



**Yew
Chung
International
School
2017**

**Primary Mathematics
Curriculum**

Guiding Statements

Purpose and Rationale

The purpose of studying Mathematics at YCIS is to inspire a lifelong appreciation of mathematics by stimulating curiosity and developing critical thinking and problem solving skills. Our aim is for students to become confident mathematicians who have the ability to apply, reason, explain and communicate their mathematical knowledge and understanding in and to, real world situations.

Our students will use mathematical reasoning to recognize the interconnectedness of mathematics with other subject areas and the world. They will demonstrate persistence, patience and creativity, incorporating the use of technology, to become effective contributors to society. They will be prepared to analyse and ethically apply their mathematical knowledge to global situations.

Belief Statements

We believe students learn Mathematics best when they...

- Feel safe and secure in an effective, supportive and nurturing environment where positive attitudes towards mathematics are shown and encouraged
- Are intrinsically motivated and engaged in and through the learning experience
- Understand connections between mathematical learning and real-world applications
- See the relevance of Mathematics to personal, local, and global real world issues
- Are given the opportunity to learn in many ways, including whole group instruction, small group collaborations, independent inquiry, project based activities and hands-on experiences that reinforce mathematical thinking
- Use the proper mathematical language and notation to communicate mathematical thinking to others
- Have a strong foundation in mathematical skills and are supported by strategically scaffolded instruction
- Are taught and assessed through differentiated means for knowledge and skills gained
- Are given opportunities to learn through multiple intelligences and learning styles
- Understand that mathematics gives them effective access to the wider curriculum and enables them to be confident and competent problem solvers and critical thinkers
- Are provided opportunities to experience continued success through challenging and empowering learning experiences that develop the enquiring mind
- Are empowered to take risks and appreciate that mistakes are part of the learning process; by self-evaluating are able to reshape their approaches to problem solving
- Recognise and reflect that mathematical learning is a journey of achievable individual goals, and are given opportunities to achieve and evaluate them
- Collaborate with peers, celebrate and support peer learning
- Are given technological and physical tools, skills and strategies to explore and apply mathematics in its range of uses

Overarching Learning Expectations

Upon graduating from YCIS, students will be equipped to:

- Employ essential mathematical knowledge and techniques in a comprehensible, coherent and rigorous way
- Be fluent in the language of mathematics
- Use analytical and quantitative skills to construct logical arguments and expose illogical ones with justification and effective communication
- Analyse, manipulate and critically assess information for the purpose of solving problems
- Engage in experimental, modelling and inquiry based mathematical investigations
- Explore the world around us with confidence, determination, perseverance and creativity
- Comprehend the need for precision and accuracy in relevant contexts
- Appreciate the role of mathematics as an interdisciplinary skillset where the application of mathematical concepts adds depth to various aspects of life
- Take advantage of the opportunities that are afforded by a more technologically dependent world
- Understand and appreciate how mathematics provides a foundation for the world, using established concepts ethically and creatively to solve ever-changing global issues

Primary Years Mathematics Curriculum Years 1 - 6

Curriculum Area Overview

	PowerSchool Reference					
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Domain 1 – Applying and Using Mathematics						
Strand A Problem Solving Skills and Processes	1MAUMPSSP	2MAUMPSSP	3MAUMPSSP	4MAUMPSSP	5MAUMPSSP	6MAUMPSSP
Domain 2 - Number						
Strand A Number and Place Value	1MNNPV	2MNNPV	3MNNPV	4MNNPV	5MNNPV	6MNNPV
Strand B Addition and Subtraction	1MNAS	2MNAS	3MNAS	4MNAS	5MNAS	6MNAS
Strand C Multiplication and Division	1MNMD	2MNMD	3MNMD	4MNMD	5MNMD	6MNMD
Strand D Fractions	1MNF	2MNF	3MNF	4MNF	5MNF	6MNF
Strand E Ratio and Proportion (Yr 6 only)						6MNRP
Strand F Algebra (Yr 6 only)						6MNA
Domain 3 - Measurement						
Strand B Measurement Concepts	1MMMC	2MMMC	3MMMC	4MMMC	5MMMC	6MMMC
Domain 4 - Geometry						
Strand A Properties of Shape	1MGPS	2MGPS	3MGPS	4MGPS	5MGPS	6MGPS
Strand B Position and Direction	1MGPD	2MGPD	3MGPD	4MGPD	5MGPD	6MGPD
Domain 5 - Statistics						
Strand A Analyse and Represent Data	1MSARD	2MSARD	3MSARD	4MSARD	5MSARD	6MSARD

Year 1

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 1MAUMPSSP1 Solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money, for example to 'pay' and 'give change'
- 1MAUMPSSP2 Describe a puzzle or problem using numbers, practical materials and diagrams; use these to solve the problem and set the solution in the original context
- 1MAUMPSSP3 Answer a question by selecting and using suitable equipment, and sorting information, shapes or objects; display results using tables and pictures
- 1MAUMPSSP4 Describe simple patterns and relationships involving numbers or shapes; decide whether examples satisfy given conditions
- 1MAUMPSSP5 Describe ways of solving puzzles and problems, explaining choices and decisions orally or using pictures

Domain 2: Number

Strand A: Number and Place Value

- 1MNNPV1 Count reliably at least 100 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting
- 1MNNPV2 Compare and order numbers, using the related vocabulary (equal to, more than, less than (fewer), most and least, first, second, third, etc.) using the following mathematical statements $-$, $+$ and $=$
- 1MNNPV3 Read and write numerals from 0 to 100, then beyond; use knowledge of place value to position these numbers on a number track and number line
- 1MNNPV4 Count on or back in ones, twos, fives and tens and use this knowledge to derive the multiples of 2, 5 and 10 to the tenth multiple
- Guidance
- Students practise counting (1, 2, 3...), ordering (for example, first, second, third...), and to indicate a quantity (for example, 3 apples, 2 centimetres), including solving simple concrete problems, until they are fluent.
- Students begin to recognise place value in numbers beyond 20 by reading, writing, counting and comparing numbers up to 100, supported by objects and pictorial representations.
- Students practise counting as reciting numbers and counting as enumerating objects, and counting in twos, fives and tens from different multiples to develop their recognition of patterns in the number system (for example, odd and even numbers), including varied and frequent practice through increasingly complex questions.
- Students recognise and create repeating patterns with objects and with shapes.

Strand B: Addition and Subtraction

- 1MNAS1 Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10
- 1MNAS2 Derive and recall all pairs of numbers with a total of 20 and addition facts for totals to at least 5; work out the corresponding subtraction facts
- 1MNAS3 Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number
- 1MNAS4 Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number
- 1MNAS5 Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences

Guidance

Students memorise and reason with number bonds to 10 and 20 in several forms (for example, $9 + 7 = 16$; $16 - 7 = 9$; $7 = 16 - 9$). They realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.

Students combine and increase numbers, counting forwards and backwards.

Students discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that students develop the concept of addition and subtraction and are enabled to use these operations flexibly.

Strand C: Multiplication and Division

1MNMD1 Recall the doubles of all numbers to at least 20

1MNMD2 Solve practical problems that involve combining groups of 2, 5 or 10, or sharing into equal groups

Guidance

Through grouping and sharing small quantities, students begin to understand multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

They make connections between arrays, number patterns, and counting in twos, fives and tens.

Strand D: Fractions

1MNF1 Use the vocabulary as well as recognise and find halves and quarters in context

Guidance

Students learn half and quarter as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. For example, they could recognise and find half a length, quantity, set of objects or shape.

Students connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognise and combine halves and quarters as parts of a whole.

Domain 3: Measurement

Strand A: Measurement Concepts

1MMMC1 Estimate, measure, weigh, record and compare objects, choosing and using suitable uniform non-standard or standard units and measuring instruments (e.g. a lever balance, metre stick or measuring jug)

1MMMC2 Use vocabulary related to time (before and after, next, first, today, yesterday, tomorrow, morning, afternoon, evening); order days of the week and months; read and represent the time to the hour and half hour

Guidance

The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage.

Students move from using and comparing different types of quantities and measures using non-standard units, including discrete (for example, counting) and continuous (for example, liquid) measurement, to using manageable common standard units.

In order to become familiar with standard measures, students begin to use measuring tools such as a ruler, weighing scales and containers.

Students use the language of time, including telling the time throughout the day, first using o'clock and then half past.

Domain 4: Geometry

Strand A: Properties of Shape

1MGPS1 Visualise and name common 2-D shapes and 3-D solids and describe their features; use them to make patterns, pictures and models

Guidance

Students handle common 2-D and 3-D shapes, naming these and related everyday objects fluently. They recognise these shapes in different orientations and sizes, and know that rectangles, triangles, cuboids and pyramids are not always similar to each other.

Strand B: Position and Direction

1MGPD1 Identify objects that turn about a point (e.g. scissors) or about a line (e.g. a door); recognise and make whole, half and quarter turns

1MGPD2 Visualise and use everyday language to describe the position of objects and direction and distance when moving them, for example when placing or moving objects on a game board

Guidance

Students use the language of position, direction and motion, including: left and right, top, middle and bottom, on top of, in front of, above, between, around, near, close and far, up and down, forwards and backwards, inside and outside.

Students make whole, half, quarter and three-quarter turns in both directions and connect turning clockwise with movement on a clock face.

Domain 5: Statistics

Strand A: Analyse and Represent Data

1MSARD1 Answer a question by recording information in lists and tables; present Learning Standards using practical resources, pictures, block graphs or pictograms

1MSARD2 Use diagrams to sort objects into groups according to a given criterion; suggest a different criterion for grouping the same objects

Year 2

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 2MAUMPSSP1 Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures or appropriate monetary notation
- 2MAUMPSSP2 Identify and record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem
- 2MAUMPSSP3 Follow a line of enquiry; answer questions by choosing and using suitable equipment and selecting, organising and presenting information in lists, tables and simple diagrams
- 2MAUMPSSP4 Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples
- 2MAUMPSSP5 Present solutions to puzzles and problems in an organised way; explain decisions, methods and results in pictorial, spoken or written form, using mathematical language and number sentences

Domain 2: Number

Strand A: Number and Place Value

- 2MNNPV1 Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers
- 2MNNPV2 Count up to 100 objects by grouping them and counting in tens, fives, fours and twos forwards and backwards; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1
- 2MNNPV3 Order two-digit numbers and position them on a number line; use the greater than (>) and less than (<) signs
- 2MNNPV4 Estimate a number of objects; round two-digit numbers to the nearest 10 (Extension: find, name and write these, including with quantities)
- 2MNNPV5 Use the symbols +, -, ×, ÷ and = to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. $\div 2 = 6$, $30 - = 24$)

Guidance

Using materials and a range of representations, students practise counting, reading, writing and comparing numbers to at least 100 and solving a variety of related problems to develop fluency. They count in multiples of three to support their later understanding of "a third".

As they become more confident with numbers up to 100, students are introduced to larger numbers to develop further their recognition of patterns within the number system and represent them in different ways, including spatial representations.

Students should partition numbers in different ways (for example, $23 = 20 + 3$ and $23 = 10 + 13$) to support subtraction. They become fluent and apply their knowledge of numbers to reason with, discuss and solve problems that emphasise the value of each digit in two-digit numbers. They begin to understand zero as a placeholder.

Strand B: Addition and Subtraction

- 2MNAS1 Derive and recall all addition and subtraction facts for each number to at least 20, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100
- 2MNAS2 Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves
- 2MNAS3 Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number; use practical and informal written methods to add and subtract two-digit number
- 2MNAS4 Understand that subtraction is the inverse of addition and vice versa; use this to derive and record related addition and subtraction number sentences
- 2MNAS5 Use knowledge of number facts and operations, including that addition (not subtraction) can be done in any order, to estimate and check answers to calculations

Guidance

Students extend their understanding of the language of addition and subtraction to include sum and difference.

Students practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using $3 + 7 = 10$; $10 - 7 = 3$ and $7 = 10 - 3$ to calculate $30 + 70 = 100$; $100 - 70 = 30$ and $70 = 100 - 30$. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, $5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5$). This establishes commutativity and associativity of addition.

Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Strand C: Multiplication and Division

2MNMD1 Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10

2MNMD2 Represent repeated addition and arrays as multiplication, and sharing and repeated subtraction (grouping) as division; use practical and informal written methods and related vocabulary to support multiplication and division, including calculations with remainders and knowing that multiplication (not division) can be done in any order

Guidance

Students use a variety of language to describe multiplication and division.

Students are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.

Students work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition. They begin to relate these to fractions and measures (for example, $40 \div 2 = 20$, 20 is a half of 40). They use commutativity and inverse.

Strand D: Fractions

2MNF1 Recognise one half, one quarter and three quarters of shapes, sets of objects

Guidance

Students use fractions as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. They connect unit fractions to equal sharing and grouping, to numbers when they can be calculated, and to measures, finding fractions of lengths, quantities, sets of objects or shapes.

Domain 3: Measurement

Strand A: Measurement Concepts

2MMMC1 Estimate, compare and measure lengths and temperature, choosing and using appropriate standard units (m, cm, °C) and suitable measuring instruments

2MMMC2 Recognise units of measurement for weight and capacity (g, kg, ml, L) (Local application: read and be aware of units of measurement for environmental concerns, e.g. AQI measures)

2MMMC3 Read the numbered divisions on a scale, and interpret the divisions between them (e.g. on a scale from 0 to 25 with intervals of 1 shown but only the divisions 0, 5, 10, 15 and 20 numbered); use a ruler to draw and measure lines to the nearest centimeter

2MMMC4 Recognise and use symbols for money, including local currencies and pounds (£) and pence (p); combine amounts to make a particular value (extension: recognise and use other base 100 currencies, e.g. dollars, etc.)

2MMMC5 Find different combinations of coins that equal the same amount of money

2MMMC6 Use, compare and sequence units of time (seconds, minutes, hours, days) and know the relationships between them

2MMMC7 Read the time to the quarter hour; identify time intervals that fall on the quarter hours, including those that cross the hour

Guidance

The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage.

Students move from using and comparing different types of quantities and measures using non-standard units, including discrete (for example, counting) and continuous (for example, liquid) measurement, to using manageable common standard units. In order to become familiar with standard measures, students begin to use measuring tools such as a ruler, weighing scales and containers.

Students use the language of time, including telling the time throughout the day, first using o'clock and then half past.

Domain 4: Geometry

Strand A: Properties of Shape

- 2MGPS1 Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
- 2MGPS2 Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
- 2MGPS3 Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
- 2MGPS4 Compare and sort common 2-D and 3-D shapes and everyday objects

Guidance

Students handle and name a wide variety of common 2-D and 3-D shapes including: quadrilaterals and other polygons, and cuboids, other prisms and cones, and identify the properties of each shape (for example, number of sides, number of faces).

Students identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.

Students read and write names for shapes that are appropriate for their word reading and spelling.

Students draw lines and shapes using a straight edge.

Strand B: Position and Direction

- 2MGPD1 Order and arrange combinations of mathematical objects in patterns and sequences
- 2MGPD2 Follow and give instructions involving position, direction and movement
- 2MGPD3 Recognise and use whole, half and quarter turns, both clockwise and anticlockwise; know that a right angle represents a quarter turn

Guidance

Students work with patterns of shapes, including those in different orientations.

Students use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (for example, students themselves moving in turns, giving instructions to other students to do so, and programming robots using instructions given in right angles).

Domain 5: Statistics

Strand A: Analyse and Represent Data

- 2MSARD1 Interpret and construct simple pictograms, tally charts, block diagrams and tables; use ICT where appropriate
- 2MSARD2 Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
- 2MSARD3 Ask and answer questions about totaling and comparing categorical data
- 2MSARD4 Explain choices using appropriate language, including 'not' (e.g. "a rectangle, not a rectangle; an even number, not an even number")

Guidance

Students record, interpret, collate, organise and compare information (for example, using many-to-one correspondence in pictograms with simple ratios 2, 5, 10).

Year 3

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 3MAUMPSSP1 Solve the information in a puzzle or problem using numbers, images or diagrams; use these to find a solution and present it in context, where appropriate using appropriate monetary notation or units of measure
- 3MAUMPSSP2 Describe and explain methods, choices and solutions to puzzles and problems, orally and in writing, using pictures and diagrams

Domain 2: Number

Strand A: Number and Place Value

- 3MNNPV1 Read and write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10
- 3MNNPV2 Partition three-digit numbers into multiples of 100, 10 and 1 in different ways
- 3MNNPV3 Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences

Guidance

Students use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.

Students use larger numbers to at least 1000, applying partitioning related to place value using varied and increasingly complex problems, building on work in year 2 (for example, $146 = 100 + 40$ and 6 , $146 = 130 + 16$).

Using a variety of representations, including those related to measure, students continue to count in ones, tens and hundreds, so that they become fluent in the order and place value of numbers to 1000.

Strand B: Addition and Subtraction

- 3MNAS1 Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100
- 3MNAS2 Add or subtract mentally combinations of one-digit and two-digit numbers
- 3MNAS3 Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers
- 3MNAS4 Use knowledge of number facts and operations, including that addition (not subtraction) can be done in any order, to estimate and check answers to calculations

Guidance

Students practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100.

Students use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent.

Strand C: Multiplication and Division

- 3MNMD1 Derive and recall multiplication facts for the 2, 3, 4, 5, 8 and 10 times-tables and the corresponding division facts; recognise multiples of 2, 5 or 10 up to 1000
- 3MNMD2 Use knowledge of number operations and corresponding inverses, including doubling and halving, to estimate and check calculations
- 3MNMD3 Multiply one-digit and two-digit numbers by 10 or 100, and describe the effect

3MNMD4 Use practical and informal written methods to multiply and divide two-digit numbers (e.g. 13 3, 50 4); round remainders up or down, depending on the context

3MNMD5 Understand that division is the inverse of multiplication and vice versa; use this to derive and record related multiplication and division number sentences

Guidance

Students continue to practise their mental recall of multiplication tables when they are calculating mathematical statements in order to improve fluency. Through doubling, they connect the 2, 4 and 8 multiplication tables.

Students develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (for example, using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts (for example, $30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$).

Students develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.

Students solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children).

Strand D: Fractions

3MNF1 Recognise and write proper fractions (e.g. $3/7$, $9/10$), interpreting the denominator as the parts of a whole and the numerator as the number of parts; identify and estimate fractions of shapes; use diagrams to compare fractions and establish equivalents with common denominators; add and subtract fractions with common denominators to make totals less than 1 whole

3MNF2 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

3MNF3 Find unit fractions of numbers and quantities (e.g. $1/2$, $1/3$, $1/4$ and $1/6$ of 12 litres)

Guidance

Students connect tenths to place value, decimal measures and to division by 10.

Students begin to understand unit and non-unit fractions as numbers on the number line, and deduce relations between them, such as size and equivalence. They should go beyond the $[0, 1]$ interval, including relating this to measure.

Students understand the relation between unit fractions as operators (fractions of), and division by integers.

Students continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, and unit fractions as a division of a quantity.

Students practise adding and subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency.

Domain 3: Measurement

Strand A: Measurement Concepts

3MMMC1 Know the relationships between kilometres and metres, metres and centimetres, kilograms and grams, litres and millilitres; choose and use appropriate units to estimate, measure and record measurements

3MMMC2 Measure the perimeter of simple 2-D shapes

3MMMC3 Read, to the nearest division and half-division, scales that are numbered or partially numbered; use the information to measure and draw to a suitable degree of accuracy

3MMMC4 Read the time on a 12-hour digital clock and to the nearest 5 minutes on an analogue clock; calculate time intervals and find start or end times for a given time interval (extension: use Roman numerals and 24-hour clocks)

3MMMC5 Know the number of seconds in a minute and the number of days in each month, year and leap year

3MMMC6 Solve one-step and two-step problems involving numbers, money or measures, including time, choosing and carrying out appropriate calculations

Guidance

Students 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).

The comparison of measures includes simple scaling by integers (for example, a given quantity or measure is twice as long or five times as high) and this connects to multiplication.

Students continue to become fluent in recognising the value of coins, by adding and subtracting amounts, including mixed units, and giving change using manageable amounts. They record £ and p separately. The decimal recording of money is introduced formally in year 4.

Students use both analogue and digital 12-hour clocks and record their times. In this way they become fluent in and prepared for using digital 24-hour clocks in year 4.

Domain 4: Geometry

Strand A: Properties of Shape

- 3MGPS1 Relate 2-D shapes and 3-D solids to drawings of them; describe, visualise, classify, draw and make the shapes
- 3MGPS2 Draw and complete shapes with reflective symmetry; draw the reflection of a shape in a mirror line along one side
- 3MGPS3 Use a set-square to draw right angles and to identify right angles in 2-D shapes; identify angles larger than/smaller than right angles; recognise that a straight line is equivalent to two right angles
- 3MGPS4 Identify horizontal and vertical lines and pairs of perpendicular and parallel lines

Guidance

Students' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. Students extend their use of the properties of shapes. They should be able to describe the properties of 2-D and 3-D shapes using accurate language, including lengths of lines and acute and obtuse for angles greater or lesser than a right angle.

Students connect decimals and rounding to drawing and measuring straight lines in centimetres, in a variety of contexts.

Strand B: Position and Direction

- 3MGPD1 Read and record the vocabulary of position, direction and movement, using the four compass directions to describe movement about a grid
- 3MGPD2 Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn
- 3MGPD3 Identify patterns and relationships involving numbers or shapes, and use these to solve problems

Guidance

Students consolidate the concept and language of angles as parts of a complete turn.

Students are introduced to positioning on a grid, including using coordinate vocabulary to describe position and compass directions to describe movement.

Students have identified patterns with numbers and shapes in lower years; now they begin to use these patterns to solve simple problems.

Domain 5: Statistics

Strand A: Analyse and Represent Data

- 3MSARD1 Answer a question by collecting, organising and interpreting data; use tally charts, frequency tables, pictograms and bar charts to represent results and illustrate observations; use ICT to create a simple bar chart
- 3MSARD2 Use Venn diagrams or Carroll diagrams to sort data and objects using more than one criterion
- 3MSARD3 Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables
- 3MSARD4 Follow a line of enquiry by deciding what information is important; make and use lists, tables and graphs to organise and interpret the information

Guidance

Students understand and use simple scales (for example, 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy.

Students continue to interpret data presented in many contexts.

Year 4

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 4MAUMPSSP1 Solve one-step and two-step problems involving numbers, money or measures, including time; choose and carry out appropriate calculations, using calculator methods where appropriate
- 4MAUMPSSP2 Represent a puzzle or problem using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem
- 4MAUMPSSP3 Suggest a line of enquiry and the strategy needed to follow it; collect, organise and interpret selected information to find answers
- 4MAUMPSSP4 Identify and use patterns, relationships and properties of numbers or shapes; investigate a statement involving numbers and test it with examples
- 4MAUMPSSP5 Report solutions to puzzles and problems, giving explanations and reasoning orally and in writing, using diagrams and symbols
- 4MAUMPSSP6 Use knowledge of rounding, number operations and inverses to estimate and check calculations
- 4MAUMPSSP7 Use a calculator to carry out one-step and two-step calculations involving all four operations; recognise negative numbers in the display, correct mistaken entries and interpret the display correctly in the context of money

Domain 2: Number

Strand A: Number and Place Value

- 4MNNPV1 Recognise and continue number sequences formed by counting on or back in steps of constant size
- 4MNNPV2 Partition, round and order four-digit whole numbers; use positive and negative numbers in context and position them on a number line; state inequalities using the symbols $<$ and $>$ (e.g. $-3 > -5$, $-1 < 1$)
- 4MNNPV3 Round any number to the nearest 10, 100 or 1000
- 4MNNPV4 Round decimals with one decimal place to the nearest whole number
- 4MNNPV5 Count backwards through zero to include negative numbers
- 4MNNPV6 Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
- 4MNNPV7 Order and compare numbers beyond 1000
- 4MNNPV8 Identify, represent and estimate numbers using different representations, including measures

Guidance

Using a variety of representations, including measures, students become fluent in the order and place value of numbers beyond 1000, including counting in tens and hundreds, and maintaining fluency in other multiples through varied and frequent practice.

Students begin to extend their knowledge of the number system to include the decimal numbers and fractions that they have met so far.

Students connect estimation and rounding numbers to the use of measuring instruments.

Strand B: Addition and Subtraction

- 4MNAS1 Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000
- 4MNAS2 Add or subtract mentally pairs of two-digit whole numbers (e.g. $47 + 58$, $91 - 35$)
- 4MNAS3 Refine and use efficient written methods to add and subtract whole numbers with up to 4 digits and money

Guidance

Students continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency.

Strand C: Multiplication and Division

- 4MNMD1 Count in multiples of 6, 7, 9, 25 and 1000
- 4MNMD2 Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves
- 4MNMD3 Derive and recall multiplication facts up to 10×10 and derive multiplication beyond the 10 times table, the corresponding division facts and multiples of numbers to 10 up to the tenth multiple
- 4MNMD4 Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit
- 4MNMD5 Multiply and divide numbers to 1000 by 10 and then 100 (whole-number answers), understanding the effect; relate to scaling up or down
- 4MNMD6 Develop and use written methods to record, support and explain multiplication and division of two-digit and three-digit numbers by a one-digit number, including division with remainders (e.g. 155×9 , $98 \div 6$)
- 4MNMD7 Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; derive multiplication of three one-digit numbers
- 4MNMD8 Recognise and use factor pairs and the commutativity property of multiplication and addition in mental calculations

Guidance

Students continue to practise recalling and using multiplication tables and related division facts to aid fluency.

Students practise mental methods and extend this to three-digit numbers to derive facts, (for example $600 \div 3 = 200$ can be derived from $2 \times 3 = 6$).

Students practise to become fluent in the formal written method of short multiplication and short division with exact answers

Students write statements about the equality of expressions (for example, use the distributive law $39 \times 7 = 30 \times 7 + 9 \times 7$ and associative law $(2 \times 3) \times 4 = 2 \times (3 \times 4)$). They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, $2 \times 6 \times 5 = 10 \times 6 = 60$.

Students solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.

Strand D: Fractions

- 4MNF1 Recognise the equivalence between decimal and fraction forms of one half, quarters, tenths and hundredths
- 4MNF2 Use diagrams to identify equivalent fractions (e.g. $6/8$ and $3/4$, or $70/100$ and $7/10$); interpret mixed numbers and position them on a number line (e.g. $31/2$)
- 4MNF3 Use the vocabulary of ratio and proportion to describe the relationship between two quantities (e.g. 'There are 2 red beads to every 3 blue beads, or 2 beads in every 5 beads are red'); estimate a proportion (e.g. 'about one quarter of the apples in the box are green')
- 4MNF4 Find fractions (including non-unit fractions) of numbers, quantities or shapes, where the answer is a whole number (e.g. $2/5$ of 30 plums, $2/8$ of a 6 by 4 rectangle)
- 4MNF5 Add and subtract fractions with the same denominator to make one whole (e.g. $? + 3/7 = 1$?)

Guidance

Students connect hundredths to tenths and place value and decimal measure.

They extend the use of the number line to connect fractions, numbers and measures.

Students understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths.

Students make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities. Students use factors and multiples to recognise equivalent fractions and simplify where appropriate (for example, $6/9 = 2/3$ or $1/4 = 2/8$).

Students continue to practise adding and subtracting fractions with the same denominator, to become fluent through a variety of increasingly complex problems beyond one whole.

Students learn that decimals and fractions are different ways of expressing numbers and proportions.

Students' understanding of the number system and decimal place value is extended at this stage to tenths and then hundredths. This includes relating the decimal notation to division of whole number by 10 and later 100.

They practise counting using simple fractions and decimals, both forwards and backwards.

Students learn decimal notation and the language associated with it, including in the context of measurements. They make comparisons and order decimal amounts and quantities that are expressed to the same number of decimal places. They should be able to represent numbers with one or two decimal places in several ways, such as on number lines.

Domain 3: Measurement

Strand A: Measurement Concepts

- 4MMMC1 Choose and use standard metric units and their abbreviations when estimating, measuring and recording length, weight and capacity, and base-ten money; know the meaning of 'kilo', 'centi' and 'milli' and, where appropriate, use decimal notation to record measurements (e.g. 1.3 m or 0.6 kg)
- 4MMMC2 Interpret intervals and divisions on partially numbered scales and record readings accurately, where appropriate to the nearest tenth of a unit
- 4MMMC3 Draw rectangles and measure and calculate their perimeters; find the area of rectilinear shapes drawn on a square grid by counting squares
- 4MMMC4 Read time to the nearest minute; use am, pm and 12- hour clock notation; read 24-hour clocks; choose units of time to measure time intervals; calculate time intervals from clocks and timetables, including over the hour
- 4MMMC5 Solve problems involving converting between hours and minutes; minutes and seconds; years and months; weeks and days

Guidance

Students build on their understanding of place value and decimal notation to record metric measures, including money.

Students use multiplication to convert from larger to smaller units.

Perimeter can be expressed algebraically as $2(a + b)$ where a and b are the dimensions in the same unit.

Students relate area to arrays and multiplication.

Domain 4: Geometry

Strand A: Properties of Shape

- 4MGPS1 Draw polygons and classify them by identifying their properties, including their line symmetry
- 4MGPS2 Identify lines of symmetry in 2-D shapes presented in different orientations
- 4MGPS3 Identify 3-D objects from 2-D drawings; make nets of common solids
- 4MGPS4 Recognise horizontal and vertical lines
- 4MGPS5 Demonstrate that angles are measured in degrees and that one whole turn is 360; compare and order angles less than 180 degrees, know the terms acute and obtuse angles

Guidance

Students continue to classify shapes using geometrical properties, extending to classifying different triangles (for example, isosceles, equilateral, scalene) and quadrilaterals (for example, parallelogram, rhombus, trapezium).

Students compare and order angles in preparation for using a protractor and compare lengths and angles to decide if a polygon is regular or irregular.

Students draw symmetric patterns using a variety of media to become familiar with different orientations of lines of symmetry; and recognise line symmetry in a variety of diagrams, including where the line of symmetry does not dissect the original shape.

Strand B: Position and Direction

- 4MGPD1 Use the eight compass points to describe direction; describe and identify the position of a square on a grid of squares (describe positions on a 2-D grid as coordinates in the first quadrant)
- 4MGPD2 Describe movements between positions as translations of a given unit to the left/right and up/down
- 4MGPD3 Plot specified points and draw sides to complete a given polygon within the first quadrant

Guidance

Students draw a pair of axes in one quadrant, with equal scales and integer labels. They read, write and use pairs of coordinates, for example (2, 5), including using coordinate-plotting ICT tools.

Domain 5: Statistics

Strand A: Analyse and Represent Data

- 4MSARD1 Answer a question by identifying what data to collect; organise, present, analyse and interpret the data in tables, diagrams, tally charts, pictograms and bar charts, using ICT where appropriate
- 4MSARD2 Compare the impact of representations where scales have intervals of differing size
- 4MSARD3 Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs

Guidance

Students understand and use a greater range of scales in their representations.

Students begin to relate the graphical representation of data to recording change over time.

Year 5

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 5MAUMPSSP1 Solve one-step and two-step problems involving whole numbers and decimals up to 3 decimal places and all four operations, choosing and using appropriate calculation strategies, including calculator use
- 5MAUMPSSP2 Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem
- 5MAUMPSSP3 Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry
- 5MAUMPSSP4 Explore patterns, properties and relationships and propose a general statement involving numbers or shapes; identify examples for which the statement is true or false
- 5MAUMPSSP5 Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols
- 5MAUMPSSP6 Use inverse operations to estimate and check calculations
- 5MAUMPSSP7 Use a calculator to solve problems, including those involving decimals or fractions (e.g. find $\frac{3}{4}$ of 150 g); interpret the display correctly in the context of measurement

Domain 2: Number

Strand A: Number and Place Value

- 5MNNPV1 Count from any given number in whole-number and decimal steps, extending beyond zero when counting backwards; relate the numbers to their position on a number line
- 5MNNPV2 Explain what each digit represents in whole numbers and decimals with up to three places, and partition these numbers
- 5MNNPV3 Read, write order, round and compare numbers with up to 3 decimal places
- 5MNNPV4 Recognise that prime numbers have only two factors and identify prime numbers less than 100 and recognise composite numbers
- 5MNNPV5 Use knowledge of rounding, place value, number facts with numbers up to 1,000,000

Strand B: Addition and Subtraction

- 5MNAS1 Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences and doubles and halves of decimals (e.g. 6.5 ± 2.7 , half of 5.6, double 0.34)
- 5MNAS2 Extend mental-methods for whole-number calculations, for example to subtract one near-multiple of 1000 from another (e.g. $6070 - 4097$)
- 5MNAS3 Use efficient written methods to add and subtract whole numbers and decimals with up to two places

Guidance

Students practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency.

Students practise mental calculations with increasingly large numbers to aid fluency (for example, $12\,462 - 2300 = 10\,162$).

Strand C: Multiplication and Division

- 5MNMD1 Use sequences to scale numbers up or down; solve problems involving proportions of quantities (e.g. decrease quantities in a recipe designed to feed six people)
- 5MNMD2 Recall quickly multiplication facts up to 10×10 and derive facts beyond the 10 times table, and use them to multiply pairs of multiples of 10 and 100; derive quickly corresponding division facts
- 5MNMD3 Identify pairs of factors of two-digit whole numbers and find common multiples (e.g. for 6 and 9)
- 5MNMD4 Recognise and use square numbers and their notations; know that cube numbers are numbers multiplied by themselves 3 times
- 5MNMD5 Extend mental-methods for whole-number calculations, for example to multiply a two-digit by a one-digit number (e.g. 12×9), to multiply by 25 (e.g. 16×25)
- 5MNMD6 Use understanding of place value to multiply and divide whole numbers and those involving decimals by 10, 100 or 1000
- 5MNMD7 Use the standard written methods to multiply numbers up to 4 digits by a 1 or 2 digit number
- 5MNMD8 Divide numbers up to 4 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately for the context
- 5MNMD9 Solve problems involving multiplication and division where larger numbers can be partitioned and the distributive property may be used

Guidance

Students practise and extend their use of the formal written methods of short multiplication and short division (see Mathematics Appendix 1). [Y6IS Curriculum does not have Appendix 1 – NCIE does]. They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.

They use and understand the terms factor, multiple and prime, square and cube numbers.

Students interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, $98 \div 4 = 98/4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$).

Students use multiplication and division as inverse operations to support the introduction of ratio in Year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of 1000 in converting between units such as kilometres and metres.

Distributivity can be expressed as $a(b+c) = ab+ac$.

Students understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 92 \times 10$).

Students use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5 \times \square$).

Strand D: Fractions

- 5MNF1 Read and write decimal numbers as fractions including equivalent, improper fractions and mixed numbers (e.g. $171 = 171/100 = 1 + 71/100$)
- 5MNF2 Write percentages as a fraction with a denominator of 100 and as a decimal fraction
- 5MNF3 Compare and order fractions whose denominators are all multiples of the same number
- 5MNF4 Find fractions using division (e.g. of 5 kg), and percentages of numbers and quantities (e.g. 10%, 5% and 15% of \$80). Add and subtract fractions with the same denominator and multiples of the same number
- 5MNF5 Associate a fraction with division and calculate decimal equivalents to simple fractions (e.g. $\frac{3}{4} = 3 \div 4 = 0.75$)
- 5MNF6 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 with a denominator of a multiple of 10 or 25

Guidance

Students learn that percentages, decimals and fractions are different ways of expressing proportions.

They extend their knowledge of fractions to thousandths and connect to decimals and measures.

Students connect equivalent fractions > 1 that simplify to integers with division and other fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions.

Students connect multiplication by a fraction to using fractions as operators (fractions of), and to division, building on work from previous years. This relates to scaling by simple fractions, including fractions > 1 .

Students practise adding and subtracting fractions to become fluent through a variety of increasingly complex problems. They extend their understanding of adding and subtracting fractions to calculations that exceed 1 as a mixed number.

Students continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities.

Students extend counting from Year 4, using decimals and fractions including bridging zero, for example on a number line and continue to practise counting forwards and backwards in simple fractions.

Students say, read and write decimal fractions and related tenths, hundredths and thousandths accurately and are confident in checking the reasonableness of their answers to problems.

Students mentally add and subtract tenths, and one-digit whole numbers and tenths.

Students practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (for example, $0.83 + 0.17 = 1$).

Students go beyond the measurement and money models of decimals, for example, by solving puzzles involving decimals.

Students make connections between percentages, fractions and decimals (for example, 100% represents a whole quantity and 1% is $1/100$, 50% is $50/100$, 25% is $25/100$) and relate this to finding 'fractions of'.

Domain 3: Measurement

Strand A: Measurement Concepts

- 5MMMC1 Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 26 kg to 2600 g)
- 5MMMC2 Interpret a reading that lies between two unnumbered divisions on a scale
- 5MMMC3 Draw and measure lines to the nearest millimetre; measure and calculate the perimeter of regular and irregular polygons; use the formula for the area of a rectangle to calculate the rectangle's area
- 5MMMC4 Read timetables and time using 24-hour clock notation; use a calendar to calculate time intervals

Guidance

Students use their knowledge of place value and multiplication and division to convert between standard units.

Students calculate the perimeter of rectangles and related composite shapes, including using the relations of perimeter or area to find unknown lengths.

Missing measures questions such as these can be expressed algebraically, for example $4 + 2b = 20$ for a rectangle of sides 2 cm and b cm and perimeter of 20cm.

Students calculate the area from scale drawings using given measurements.

Students use all four operations in problems involving time and money, including conversions (for example, days to weeks, expressing the answer as weeks and days).

Domain 4: Geometry

Strand A: Properties of Shape

- 5MGPS1 Identify, visualise and describe properties of rectangles, triangles, regular polygons and 3-D solids; use knowledge of properties to draw 2-D shapes, and to identify and draw nets of 3-D shapes
- 5MGPS2 Know that angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
- 5MGPS3 Draw given angles and measure them in degrees
- 5MGPS4 Identify angles on a straight line and in a full circle, and recognise that a half turn equals 180 degrees and a full turn equals 360 degrees; use this knowledge to calculate missing angle measurements

Guidance

Students become accurate in drawing lines with a ruler to the nearest millimetre, and measuring with a protractor. They use conventional markings for parallel lines and right angles.

Students use the term diagonal and make conjectures about the angles formed between sides, and between diagonals and parallel sides, and other properties of quadrilaterals, for example using dynamic geometry ICT tools.

Students use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.

Strand B: Position and Direction

- 5MGPD1 Read and plot coordinates in the first and second quadrant; recognise parallel and perpendicular lines in grids and shapes; use a set-square and ruler to draw shapes with perpendicular or parallel sides
- 5MGPD2 Identify, describe and represent the position of a shape following a reflection or translation within the first and second quadrant

Guidance

Students recognise and use reflection and translation in a variety of diagrams, including continuing to use a 2-D grid and coordinates in the first quadrant. Reflection should be in lines that are parallel to the axes.

Domain 5: Statistics

Strand A: Analyse and Represent Data

- 5MSARD1 Describe the occurrence of familiar events using the language of chance or likelihood
- 5MSARD2 Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask
- 5MSARD3 Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time
- 5MSARD4 Find and interpret the mode of a set of data

Guidance

Students connect their work on coordinates and scales to their interpretation of time graphs, and they begin to decide which representations of data are most appropriate and why.

Year 6

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

- 6MAUMPSSP1 Solve multi-step problems involving addition, subtraction, multiplication and division in context, deciding which operations and methods to use and why
- 6MAUMPSSP2 Solve problems which require answers to be rounded to specified degrees of accuracy
- 6MAUMPSSP3 Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places
- 6MAUMPSSP4 Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
- 6MAUMPSSP5 Suggest, plan and develop lines of enquiry; collect, organise and represent information, interpret results and review methods; identify and answer related questions
- 6MAUMPSSP6 Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols (e.g. the cost of 6 pens at 15 pence each is 15 cents)
- 6MAUMPSSP7 Explain reasoning and conclusions, using words, symbols or diagrams as appropriate

Domain 2: Number

Strand A: Number and Place Value

- 6MNNPV1 Recognise that prime numbers have only two factors and identify prime numbers less than 100; find the prime factors of two-digit numbers
- 6MNNPV2 Use approximations, inverse operations and tests of divisibility to estimate and check results
- 6MNNPV3 Use a calculator to solve problems involving multi-step calculations
- Guidance
Students use the whole number system, including saying, reading and writing numbers accurately.

Strand B: Addition and Subtraction - Multiplication and Division

- 6MNASMD1 Use knowledge of place value and multiplication facts to 10×10 to derive related multiplication and division facts involving larger numbers and decimals (e.g. 0.8×7 , $4.8 \div 6$)
- 6MNASMD2 Use knowledge of multiplication facts to derive quickly squares of numbers to 12×12 and the corresponding squares of multiples of 10
- 6MNASMD3 Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using formal long multiplication
- 6MNASMD4 Use written division methods in cases where the answer has up to 2 decimal places
- 6MNASMD5 Divide numbers up to 4 digits by a 2 digit whole number using long division and interpret remainders as whole number remainders, fractions or rounding
- 6MNASMD6 Use knowledge of the order of operations to carry out calculations involving the four operations
- 6MNASMD7 Calculate mentally with integers and decimals

Guidance

Students practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.

Students undertake mental calculations with increasingly large numbers and more complex calculations.

Students continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.

Students round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.

Students explore the order of operations using brackets; for example, $2 + 1 \times 3 = 5$ and $(2 + 1) \times 3 = 9$.

Common factors can be related to finding equivalent fractions.

Strand D: Fractions, Decimals and Percentages

- 6MNFDP1 Use decimal notation for tenths, hundredths and thousandths; partition, round and order decimals with up to three places, and position them on the number line
- 6MNFDP2 Read and write decimal numbers as fractions including equivalent, improper fractions and mixed numbers (e.g. $1.71 = 171/100 = 1 + 71/100$)
- 6MNFDP3 Simplify fractions by cancelling common factors; order a set of fractions by converting them to fractions with a common denominator including fractions greater than 1
- 6MNFDP4 Express one quantity as a percentage of another (e.g. express £400 as a percentage of £1000); find equivalent percentages, decimals and fractions
- 6MNFDP5 Relate fractions to multiplication and division (e.g. $6 \div 2 = \frac{1}{2}$ of $6 = 6 \times \frac{1}{2}$); express a quotient as a fraction or decimal (e.g. $67 \div 5 = 134$ or $132/5$); find fractions and percentages of whole-number quantities (e.g. $5/8$ of 96, 65% of 260)
- 6MNFDP6 Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
- 6MNFDP7 Multiply simple fractions by whole numbers (e.g. $\frac{3}{4} \times 3$) and find their sums as simplest form
- 6MNFDP8 Associate a fraction with division and calculate decimal equivalents (e.g. $3/8 = 3 \div 8 = 0.375$)
- 6MNFDP9 Multiply one-digit numbers with up to two decimal places by whole numbers

Guidance

Students practise, use and understand the addition and subtraction of fractions with different denominators by identifying equivalent fractions with the same denominator. They should start with fractions where the denominator of one fraction is a multiple of the other (for example, $\frac{1}{2} + \frac{1}{8} = \frac{5}{8}$) and progress to varied and increasingly complex problems.

Students use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, for example as parts of a rectangle.

Students use their understanding of the relationship between unit fractions and division to work backwards by multiplying a quantity that represents a unit fraction to find the whole quantity (for example, if $\frac{1}{4}$ of a length is 36cm, then the whole length is $36 \times 4 = 144$ cm).

Students practise calculations with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators.

Students can explore and make conjectures about converting a simple fraction to a decimal fraction (for example, $3 \div 8 = 0.375$). For simple fractions with recurring decimal equivalents, pupils learn about rounding the decimal to three decimal places, or other appropriate approximations depending on the context. Students multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Students multiply decimals by whole numbers, starting with the simplest cases, such as $0.4 \times 2 = 0.8$, and in practical contexts, such as measures and money.

Students are introduced to the division of decimal numbers by one-digit whole number, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication.

Students also develop their skills of rounding and estimating as a means of predicting and checking the order of magnitude of their answers to decimal calculations. This includes rounding answers to a specified degree of accuracy and checking the reasonableness of their answers.

Strand E: Ratio and Proportion

- 6MNRP1 Solve simple problems involving direct proportion by scaling quantities up or down

Guidance

Students recognise proportionality in contexts when the relations between quantities are in the same ratio (for example, similar shapes and recipes).

Students should consolidate their understanding of ratio when comparing quantities, sizes and scale drawings by solving a variety of problems. They might use the notation a:b to record their work.

Students solve problems involving unequal quantities, for example, 'for every egg you need three spoonfuls of flour', '3/5 of the class are boys'. These problems are the foundation for later formal approaches to ratio and proportion.

Strand F: Algebra

- 6MNA 1 Express missing number problems algebraically
- 6MNA 2 Use simple formulae expressed in words
- 6MNA 3 Use simple substitution to evaluate formulae
- 6MNA 4 Generate and describe linear number sequences (find the n th term)
- 6MNA 5 Find pairs of numbers that satisfy number sentences involving two unknowns
- 6MNA 6 Enumerate all possibilities of combinations of two variables

Guidance

Students are introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as:

Missing numbers, lengths, coordinates and angles

Formulae in mathematics and science

Equivalent expressions (for example, $a + b = b + a$)

Generalisations of number patterns

Number puzzles (for example, what two numbers can add up to).

Domain 3: Measurement

Strand A: Measurement Concepts

- 6MMMC1 Find the difference between a positive and a negative integer, or two negative integers, in measurement contexts
- 6MMMC2 Select and use standard metric and imperial units of measure and convert between metric units using decimals to two places (e.g. change 2.75 litres to 2750 ml, or vice versa)
- 6MMMC3 Read and interpret scales on a range of measuring instruments, recognising that the measurement made is approximate and recording results to a required degree of accuracy; compare readings on different scales, for example when using different instruments
- 6MMMC4 Recognise that shapes with the same areas can have different perimeters and vice versa
- 6MMMC5 Recognise when it is possible to use formulae for area and volume of shapes
- 6MMMC6 Calculate the area of parallelograms and triangles
- 6MMMC7 Estimate, calculate and compare volume of cubes and cuboids
- 6MMMC8 Estimate angles, and use a protractor to measure and draw them, on their own and in shapes; calculate angles in a triangle or around a point

Guidance

Students connect conversion (for example, from kilometres to miles) to a graphical representation as preparation for understanding linear/proportional graphs.

Students know approximate conversions and are able to tell if an answer is sensible. [the convert between miles and kilometres outcome from NCIE was not included in the draft because it was considered too esoteric for our context]

Using the number line, students use, add and subtract positive and negative integers for measures such as temperature.

Domain 4: Geometry

Strand A: Properties of Shape

- 6MGPS1 Describe, identify and visualise parallel and perpendicular edges or faces; use these properties to classify 2-D shapes and 3-D solids
- 6MGPS2 Make and draw shapes with increasing accuracy and apply knowledge of their properties
- 6MGPS3 Solve problems involving similar shapes where the scale factor is known or can be found

6MGPS4 Compare and classify geometric shapes based on their properties and sizes and find unknown angles in regular polygons

6MGPS5 Illustrate and name parts of a circle including radius, diameter and circumference

Guidance

Students draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles.

Students describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.

Strand B: Position and Direction

6MGPD1 Visualise and draw on grids of different types where a shape will be after reflection, after translations, or after rotation through 90° or 180° about its centre or one of its vertices

6MGPD2 Use coordinates in all four quadrants to draw, locate and complete shapes that meet given properties

Guidance

Students draw and label a pair of axes in all four quadrants with equal scaling. This extends their knowledge of one quadrant to all four quadrants, including the use of negative numbers.

Domain 5: Statistics

Strand A: Analyse and Represent Data

6MSARD1 Describe and predict from data using the language of chance or likelihood

6MSARD2 Solve problems by collecting, selecting, processing, presenting and interpreting data, using ICT where appropriate; draw conclusions and identify further questions to ask

6MSARD3 Construct and interpret frequency tables, bar charts with grouped discrete data, and line graphs; interpret pie charts

6MSARD4 Describe and interpret results and solutions to problems using the mode, range, median and mean

Guidance

Students connect their work on angles, fractions and percentages to the interpretation of pie charts.

Students both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects.

Students connect conversion from kilometres to miles in measurement to its graphical representation. [See guidance notes to Measurement – the miles/kilometres conversion from NCE was not included.

Students know when it is appropriate to find the mean of a data set.

Domain 1: Applying and Using Mathematics

Strand A: Problem Solving Skills and Processes

Year 1	1MAUMPSSP1	Solve problems involving counting, adding, subtracting, doubling or halving in the context of numbers, measures or money, for example to 'pay' and 'give change'
	1MAUMPSSP2	Describe a puzzle or problem using numbers, practical materials and diagrams; use these to solve the problem and set the solution in the original context
	1MAUMPSSP3	Answer a question by selecting and using suitable equipment, and sorting information, shapes or objects; display results using tables and pictures
	1MAUMPSSP4	Describe simple patterns and relationships involving numbers or shapes; decide whether examples satisfy given conditions
	1MAUMPSSP5	Describe ways of solving puzzles and problems, explaining choices and decisions orally or using pictures
Year 2	2MAUMPSSP1	Solve problems involving addition, subtraction, multiplication or division in contexts of numbers, measures appropriate monetary notation
	2MAUMPSSP2	Identify and record the information or calculation needed to solve a puzzle or problem; carry out the steps or calculations and check the solution in the context of the problem
	2MAUMPSSP3	Follow a line of enquiry; answer questions by choosing and using suitable equipment and selecting, organising and presenting information in lists, tables and simple diagrams
	2MAUMPSSP4	Describe patterns and relationships involving numbers or shapes, make predictions and test these with examples
	2MAUMPSSP5	Present solutions to puzzles and problems in an organised way; explain decisions, methods and results in pictorial, spoken or written form, using mathematical language and number sentences
Year 3	3MAUMPSSP1	Solve the information in a puzzle or problem using numbers, images or diagrams; use these to find a solution and present it in context, where appropriate using appropriate monetary notation or units of measure
	3MAUMPSSP2	Describe and explain methods, choices and solutions to puzzles and problems, orally and in writing, using pictures and diagrams
Year 4	4MAUMPSSP1	Solve one-step and two-step problems involving numbers, money or measures, including time; choose and carry out appropriate calculations, using calculator methods where appropriate
	4MAUMPSSP2	Represent a puzzle or problem using number sentences, statements or diagrams; use these to solve the problem; present and interpret the solution in the context of the problem
	4MAUMPSSP3	Suggest a line of enquiry and the strategy needed to follow it; collect, organise and interpret selected information to find answers
	4MAUMPSSP4	Identify and use patterns, relationships and properties of numbers or shapes; investigate a statement involving numbers and test it with examples
	4MAUMPSSP5	Report solutions to puzzles and problems, giving explanations and reasoning orally and in writing, using diagrams and symbols
	4MAUMPSSP6	Use knowledge of rounding, number operations and inverses to estimate and check calculations
	4MAUMPSSP7	Use a calculator to carry out one-step and two-step calculations involving all four operations; recognise negative numbers in the display, correct mistaken entries and interpret the display correctly in the context of money
Year 5	5MAUMPSSP1	Solve one-step and two-step problems involving whole numbers and decimals up to 3 decimal places and all four operations, choosing and using appropriate calculation strategies, including calculator use
	5MAUMPSSP2	Represent a puzzle or problem by identifying and recording the information or calculations needed to solve it; find possible solutions and confirm them in the context of the problem
	5MAUMPSSP3	Plan and pursue an enquiry; present evidence by collecting, organising and interpreting information; suggest extensions to the enquiry

	5MAUMPSSP4	Explore patterns, properties and relationships and propose a general statement involving numbers or shapes; identify examples for which the statement is true or false
	5MAUMPSSP5	Explain reasoning using diagrams, graphs and text; refine ways of recording using images and symbols
	5MAUMPSSP6	Use inverse operations to estimate and check calculations
	5MAUMPSSP7	Use a calculator to solve problems, including those involving decimals or fractions (e.g. find $\frac{3}{4}$ of 150 g); interpret the display correctly in the context of measurement
Year 6	6MAUMPSSP1	Solve multi-step problems involving addition, subtraction, multiplication and division in context, deciding which operations and methods to use and why
	6MAUMPSSP2	Solve problems which require answers to be rounded to specified degrees of accuracy
	6MAUMPSSP3	Solve problems involving the calculation and conversion of units of measure, using decimal notation up to 3 decimal places
	6MAUMPSSP4	Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy
	6MAUMPSSP5	Suggest, plan and develop lines of enquiry; collect, organise and represent information, interpret results and review methods; identify and answer related questions
	6MAUMPSSP6	Represent and interpret sequences, patterns and relationships involving numbers and shapes; suggest and test hypotheses; construct and use simple expressions and formulae in words then symbols (e.g. the cost of 6 pens at 15 pence each is 15 cents)
	6MAUMPSSP7	Explain reasoning and conclusions, using words, symbols or diagrams as appropriate

Domain 2: Number

Strand A: Number and Place Value

Year 1	1MNNPV1	Count reliably at least 100 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting
	1MNNPV2	Compare and order numbers, using the related vocabulary (equal to, more than, less than (fewer), most and least, first, second, third, etc.) using the following mathematical statements $-$, $+$ and $=$
	1MNNPV3	Read and write numerals from 0 to 100, then beyond; use knowledge of place value to position these numbers on a number track and number line
	1MNNPV4	Count on or back in ones, twos, fives and tens and use this knowledge to derive the multiples of 2, 5 and 10 to the tenth multiple
Year 2	2MNNPV1	Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers
	2MNNPV2	Count up to 100 objects by grouping them and counting in tens, fives, fours and twos forwards and backwards; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1
	2MNNPV3	Order two-digit numbers and position them on a number line; use the greater than ($>$) and less than ($<$) signs
	2MNNPV4	Estimate a number of objects; round two-digit numbers to the nearest 10 (Extension: find, name and write these, including with quantities)
	2MNNPV5	Use the symbols $+$, $-$, \times , \div and $=$ to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. $\div 2 = 6$, $30 - = 24$)
Year 3	3MNNPV1	Read and write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10
	3MNNPV2	Partition three-digit numbers into multiples of 100, 10 and 1 in different ways
	3MNNPV3	Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences
Year 4	4MNNPV1	Recognise and continue number sequences formed by counting on or back in steps of constant size
	4MNNPV2	Partition, round and order four-digit whole numbers; use positive and negative numbers in context and position them on a number line; state inequalities using the symbols $<$ and $>$ (e.g. $-3 > -5$, $-1 < 1$)
	4MNNPV3	Round any number to the nearest 10, 100 or 1000
	4MNNPV4	Round decimals with one decimal place to the nearest whole number
	4MNNPV5	Count backwards through zero to include negative numbers
	4MNNPV6	Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
	4MNNPV7	Order and compare numbers beyond 1000
	4MNNPV8	Identify, represent and estimate numbers using different representations, including measures
Year 5	5MNNPV1	Count from any given number in whole-number and decimal steps, extending beyond zero when counting backwards; relate the numbers to their position on a number line
	5MNNPV2	Explain what each digit represents in whole numbers and decimals with up to three places, and partition these numbers
	5MNNPV3	Read, write order, round and compare numbers with up to 3 decimal places
	5MNNPV4	Recognise that prime numbers have only two factors and identify prime numbers less than 100 and recognise composite numbers

	5MNNPV5	Use knowledge of rounding, place value, number facts with numbers up to 1,000,000
Year 6	6MNNPV1	Recognise that prime numbers have only two factors and identify prime numbers less than 100; find the prime factors of two-digit numbers
	6MNNPV2	Use approximations, inverse operations and tests of divisibility to estimate and check results
	6MNNPV3	Use a calculator to solve problems involving multi-step calculations

Strand B: Addition and Subtraction

Year 1	1MNAS1	Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10
	1MNAS2	Derive and recall all pairs of numbers with a total of 20 and addition facts for totals to at least 5; work out the corresponding subtraction facts
	1MNAS3	Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number
	1MNAS4	Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one digit or two-digit number and a multiple of 10 from a two-digit number
	1MNAS5	Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentences
Year 2	2MNAS1	Derive and recall all addition and subtraction facts for each number to at least 20, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100
	2MNAS2	Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves
	2MNAS3	Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number; use practical and informal written methods to add and subtract two-digit numbers
	2MNAS4	Understand that subtraction is the inverse of addition and vice versa; use this to derive and record related addition and subtraction number sentences
	2MNAS5	Use knowledge of number facts and operations, including that addition (not subtraction) can be done in any order, to estimate and check answers to calculations
Year 3	3MNAS1	Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100
	3MNAS2	Add or subtract mentally combinations of one-digit and two-digit numbers
	3MNAS3	Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers
	3MNAS4	Use knowledge of number facts and operations, including that addition (not subtraction) can be done in any order, to estimate and check answers to calculations
Year 4	4MNAS1	Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000
	4MNAS2	Add or subtract mentally pairs of two-digit whole numbers (e.g. $47 + 58$, $91 - 35$)
	4MNAS3	Refine and use efficient written methods to add and subtract whole numbers with up to 4 digits and money
Year 5	5MNAS1	Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences and doubles and halves of decimals (e.g. 6.5 ± 2.7 , half of 5.6, double 0.34)
	5MNAS2	Extend mental-methods for whole-number calculations, for example to subtract one near-multiple of 1000 from another (e.g. $6070 - 4097$)

	5MNAS3	Use efficient written methods to add and subtract whole numbers and decimals with up to two places
Year 6	6MNASMD1	Use knowledge of place value and multiplication facts to 10×10 to derive related multiplication and division facts involving larger numbers and decimals (e.g. 0.8×7 , $4.8 \div 6$)
	6MNASMD2	Use knowledge of multiplication facts to derive quickly squares of numbers to 12×12 and the corresponding squares of multiples of 10
	6MNASMD3	Multiply multi-digit numbers up to 4 digits by a 2 digit whole number using formal long multiplication
	6MNASMD4	Use written division methods in cases where the answer has up to 2 decimal places
	6MNASMD5	Divide numbers up to 4 digits by a 2 digit whole number using long division and interpret remainders as whole number remainders, fractions or rounding
	6MNASMD6	Use knowledge of the order of operations to carry out calculations involving the four operations
	6MNASMD7	Calculate mentally with integers and decimals

Strand C: Multiplication and Division

Year 1	1MNMD1	Recall the doubles of all numbers to at least 20
	1MNMD2	Solve practical problems that involve combining groups of 2, 5 or 10, or sharing into equal groups
Year 2	2MNMD1	Derive and recall multiplication facts for the 2, 5 and 10 times-tables and the related division facts; recognise multiples of 2, 5 and 10
	2MNMD2	Represent repeated addition and arrays as multiplication, and sharing and repeated subtraction (grouping) as division; use practical and informal written methods and related vocabulary to support multiplication and division, including calculations with remainders and knowing that multiplication (not division) can be done in any order
Year 3	3MNMD1	Derive and recall multiplication facts for the 2, 3, 4, 5, 8 and 10 times-tables and the corresponding division facts; recognise multiples of 2, 5 or 10 up to 1000
	3MNMD2	Use knowledge of number operations and corresponding inverses, including doubling and halving, to estimate and check calculations
	3MNMD3	Multiply one-digit and two-digit numbers by 10 or 100, and describe the effect
	3MNMD4	Use practical and informal written methods to multiply and divide two-digit numbers (e.g. 13×3 , $50 \div 4$); round remainders up or down, depending on the context
	3MNMD5	Understand that division is the inverse of multiplication and vice versa; use this to derive and record
Year 4	4MNMD1	Count in multiples of 6, 7, 9, 25 and 1000
	4MNMD2	Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves
	4MNMD3	Derive and recall multiplication facts up to 10×10 and derive multiplication beyond the 10 times table, the corresponding division facts and multiples of numbers to 10 up to the tenth multiple
	4MNMD4	Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit
	4MNMD5	Multiply and divide numbers to 1000 by 10 and then 100 (whole-number answers), understanding the effect; relate to scaling up or down
	4MNMD6	Develop and use written methods to record, support and explain multiplication and division of two-digit and three-digit numbers by a one-digit number, including division with remainders (e.g. 155×9 , $98 \div 6$)
	4MNMD7	Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; derive multiplication of three one-digit numbers

	4MNMD8	Recognise and use factor pairs and the commutativity property of multiplication and addition in mental calculations
Year 5	5MNMD1	Use sequences to scale numbers up or down; solve problems involving proportions of quantities (e.g. decrease quantities in a recipe designed to feed six people)
	5MNMD2	Recall quickly multiplication facts up to 10×10 and derive facts beyond the 10 times table, and use them to multiply pairs of multiples of 10 and 100; derive quickly corresponding division facts
	5MNMD3	Identify pairs of factors of two-digit whole numbers and find common multiples (e.g. for 6 and 9)
	5MNMD4	Recognise and use square numbers and their notations; know that cube numbers are numbers multiplied by themselves 3 times
	5MNMD5	Extend mental-methods for whole-number calculations, for example to multiply a two-digit by a one-digit number (e.g. 12×9), to multiply by 25 (e.g. 16×25)
	5MNMD6	Use understanding of place value to multiply and divide whole numbers and those involving decimals by 10, 100 or 1000
	5MNMD7	Use the standard written methods to multiply numbers up to 4 digits by a 1 or 2 digit number
	5MNMD8	Divide numbers up to 4 digits by a 1 digit number using the formal written method of short division and interpret remainders appropriately for the context
	5MNMD9	Solve problems involving multiplication and division where larger numbers can be partitioned and the distributive property may be used

Strand D: Fractions

Year 1	1MNF1	Use the vocabulary as well as recognise and find halves and quarters in context
Year 2	2MNF1	Recognise one half, one quarter and three quarters of shapes, sets of objects
Year 3	3MNF1	Recognise and write proper fractions (e.g. $\frac{3}{7}$, $\frac{9}{10}$), interpreting the denominator as the parts of a whole and the numerator as the number of parts; identify and estimate fractions of shapes; use diagrams to compare fractions and establish equivalents with common denominators; add and subtract fractions with common denominators to make totals less than 1 whole
	3MNF2	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
	3MNF3	Find unit fractions of numbers and quantities (e.g. $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$ and $\frac{1}{6}$ of 12 litres)
Year 4	4MNF1	Recognise the equivalence between decimal and fraction forms of one half, quarters, tenths and hundredths
	4MNF2	Use diagrams to identify equivalent fractions (e.g. $\frac{6}{8}$ and $\frac{3}{4}$, or $\frac{70}{100}$ and $\frac{7}{10}$); interpret mixed numbers and position them on a number line (e.g. $3\frac{1}{2}$)
	4MNF3	Use the vocabulary of ratio and proportion to describe the relationship between two quantities (e.g. 'There are 2 red beads to every 3 blue beads, or 2 beads in every 5 beads are red'); estimate a proportion (e.g. 'about one quarter of the apples in the box are green')
	4MNF4	Find fractions (including non-unit fractions) of numbers, quantities or shapes, where the answer is a whole number (e.g. $\frac{2}{5}$ of 30 plums, $\frac{2}{8}$ of a 6 by 4 rectangle)
	4MNF5	Add and subtract fractions with the same denominator to make one whole (e.g. $? + \frac{3}{7} = 1$?)
Year 5	5MNF1	Read and write decimal numbers as fractions including equivalent, improper fractions and mixed numbers (e.g. $1.71 = \frac{171}{100} = 1 + \frac{71}{100}$)
	5MNF2	Write percentages as a fraction with a denominator of 100 and as a decimal fraction
	5MNF3	Compare and order fractions whose denominators are all multiples of the same number

	5MNF4	Find fractions using division (e.g. of 5 kg), and percentages of numbers and quantities (e.g. 10%, 5% and 15% of \$80). Add and subtract fractions with the same denominator and multiples of the same number
	5MNF5	Associate a fraction with division and calculate decimal equivalents to simple fractions (e.g. $\frac{3}{4} = 3 \div 4 = 0.75$)
	5MNF6	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 with a denominator of a multiple of 10 or 25
Year 6	6MNFDP1	Use decimal notation for tenths, hundredths and thousandths; partition, round and order decimals with up to three places, and position them on the number line
	6MNFDP2	Read and write decimal numbers as fractions including equivalent, improper fractions and mixed numbers (e.g. $1.71 = \frac{171}{100} = 1 + \frac{71}{100}$)
	6MNFDP3	Simplify fractions by cancelling common factors; order a set of fractions by converting them to fractions with a common denominator including fractions greater than 1
	6MNFDP4	Express one quantity as a percentage of another (e.g. express \$400 as a percentage of \$1000); find equivalent percentages, decimals and fractions
	6MNFDP5	Relate fractions to multiplication and division (e.g. $6 \div 2 = \frac{1}{2}$ of 6 = $6 \times \frac{1}{2}$); express a quotient as a fraction or decimal (e.g. $67 \div 5 = 13\frac{4}{5}$ or $13\frac{2}{5}$); find fractions and percentages of whole-number quantities (e.g. $\frac{5}{8}$ of 96, 65% of 260)
	6MNFDP6	Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions
	6MNFDP7	Multiply simple fractions by whole numbers (e.g. $\frac{3}{4} \times 3$) and find their sums as simplest form
	6MNFDP8	Associate a fraction with division and calculate decimal equivalents (e.g. $\frac{3}{8} = 3 \div 8 = 0.375$)
	6MNFDP9	Multiply one-digit numbers with up to two decimal places by whole numbers

Strand E: Ratio and Proportion

Year 6	6MNRP1	Solve simple problems involving direct proportion by scaling quantities up or down
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Strand F: Algebra

Year 6	6MNA 1	Express missing number problems algebraically
	6MNA 2	Use simple formulae expressed in words
	6MNA 3	Use simple substitution to evaluate formulae
	6MNA 4	Generate and describe linear number sequences (find the nth term)
	6MNA 5	Find pairs of numbers that satisfy number sentences involving two unknowns
	6MNA 6	Enumerate all possibilities of combinations of two variables

Domain 3: Measurement

Strand A: Measurement Concepts

Year 1	1MMMC1	Estimate, measure, weigh, record and compare objects, choosing and using suitable uniform non-standard or standard units and measuring instruments (e.g. a lever balance, metre stick or measuring jug)
	1MMMC2	Use vocabulary related to time (before and after, next, first, today, yesterday, tomorrow, morning, afternoon, evening); order days of the week and months; read and represent the time to the hour and half hour
Year 2	2MMMC1	Estimate, compare and measure lengths and temperature, choosing and using appropriate standard units (m, cm, °c) and suitable measuring instruments
	2MMMC2	Recognise units of measurement for weight and capacity (g, kg, ml, L) (Local application: read and be aware of units of measurement for environmental concerns, e.g. AQI measures)
	2MMMC3	Read the numbered divisions on a scale, and interpret the divisions between them (e.g. on a scale from 0 to 25 with intervals of 1 shown but only the divisions 0, 5, 10, 15 and 20 numbered); use a ruler to draw and measure lines to the nearest centimeter
	2MMMC4	Recognise and use symbols for money, including local currencies and pounds (£) and pence (p); combine amounts to make a particular value (extension: recognise and use other base 100 currencies, e.g. dollars, etc.)
	2MMMC5	Find different combinations of coins that equal the same amount of money
	2MMMC6	Use, compare and sequence units of time (seconds, minutes, hours, days) and know the relationships between them
	2MMMC7	Read the time to the quarter hour; identify time intervals that fall on the quarter hours, including those that cross the hour
Year 3	3MMMC1	Know the relationships between kilometres and metres, metres and centimetres, kilograms and grams, litres and millilitres; choose and use appropriate units to estimate, measure and record measurements
	3MMMC2	Measure the perimeter of simple 2-D shapes
	3MMMC3	Read, to the nearest division and half-division, scales that are numbered or partially numbered; use the information to measure and draw to a suitable degree of accuracy
	3MMMC4	Read the time on a 12-hour digital clock and to the nearest 5 minutes on an analogue clock; calculate time intervals and find start or end times for a given time interval(extension: use Roman numerals and 24-hour clocks)
	3MMMC5	Know the number of seconds in a minute and the number of days in each month, year and leap year
	3MMMC6	Solve one-step and two-step problems involving numbers, money or measures, including time, choosing and carrying out appropriate calculations
Year 4	4MMMC1	Choose and use standard metric units and their abbreviations when estimating, measuring and recording length, weight and capacity, and base-ten money; know the meaning of 'kilo', 'centi' and 'milli' and, where appropriate, use decimal notation to record measurements (e.g. 1.3 m or 0.6 kg)
	4MMMC2	Interpret intervals and divisions on partially numbered scales and record readings accurately, where appropriate to the nearest tenth of a unit
	4MMMC3	Draw rectangles and measure and calculate their perimeters; find the area of rectilinear shapes drawn on a square grid counting squares
	4MMMC4	Read time to the nearest minute; use am, pm and 12- hour clock notation; read 24-hour clocks; choose units of time to measure time intervals; calculate time intervals from clocks and timetables, including over the hour
	4MMMC5	Solve problems involving converting between hours and minutes; minutes and seconds; years and months; weeks and days
Year 5	5MMMC1	Read, choose, use and record standard metric units to estimate and measure length, weight and capacity to a suitable degree of accuracy (e.g. the nearest centimetre); convert larger to smaller units using decimals to one place (e.g. change 26 kg to 2600 g)
	5MMMC2	Interpret a reading that lies between two unnumbered divisions on a scale
	5MMMC3	Draw and measure lines to the nearest millimetre; measure and calculate the perimeter of regular and irregular polygons; use the formula for the area of a rectangle to calculate the rectangle's area
	5MMMC4	Read timetables and time using 24-hour clock notation; use a calendar to calculate time intervals



Year 6	6MMMC1	Find the difference between a positive and a negative integer, or two negative integers, in measurement contexts
	6MMMC2	Select and use standard metric and imperial units of measure and convert between metric units using decimals to two places (e.g. change 2.75 litres to 2750 ml, or vice versa)
	6MMMC3	Read and interpret scales on a range of measuring instruments, recognising that the measurement made is approximate and recording results to a required degree of accuracy; compare readings on different scales, for example when using different instruments
	6MMMC4	Recognise that shapes with the same areas can have different perimeters and vice versa
	6MMMC5	Recognise when it is possible to use formulae for area and volume of shapes
	6MMMC6	Calculate the area of parallelograms and triangles
	6MMMC7	Estimate, calculate and compare volume of cubes and cuboids
	6MMMC8	Estimate angles, and use a protractor to measure and draw them, on their own and in shapes; calculate angles in a triangle or around a point

Domain 4: Geometry

Strand A: Properties of Shape

Year 1	1MGPS1	Visualise and name common 2-D shapes and 3-D solids and describe their features; use them to make patterns, pictures and models
Year 2	2MGPS1	Identify and describe the properties of 2-D shapes, including the number of sides and line symmetry in a vertical line
	2MGPS2	Identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces
	2MGPS3	Identify 2-D shapes on the surface of 3-D shapes, [for example, a circle on a cylinder and a triangle on a pyramid]
	2MGPS4	Compare and sort common 2-D and 3-D shapes and everyday objects
Year 3	3MGPS1	Relate 2-D shapes and 3-D solids to drawings of them; describe, visualise, classify, draw and make the shapes
	3MGPS2	Draw and complete shapes with reflective symmetry; draw the reflection of a shape in a mirror line along one side
	3MGPS3	Use a set-square to draw right angles and to identify right angles in 2-D shapes; identify angles larger than/smaller than right angles; recognise that a straight line is equivalent to two right angles
	3MGPS4	Identify horizontal and vertical lines and pairs of perpendicular and parallel lines
Year 4	4MGPS1	Draw polygons and classify them by identifying their properties, including their line symmetry
	4MGPS2	Identify lines of symmetry in 2-D shapes presented in different orientations
	4MGPS3	Identify 3-D objects from 2-D drawings; make nets of common solids
	4MGPS4	Recognise horizontal and vertical lines
	4MGPS5	Demonstrate that angles are measured in degrees and that one whole turn is 360; compare and order angles less than 180 degrees, know the terms acute and obtuse angles
Year 5	5MGPS1	Identify, visualise and describe properties of rectangles, triangles, regular polygons and 3-D solids; use knowledge of properties to draw 2-D shapes, and to identify and draw nets of 3-D shapes
	5MGPS2	Know that angles are measured in degrees: estimate and compare acute, obtuse and reflex angles
	5MGPS3	Draw given angles and measure them in degrees
	5MGPS4	Identify angles on a straight line and in a full circle, and recognise that a half turn equals 180 degrees and a full turn equals 360 degrees; use this knowledge to calculate missing angle measurements
Year 6	6MGPS1	Describe, identify and visualise parallel and perpendicular edges or faces; use these properties to classify 2-D shapes and 3-D solids
	6MGPS2	Make and draw shapes with increasing accuracy and apply knowledge of their properties
	6MGPS3	Solve problems involving similar shapes where the scale factor is known or can be found
	6MGPS4	Compare and classify geometric shapes based on their properties and sizes and find unknown angles in regular polygons
	6MGPS5	Illustrate and name parts of a circle including radius, diameter and circumference

Strand B: Position and Direction

Year 1	1MGPD1	Identify objects that turn about a point (e.g. scissors) or about a line (e.g. a door); recognise and make whole, half and quarter turns
	1MGPD2	Visualise and use everyday language to describe the position of objects and direction and distance when moving them, for example when placing or moving objects on a game board
Year 2	2MGPD1	Order and arrange combinations of mathematical objects in patterns and sequences
	2MGPD2	Follow and give instructions involving position, direction and movement
	2MGPD3	Recognise and use whole, half and quarter turns, both clockwise and anticlockwise; know that a right angle represents a quarter turn
Year 3	3MGPD1	Read and record the vocabulary of position, direction and movement, using the four compass directions to describe movement about a grid
	3MGPD2	Identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn
	3MGPD3	Identify patterns and relationships involving numbers or shapes, and use these to solve problems
Year 4	4MGPD1	Use the eight compass points to describe direction; describe and identify the position of a square on a grid of squares (describe positions on a 2-D grid as coordinates in the first quadrant)
	4MGPD2	Describe movements between positions as translations of a given unit to the left/right and up/down
	4MGPD3	Plot specified points and draw sides to complete a given polygon within the first quadrant
Year 5	5MGPD1	Read and plot coordinates in the first and second quadrant; recognise parallel and perpendicular lines in grids and shapes; use a set-square and ruler to draw shapes with perpendicular or parallel sides
	5MGPD2	Identify, describe and represent the position of a shape following a reflection or translation within the first and second quadrant
Year 6	6MGPD1	Visualise and draw on grids of different types where a shape will be after reflection, after translations, or after rotation through 90° or 180° about its centre or one of its vertices
	6MGPD2	Use coordinates in all four quadrants to draw, locate and complete shapes that meet given properties

Domain 5: Statistics

Strand A: Analyse and Represent Data

Year 1	1MSARD1	Answer a question by recording information in lists and tables; present using practical resources, pictures, block graphs or pictograms
	1MSARD2	Use diagrams to sort objects into groups according to a given criterion; suggest a different criterion for grouping the same objects
Year 2	2MSARD1	Interpret and construct simple pictograms, tally charts, block diagrams and tables; use ICT where appropriate
	2MSARD2	Ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity
	2MSARD3	Ask and answer questions about totaling and comparing categorical data
	2MSARD4	Explain choices using appropriate language, including 'not' (e.g. "a rectangle, not a rectangle; an even number, not an even number")
Year 3	3MSARD1	Answer a question by collecting, organising and interpreting data; use tally charts, frequency tables, pictograms and bar charts to represent results and illustrate observations; use ICT to create a simple bar chart
	3MSARD2	Use Venn diagrams or Carroll diagrams to sort data and objects using more than one criterion
	3MSARD3	Solve one-step and two-step questions using information presented in scaled bar charts and pictograms and tables
	3MSARD4	Follow a line of enquiry by deciding what information is important; make and use lists, tables and graphs to organise and interpret the information
Year 4	4MSARD1	Answer a question by identifying what data to collect; organise, present, analyse and interpret the data in tables, diagrams, tally charts, pictograms and bar charts, using ICT where appropriate
	4MSARD2	Compare the impact of representations where scales have intervals of differing size
	4MSARD3	Solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs
Year 5	5MSARD1	Describe the occurrence of familiar events using the language of chance or likelihood
	5MSARD2	Answer a set of related questions by collecting, selecting and organising relevant data; draw conclusions, using ICT to present features, and identify further questions to ask
	5MSARD3	Construct frequency tables, pictograms and bar and line graphs to represent the frequencies of events and changes over time
	5MSARD4	Find and interpret the mode of a set of data
Year 6	6MSARD1	Describe and predict from data using the language of chance or likelihood
	6MSARD2	Solve problems by collecting, selecting, processing, presenting and interpreting data, using ICT where appropriate; draw conclusions and identify further questions to ask
	6MSARD3	Construct and interpret frequency tables, bar charts with grouped discrete data, and line graphs; interpret pie charts
	6MSARD4	Describe and interpret results and solutions to problems using the mode, range, median and mean