.	• Nrich activities • Measuring perimeter, recognise types of lines, recognise angles as a turn angles. OBJ

		• identify horizontal and vertical lines and pairs of perpendicular and parallel lines VOCAB Pentagonal, hexagonal, octagonal, quadrilateral, right angled, parallel, perpendicular, horizontal, perpendicular, perimeter, equivalent, diagonal, angle, … is a greater/ smaller angle than, acute angle, obtuse angle millimetre, kilometre, mile, distance apart… between… to… from…	scalene triangle, heptagon, parallelogram, rhombus, trapezium, polygon, Breadth, edge, area, covers, square centimetres cm² unit, standard unit, metric unit angle measurer, compass Line, construct, sketch, centre, angle, right-angled, base, square based, reflect, reflection, regular, irregular	
Reasoning with multiplication and division (2 weeks)		• recall and use multiplication and division facts for the 3 and 4 multiplication tables • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods • solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects VOCAB factor of, relationship, factor, product, remainder, scaling, missing number problems, one digit, two digit, mental	• use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers • multiply two-digit and three-digit numbers by a one-digit number using formal written layout • Solve problems involving the above • VOCAB Inverse, place value, grid method, formal written method, mental method	 • Nrich activities

		calculation, written calculation, place value, grid method		
	Decimals and fractions (focus on calculation) (2 weeks)	• count up and down in tenths • recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10 • solve problems that involve all of the above VOCAB greatest value, least value, statement, tenths, division, problem, place value, equivalent, decimal fraction	• find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths • recognise and write decimal equivalents of any number of tenths or hundredths • recognise and write decimal equivalents to $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$ • round decimals with one decimal place to the nearest whole number • compare numbers with the same number of decimal places up to two decimal places VOCAB Hundredths, decimal, decimal fraction, decimal point, decimal place, decimal equivalent, proportion, place value, ten times smaller, round, whole number	• Fractions and decimals • Nrich activities
	Problem solving with addition and subtraction (2 weeks)	• measure, compare, add and subtract: lengths (m/cm/mm) • solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction • Add and subtract amounts of money in pounds and pence to give change VOCAB millimetre, kilometre, mile, addition, add, make, sum, total altogether, increase, more, plus	• solve simple measure and money problems involving fractions and decimals to two decimal places • estimate, compare and calculate different measures, including money in pounds and pence VOCAB (as Yr 3 and including the following) Estimate, roughly, approximately, decimal places, fractions, decimals, problem, method, efficient, representation	• Nrich activities

		subtract, difference, minus, less, decrease, take away equals, is the same as, inverse, tens/hundreds boundary, exchange, missing number, near double, half, halve,		
	Statistics (1 week)	• interpret and present data using bar charts, pictograms and tables solve one-step and two-step questions [for example, 'How many more?' and 'How many fewer?'] using information presented in scaled bar charts and pictograms and tables VOCAB chart, bar chart, frequency table, Carroll diagram, Venn diagram, axis, axes, diagram	• solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs • interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs VOCAB (as Yr 3 plus the following) Survey, questionnaire, data	• Nrich activities
Summer	Multiplication and division (1 week)	Focus on 3,4 and 8 times table • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods VOCAB factor of, relationship, factor, product, remainder, scaling, missing number problems, one digit, two digit, mental	Focus on 6, 7 and 9 times table • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers and 3 digit times one digit, using mental and progressing to formal written methods VOCAB Inverse, place value, grid method, formal written method, mental method	Nrich activities

		calculation, written calculation, place value, grid method		
	Problem solving with time (including use of calculation strategies) (2-3 weeks)	• tell and write the time from an analogue clock • estimate and read time with increasing accuracy to the nearest minute • record and compare time in terms of seconds, minutes and hours • use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight • know the number of seconds in a minute and the number of days in each month, year and leap year • compare durations of events [for example to calculate the time taken by particular events or tasks] VOCAB Fortnight, 5, 10, 15… minutes past, digital, analogue, timer Century, calendar, earliest, latest, am, pm, Roman numerals, 12-hour clock time, 24-hour clock time	• convert between different units of measure [for example, hour to minute] • problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days • write and convert time between analogue and digital 12- and 24-hour clocks VOCAB (as Yr 3 plus the following) leap year, millennium, noon, date of birth, timetable, arrive depart	• Nrich activities
	Measurement (including calculation strategies and fractions) (2-3 weeks)	• measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) • solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction • continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (for example, 1 kg and 200g) and simple equivalents of mixed units (for example, 5m = 500cm) VOCAB Temperature, centigrade, millimetre, kilometre, mile, conversion, kilogram,	• find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths • solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number • solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why VOCAB Multiply and divide by 10, 100, decimal, decimal place, tenths, hundredths, fractions, quantities, unit fraction, non-unit fraction Temperature, centigrade, millimetre, kilometre, mile, conversion, kilogram, gram,	• Nrich activities

		gram, litre, millilitre, millimetre, centimetre, equivalent, units Mass, big, bigger, small, smaller, weight, heavy/ light, heavier / lighter, heaviest / lightest	litre, millilitre, millimetre, centimetre, equivalent, units Mass, big, bigger, small, smaller, weight, heavy/ light, heavier / lighter, heaviest / lightest	
	Geometry (2 weeks)	• draw 2-D shapes and make 3-D shapes using modelling materials • recognise 3-D shapes in different orientations and describe them • Mark a given square on a grid, e.g. A3 • Continue to recognise and devise patterns and sequences in shapes • Give and follow multi-step directions in own environment VOCAB compass point, north, south, east, west, N,S,E,W, hemisphere, prism, triangular prism, two dimensional, three dimensional, pattern, sequence, face, edge, vertex, vertices, cube, pyramidsphere, cone	• identify lines of symmetry in 2-D shapes presented in different orientations • 3D shapes • complete a simple symmetric figure with respect to a specific line of symmetry • describe positions on a 2-D grid as coordinates in the first quadrant • describe movements between positions as translations of a given unit to the left/right and up/down • plot specified points and draw sides to complete a given polygon VOCAB (as Y3 plus the following) north-east, north-west, south-east, south-west, NE, NW, SE, SW, translate, translation, rotate, rotation three- dimensional, spherical, cylindrical, tetrahedron, polyhedron two dimensional, oblong, rectilinear, equilateral triangle, isosceles triangle, scalene triangle, heptagon, parallelogram, rhombus, trapezium, polygon	• OBJ • Nrich activities
	Calculating with whole numbers and decimals (3 weeks)	• Consolidation of calculation strategies and application to problems (including fractions) •	Consolidation of calculation strategies and application to problems (including fractions)	Nrich activities