



Maths Makes Sense 1
and the National Curriculum
in England (2014)

OXFORD

Maths Makes Sense 1 and the 2014 National Curriculum

| Year 1 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|---|---|--|
| NUMBER | | | |
| Number and place value | <p>Pupils practise counting (1, 2, 3), ordering (e.g. first, second, third), or to indicate a quantity (e.g. 3 apples, 2 centimetres), including solving simple concrete problems, until they are fluent.</p> <p>Pupils 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.</p> <p>They 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 (e.g. odd and even numbers), including varied and frequent practice through increasingly complex questions.</p> <p>They recognise and create repeating patterns with objects and with shapes.</p> | | |
| Pupils should be taught to: | | | |
| count to and across 100, forwards and backward beginning with 0 or 1, or from any given number | | MMS1 Daily Practice Block 1, Block 2, Block 5 | Counting to and across 100, forward and backward beginning with 0 or 1, or from any given number begins in MMSF end-of-block objectives, Counting: Count forwards/backwards starting at any number (0-1000). In MMS1 Daily Practice, this is practiced specifically with a number line and the 0-99 grid, which is extended to include values for hundreds and crossing a hundreds boundary. |
| count, read and write numbers to 100 in numerals; | | MMS1 Arithmetic 1 Block 1-Block 6; MMS1 Reasoning Block 1, Block 2; MMS1 Daily Practice Block 1, Block 2, Block 3 | Writing numbers is extended to hundreds and thousands in MMS1 Daily Practice Block 3. |
| count in multiples of twos, fives and tens | | MMS1 Daily Practice Block 4 (Geometry), Block 5 (Arithmetic 1), Block 6 (Arithmetic 1) | |
| given a number, identify one more and one less | | MMS1 Daily Practice Block 1 (Arithmetic 1 and Arithmetic 2), Block 2 (Arithmetic 1 and Arithmetic 2) | Identifying one more or less is introduced in MMSF Calculating Block 2-6 and covered in MMS1 specifically with the number line and 0-99 grid. |
| identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least | | MMS1 Arithmetic 2 Block 1-Block 6; MMS1 Reasoning Block 3, Block 4; MMS2 Data and Measure Block 3, Block 5 | Equal to (Same Value: Different Appearance) is one of the underpinning Big Ideas taught from MMSF onwards. Children use it to total amounts with whole numbers and fractions. Comparative language is used extensively in MMSF, particularly in measure contexts to compare quantities and this continues throughout MMS1. Cups used for the Real Story in MMS1 Arithmetic 2 Block 1-4 involve simple concrete problems, which in MMS1 Arithmetic 2 Block 5-6 and in MMS1 Reasoning Block 4, become Real-Life Stories to develop fluency using equal to, more than, less than, etc. The number line and 0-99 grid counting activities provide good opportunities for further practice of comparative language in Daily Practice. Least and most is used in data handling contexts in MMS2. |
| read and write numbers from 1 to 20 in numerals and words. | | MMS1 Daily Practice Block 1, Block 3 (Geometry) | |

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|--|---|--|---|
| Addition and subtraction | <p>Pupils memorise and reason with number bonds to 10 and 20 in several forms (e.g. $9 + 7 = 16$; $16 - 7 = 9$; $7 = 16 - 9$). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations.</p> <p>Pupils combine and increase numbers, counting forwards and backwards.</p> <p>They 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, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.</p> | | |
| Pupils should be taught to: | | | |
| read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs | | MMSF Calculating Block 2-Block 6; MMS1 Arithmetic 1 Block 1-Block 6; Arithmetic 2 Block 1, Block 4 - Block 6; Reasoning Block 1 - Block 4 | Extensive use of the Big Ideas of Addition, Subtraction and Equals begin in MMSF. |
| represent and use number bonds and related subtraction facts within 20 | | MMS1 Daily Practice Block 3 (Arithmetic 1), Block 4 (Arithmetic 1, Data and Measure); MMS1 Arithmetic 1 Block 2-Block 6 | Number bonds and related subtraction facts are practiced consistently with the Big Idea of Denomination for column methods. MMS1 extends addition and subtraction to numbers over 20. |
| add and subtract one-digit and two-digit numbers to 20, including zero | | MMS1 Daily Practice Block 3 (Arithmetic 1), Block 4 (Arithmetic 1, Data and Measure, Arithmetic 2), Block 6; MMS1 Arithmetic 1 Block 2-Block 6 | Adding and subtracting one-digit and two-digit numbers to 20, including zero, is practiced consistently with the Big Idea of Denomination for column methods. MMS1 extends addition and subtraction to numbers over 20. |
| solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = - 9$. | MMS1 Daily Practice Block 6 (Geometry, Data and Measure); MMS1 Reasoning Block 4; MMS1 Arithmetic 2 Block 1, Block 4-Block 6; MMS2 Daily Practice Block 4; MMS2 Reasoning Block 1; MMS2 Arithmetic 2 Block 4, Block 5 | Embellished Real-Life Stories in MMS1 Reasoning Block 4 make explicit use of everyday language associated with addition and subtraction word problems. Missing number problems are introduced in MMS2. These are dealt with after the concept of commutativity for addition and the concept of the inverse (of addition) being subtraction have been understood through the use of cups in the Real Story. | |

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|--|--|--|--|
| Multiplication and division | | | |
| Pupils should be taught to: | | | |
| solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher. | | Multiplication: MMS1 Daily Practice Block 3 (Arithmetic 2), Block 4 (Geometry, Data and Measure), Block 5 (Arithmetic 1), Block 6 (Geometry, Arithmetic 2); MMS1 Arithmetic 2 Block 2, Block 4; Division: MMS1 Daily Practice Block 3 (Arithmetic 2); MMS1 Arithmetic 2 Block 3, Block 4; MMS1 Reasoning Block 5 | Using the cups when solving one-step problems is a perfect opportunity to explore arrays on the Maths Table. |
| Fractions | Pupils are taught half and quarter as 'fractions of' discrete and continuous quantities by solving problems using shapes, objects and quantities. | | |
| Pupils should be taught to: | For example, they could recognise and find half a length, quantity, set of objects or shape. | | |
| recognise, find and name a half as one of two equal parts of an object, shape or quantity | Pupils connect halves and quarters to the equal sharing and grouping of sets of objects and to measures, as well as recognising and combining halves and quarters as parts of a whole. | MMSF Calculating Block 5, Block 6 ($\frac{1}{2}$ and $\frac{1}{4}$ cups); MMS1 Arithmetic 2 Block 1 ($\frac{1}{2}$ and $\frac{1}{4}$ cups); MMS1 Reasoning Block 5 ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ of a shape) | Addition and subtraction with fraction cups to make whole cups is taught in MMSF Block 5 and Block 6. Children share objects into equal parts in a practical context. Calculating with fractions is continued through MMS1 when finding fractions of shapes is introduced. |
| recognise, find and name a quarter as one of four equal parts of an object, shape or quantity. | | MMS1 Daily Practice Block 5; MMSF Calculating Block 5, Block 6 ($\frac{1}{2}$ and $\frac{1}{4}$ cup); MMS1 Arithmetic 2 Block 1 ($\frac{1}{4}$ and $\frac{1}{4}$ cups); MMS1 Reasoning Block 5 ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{3}{4}$ of a shape) | Addition and subtraction with fraction cups to make whole cups is taught in MMSF Block 5 and Block 6. Children share objects into equal parts in a practical context. Calculating with fractions is continued through MMS1 when finding fractions of shapes is introduced. |

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| MEASUREMENT | The pairs of terms: mass and weight, volume and capacity, are used interchangeably at this stage. | | |
| Pupils should be taught to: | | | |
| compare, describe and solve practical problems for: | Pupils move from using and comparing different types of quantities and measures using non-standard units, including discrete (e.g. counting) and continuous (e.g. liquid) measurement, to using manageable common standard units. | | Comparative language is used extensively in MMSF, particularly in measure contexts to compare quantities. |
| lengths and heights (e.g. long/short, longer/shorter, tall/short, double/half) | In order to become familiar with standard measures, pupils begin to use measuring tools such as a ruler, weighing scales and containers. | MMS1 Data and Measure Block 1, Block 2, Block 3 | Children use Same Value: Different Appearance to convert between dm and m. |
| mass or weight (e.g. heavy/light, heavier than, lighter than) | | MMS1 Data and Measure Block 2, Block 3 | Children use Same Value: Different Appearance to convert between g and kg. |
| capacity/volume (full/empty, more than, less than, half, half full, quarter) | Pupils use the language of time, including telling the time throughout the day, first using o'clock and then half past. | MMS1 Data and Measure Block 4 | Children use Same Value: Different Appearance to convert between ml and l. Maths Makes Sense uses fractional parts in all measures. |
| time (quicker, slower, earlier, later) | | MMS1 Daily Practice Block 6 (Data and Measure) | |
| measure and begin to record the following: | | | There are many cross curricula use-and-apply contexts for measures, including money and time, in addition to those listed in the Blocks. Daily Practice should be used consistently, especially for comparative language and time. |
| lengths and heights | | MMS1 Data and Measure Block 1, Block 2, Block 3 | |
| mass/weight | | MMS1 Data and Measure Block 2, Block 3 | |
| capacity and volume | | MMS1 Data and Measure Block 4 | |
| time (hours, minutes, seconds) | | MMS1 Data and Measure Block 6 | |
| recognise and know the value of different denominations of coins and notes | | MMS1 Daily Practice Block 4 (Arithmetic 2); MMS1 Data and Measure Block 4, Block 5 | Coinage from 20p - £1 is used in MMS2. Its use in everyday classroom practical contexts may be introduced in MMS1. |
| sequence events in chronological order using language such as: before and after, next, first, today, yesterday, tomorrow, morning, afternoon and evening | | MMS1 Daily Practice Block 1-6 | Daily Practice throughout the school day secures the language of chronology. |
| recognise and use language relating to dates, including days of the week, weeks, months and years | | MMS1 Daily Practice Block 1 (Geometry) Block 2 (Geometry) Block 3 (Reasoning) Block 4 (Reasoning) | |
| tell the time to the hour and half past the hour and draw the hands on a clock face to show these times. | | MMSF Block 6; MMS1 Daily Practice Block 1 (Geometry); MMS1 Data and Measure Block 6 | MMS1 focuses on reading the two circular number lines that combine to make a clock face. Children are taught to count in minutes and multiples of 5 minutes to measure duration in preparation for telling the time in MMS2. Consistent Daily Practice is an ideal opportunity for children who are ready to tell the time to extend their knowledge to the hour, half past and beyond. |

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| GEOMETRY | | | |
| Properties of shape | Pupils 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. | | |
| Pupils should be taught to: | | | |
| recognise and name common 2-D and 3-D shapes, including: | | | Recognising and naming common 2-D and 3-D shapes commences in MMSF Block 2-6. |
| 2-D shapes (e.g. rectangles (including squares), circles and triangles) | | MMS1 Daily Practice Block 6 (Arithmetic 2); MMS1 Geometry Block 4, Block 5, Block 6 | In MMS1, Geometry 1-D lines are taught as a precursor for open shapes leading to closed 2-D shapes. Properties of shapes are taught explicitly by counting sides and sorting by the number of sides. Accuracy in using sticks to construct and draw lines is taught to make and draw 2-D shapes and then name the shapes. |
| 3-D shapes (e.g. cuboids (including cubes), pyramids and spheres). | MMS1 Daily Practice Block 6 (Arithmetic 2); MMS1 Geometry Block 5, Block 6 | Pupils are also able to identify 2-D faces on 3-D shapes. | |
| Position and direction | They 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. Pupils make whole, half, quarter and three-quarter turns and routinely make these turns in both directions and connect turning clockwise with movement on a clock face. | | |
| Pupils should be taught to: | | | |
| describe position, direction and movement, including whole, half, quarter and three-quarter turns. | | MMS1 Geometry Block 3, Block 4 | In MMSF, pupils follow instructions from positional clues. This should be continued in Daily Practice. MMS1 refers to whole turns and fractional parts of a whole turn. In MMS1 Geometry Block 4, pupils name directions with correct geometric notation. There is much to be gained from cross curricula practice, e.g. in PE. |



Maths Makes Sense 2
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Maths Makes Sense 2 and the 2014 National Curriculum

| Year 2 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|---|---|--|
| NUMBER | | | |
| Number and place value | | | |
| Pupils should be taught to: | <p>Using materials and a range of representations, pupils 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.</p> <p>As they become more confident with numbers up to 100, pupils 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.</p> <p>Pupils should partition numbers in different ways (e.g. $23 = 20 + 3$ 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 place holder.</p> | | |
| count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward | | <p>MMS1 Daily Practice Block 4 (Geometry), Block 5, Block 6 (Geometry); MMS2 Daily Practice Block 1 (Geometry, Data and Measure), Block 6 (Geometry); MMS2 Arithmetic 2 Block 4, Block 5</p> | <p>MMS2 encourages fluency in counting in Daily Practice by choosing larger numbers as starting points for those children ready to move on, e.g. 1235. Steps of 3 are not made explicit but would naturally follow in Daily Practice sessions as pupils are ready. The 3 times table is used in MMS2 Reasoning Block 2 to find the inverse of times for division and to find $\frac{1}{3}$ of quantities in MMS2 Daily Practice Block 4 (Data and Measure).</p> |
| recognise the place value of each digit in a two-digit number (tens, ones) | | <p>MMS1 Daily Practice Block 2-6; MMS1 Arithmetic 1 Block 2-6; MMS2 Daily Practice Block 1,2,3; MMS2 Arithmetic 1 Block 1,2,3,6; MMS2 Arithmetic 2 Block 3, 6</p> | <p>The MMS Big Idea, The Logic of the Language and Denomination, teach a logic to counting through: 'Say it in English, Say it in Maths'. This gives a deep understanding of place value from an early stage and is built on thereafter. From MMS1, children work in denominations of cups (units) ty (tens) hundreds and thousands.</p> |
| identify, represent and estimate numbers using different representations, including the number line | | <p>MMS1 Daily Practice Block 6 (Arithmetic 1, Data and Measure); MMS2 Daily Practice Block 5 (Geometry, Data and Measure); MMS2 Arithmetic 1 Block 1-Block 6; MMS2 Arithmetic 2 Block 3, Block 6</p> | <p>Number lines are not referred to in MMS for calculation but can be used for any counting activity alongside the 0-99 grid. Number may be represented by cups (including fraction cups) and by symbolic objects such as place value cards. MMS 2 Arithmetic 2 Block 6 uses numbers shown on an abacus. Estimation by grouping in 5s and 10s taught in MMS1 should be continued in mental calculation contexts along with rounding to the nearest 10.</p> |
| compare and order numbers from 0 up to 100; use $<$, $>$ and $=$ signs | | <p>MMS2 Daily Practice Block 1, Block 2; MMS2 Daily Practice Block 4 (Arithmetic 2, Reasoning), Block 6 (Geometry); MMS2 Arithmetic 2 Block 6</p> | |
| read and write numbers to at least 100 in numerals and in words | | <p>MMS1 Daily Practice Block 3-Block 6; MMS2 Daily Practice Block 3 (Data and Measure)</p> | <p>Reading and writing numbers work started in MMS1 leads into read spell & write work in MMS2. This practice may be continued in spelling and maths contexts throughout the year.</p> |
| use place value and number facts to solve problems. | | <p>MMS1 Arithmetic 1 Block 2-Block 6; MMS2 Arithmetic 1 Block 1, Block 2, Block 3, Block 6</p> | <p>Number facts are rehearsed consistently when columnar methods are employed.</p> |

Maths Makes Sense 2 and the 2014 National Curriculum

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|---|---|--|---|
| Addition and subtraction | Pupils extend their understanding of the language of addition and subtraction to include sum and difference. | | |
| Pupils should be taught to: | | | |
| solve problems with addition and subtraction: | Pupils 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 (e.g. $5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5$). This establishes commutativity and associativity of addition. | | In MMS 2 'Think About the Word Problem!' is taught to enable pupils to analyse problems for implicit information such as sum; altogether; total; difference; etc. Pupils are fully prepared throughout MMS1 through the Big Idea of Denomination for Columnar Methods and through early concrete modelling to access symbolic reasoning. |
| using concrete objects and pictorial representations, including those involving numbers, quantities and measures | Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers. | MMS2 Arithmetic 1 Block 4, Block 5; MMS2 Arithmetic 2 Block 1, Block 2; MMS2 Reasoning Block 3, Block 4, Block 5 | Pupils use cups or standard measuring equipment, or are taught to draw a picture of the Real-Life Story, e.g. apples. The foundations of this have been built throughout MMS1. |
| applying their increasing knowledge of mental and written methods | | MMS2 Daily Practice Block 1-Block 6; MMS1 Reasoning Block 2, MMS2 Data and Measure Block 3 (difference); MMS2 Arithmetic 2 Block 3 (partitioning) MMS2 Arithmetic 1 Block 2, Block 3, Block 6 (column methods) | Mental methods are constantly in use in MMS, particularly in Daily Practice, e.g. complements; doubling; 5 and a bit; bonds to 10 and 20; rounding to the nearest 10 and use of the number line for addition/subtraction of small numbers. Funny writing is taught for a 'tricky' addition column and funny counting, e.g. $35 = 30 + 5 = 20 + 15$, for a 'tricky' subtraction column. |
| recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 | | MMS2 Daily Practice Block 1, Block 2, Block 3, Block 4 | In MMS2 Daily Practice, once children have accomplished bonds to 10, although not explicit in MMS2, it would be a natural step to work on bonds to 100. |
| add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones a two-digit number and tens two two-digit numbers adding three one-digit numbers | | MMS2 Arithmetic 1 Block 1-Block 6; MMS2 Arithmetic 2 Block 1-Block 6; MMS2 Reasoning Block 1, Block 3, Block 4, Block 5 | For help with addition and subtraction, pupils use cups or standard measuring equipment, or are taught to draw a picture of the Real-Life Story, e.g. apples. With larger numbers, children can use column methods often supported by place value cards as symbolic objects. The foundations of this have been built throughout MMS1. |
| show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot | | MMS2 Reasoning Block 1 | Practice of addition as commutative and subtraction as non-commutative continues through analysis of word problems throughout MMS2. |
| recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems. | | MMS2 Reasoning Block 1, MMS2 Arithmetic 2 Block 5 | Practice of using the inverse relationship between addition and subtraction continues through analysis of word problems throughout MMS2. |

Maths Makes Sense 2 and the 2014 National Curriculum

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|---|---|--|---|
| Multiplication and division | Pupils use a variety of language to describe multiplication and division. | | |
| Pupils should be taught to: | Pupils 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. | | Work on the 2, 5, and 10 times tables started in MMS1, as did counting in 5s on a clock face, and is continued in MMS2. |
| recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers | Pupils 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 (e.g. $40 \div 2 = 20$, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (e.g. $4 \times 5 = 20$ and $20 \div 5 = 4$). | MMS1 Daily Practice Block 4, Block 5, Block 6; MMS2 Daily Practice Block 1 (Data and Measure), Block 2, Block 3 (Geometry, Reasoning) Block 4, Block 6; Odd/even numbers: MMS1 Daily Practice Block 5; MMS2 Arithmetic 2 Block 6 | Odd and even numbers can also be investigated explicitly through the MMS2 Arithmetic 2 number puzzle activities in Block 4 and Block 5. |
| calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (\times), division (\div) and equals (=) signs | | MMS2 Arithmetic 1 Block 1; MMS2 Reasoning Block 1, Block 2, Block 6 | In MMS1 Arithmetic 1, pupils multiply and divide using $\frac{1}{2}$ and $\frac{1}{4}$ cups. This knowledge is extended in MMS2 Reasoning, where pupils are given $2 \times 3 = 6$ and use the logic of the language to write maths stories about ty, hundred or thousand, e.g. $2000 \times 3 = 6000$ and use the 'inverse of division is times' to calculate $6000 \div 3 = 2000$. |
| show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot | | MMS2 Reasoning Block 1, Block 2, Block 6 | MMS2 Reasoning gives a concrete model for the grid method as a picture of the Maths Story. The arrays of cups in the grid enables children to understand the commutativity of multiplication and to reason the inverse of times is divide and vice versa. |
| solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts. | | MMS2 Arithmetic 2 Block 1, Block 2, Block 3, Block 4, Block 5, Block 6; MMS2 Reasoning Block 1, Block 3, Block 4, Block 5, Block 6; MMS2 Daily Practice Block 2 | In MMS2, the reasoning strand develops 'Think about the word problem!' with multiplication and division word problems in all contexts including measures. Type 1 (Grouping) and Type 2 (Sharing) models are taught in problem contexts. |
| Fractions | Pupils 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, quantity, a set of objects or shapes. They meet $\frac{3}{4}$ as the first example of a non-unit fraction. | | |
| Pupils should be taught to: | | | |
| recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity | Pupils should count in fractions up to 10, starting from any number and using the $\frac{1}{2}$ and $\frac{2}{4}$ equivalence on the number line (e.g. $1\frac{1}{4}$, $1\frac{2}{4}$ (or $1\frac{1}{2}$), $1\frac{3}{4}$, 2). This reinforces the concept of fractions as numbers and that they can add up to more than one. | MMS2 Daily Practice Block 4; MMS2 Arithmetic 2 Block 5 (Lesson 3, 4) | |
| write simple fractions e.g. $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$. | | MMS2 Daily Practice Block 4; MMS2 Arithmetic 1 Block 1; MMS2 Arithmetic 2 Block 4 Lesson 1 | MMS 1 teaches Same Value Swap (or fair swap) for $\frac{2}{4}$ and $\frac{1}{2}$ using all four operations with cups. |

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|--|---|--|---|
| MEASUREMENT | <p>Pupils use standard units of measurement with increasing accuracy, using their knowledge of the number system. They use the appropriate language and record using standard abbreviations.</p> <p>Comparing measures includes simple multiples such as 'half as high'; 'twice as wide'.</p> <p>They become fluent in telling the time on analogue clocks and recording it.</p> <p>Pupils become fluent in counting and recognising coins. They read and say amounts of money confidently and use the symbols £ and p accurately, recording pounds and pence separately.</p> | | |
| Pupils should be taught to: | | | |
| choose and use appropriate standard units to estimate and measure length/height in any direction (m/cm); mass (kg/g); temperature (°C); capacity (litres/ml) to the nearest appropriate unit, using rulers, scales, thermometers and measuring vessels | | MMS2 Data and Measure Block 2; MMS2 Reasoning Block 5 | Choosing and using appropriate standard units to estimate and measure should be enriched through maths across the curriculum, e.g. science contexts. |
| compare and order lengths, mass, volume/capacity and record the results using >, < and = | | MMS2 Data and Measure Block 2, Block 4, Block 6; MMS2 Reasoning Block 5 | < and > can be used and applied in any measure context from Block 4. |
| recognise and use symbols for pounds (£) and pence (p); combine amounts to make a particular value | | MMS2 Daily Practice Block 2 (Geometry, Data and Measure); MMS2 Data and Measure Block 4 | Recognising and using symbols for pounds and pence can be practiced further through cross-curricula activities, e.g. school events. |
| find different combinations of coins that equal the same amounts of money | | MMS2 Data and Measure Block 4 | Finding different combinations of coins that equal the same amounts of money can be practiced further through cross-curricula activities, e.g. school events. |
| solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change | | MMS2 Daily Practice Block 2 (Data and Measure); MMS2 Data and Measure Block 4 | Solving simple problems involving addition and subtraction of money can be practiced further through cross-curricula activities, e.g. school events. |
| compare and sequence intervals of time | | MMS2 Daily Practice Block 1 (Arithmetic 2, Reasoning), Block 6 (Arithmetic 2, Reasoning) | MMS1 work on intervals of time prepares children for MMS2 calendar work. |
| tell and write the time to five minutes, including quarter past/to the hour and draw the hands on a clock face to show these times. | | MMS2 Data and Measure Block 1, Block 6 | Further practice in telling and writing the time for fluency is essential during every school day. |
| know the number of minutes in an hour and the number of hours in a day | | MMS1 Data and Measure Block 6 | Circular number lines 0-12 and 0-60 are used to teach hours and minutes. Children recognize the hour and the minute hand in readiness for telling the time in MMS2. |

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|--|---|--|--|
| GEOMETRY | | | |
| Properties of shape | <p>Pupils handle and name a wider variety of common 2-D and 3-D shapes including: quadrilaterals and cuboids, prisms, cones and polygons, and identify the properties of each shape (e.g. number of sides, number of faces). Pupils identify, compare and sort shapes on the basis of their properties and use vocabulary precisely, such as sides, edges, vertices and faces.</p> <p>Pupils read and write names for shapes that are appropriate for their word reading and spelling.</p> <p>Pupils draw lines and shapes using a straight edge.</p> | | |
| Pupils should be taught to:- | | | |
| identify and describe the properties of 2-D shapes, including the number of sides and symmetry in a vertical line | | MMS1 Geometry Block 4; MMS2 Geometry Block 1, Block 4, Block 5 | MMS1 prepares children for sorting shapes by properties including the number of sides. |
| identify and describe the properties of 3-D shapes, including the number of edges, vertices and faces | | MMS1 Geometry Block 5, Block 6; MMS2 Geometry Block 3, Block 4, Block 6 | |
| identify 2-D shapes on the surface of 3-D shapes, for example a circle on a cylinder and a triangle on a pyramid | | MMS1 Geometry Block 5, Block 6; MMS2 Geometry Block 3, Block 4, Block 6 | |
| compare and sort common 2-D and 3-D shapes and everyday objects. | | MMS2 Geometry Block 1 - Block 6 | Opportunities to compare and sort shapes are present in all geometry lessons. MMS2 Arithmetic 2 Block 6 Venn and Carroll diagrams work could be extended to cover 2-D and 3-D shape sorting. |
| Position and direction | <p>Pupils should work with patterns of shapes, including those in different orientations.</p> <p>Pupils use the concept and language of angles to describe 'turn' by applying rotations, including in practical contexts (e.g. pupils themselves moving in turns, giving instructions to other pupils to do so, and programming robots using instructions given in right angles).</p> | | |
| Pupils should be taught to: | | | |
| order and arrange combinations of mathematical objects in patterns and sequences | | MMS2 Arithmetic 2 Block 3; MMS2 Geometry Block 6 | PE lessons, BeBot robots or Floor turtles are an obvious extension to investigate and practice positional language and turns. In all MMS2 Geometry blocks, extension activities could involve looking at different orientations of shapes. |
| use mathematical vocabulary to describe position, direction and movement including distinguishing between rotation as a turn and in terms of right angles for quarter, half and three-quarter turns (clockwise and anti-clockwise), and movement in a straight line. | MMS2 Geometry Block 2, Block 4, Block 6 | | |
| STATISTICS | <p>Pupils record, interpret, collate, organise and compare information (e.g. using many-to-one correspondence in pictograms with simple ratios 2, 5, 10).</p> | | |
| Pupils should be taught to: | | | |
| interpret and construct simple pictograms, tally charts, block diagrams and simple tables | | MMS2 Geometry Block 1; MMS2 Arithmetic 2 Block 2; MMS2 Data and Measure Block 2, Block 5 | In MMS2 Data and Measure, pupils copy grids and charts. Using and applying this across the curriculum is possible, and there is ample opportunity to construct various data collection charts featuring children's own areas of interest. |
| ask and answer simple questions by counting the number of objects in each category and sorting the categories by quantity | | MMS2 Geometry Block 1; MMS2 Arithmetic 2 Block 2; MMS2 Data and Measure Block 2, Block 5 | |
| ask and answer questions about totalling and comparing categorical data. | MMS2 Geometry Block 1; MMS2 Arithmetic 2 Block 2; MMS2 Data and Measure Block 2, Block 5 | | |



Maths Makes Sense 3
and the National Curriculum
in England (2014)

OXFORD

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|---|---|---|
| NUMBER | | | |
| Number and place value | <p>Pupils now use multiples of 2, 3, 4, 5, 8, 10, 50 and 100.</p> <p>They 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 (e.g. $146 = 100 + 40$ and $6, 146 = 130 + 16$).</p> <p>Using a variety of representations, including those related to measure, pupils continue to count in ones, tens and hundreds, so that they become fluent in the order and place value of numbers to 1000.</p> | | |
| Pupils should be taught to: | | | |
| count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number | | MMS3 Daily Practice Block 1 - Block 6 (Block 6 Arithmetic 1, Geometry) | During Daily Practice, count in different sized steps or chant a selection of times tables, e.g. start at 2357, count on in 10s or 100s. MMS also counts in fractional parts, e.g. $\frac{1}{4}$ s. |
| recognise the place value of each digit in a three-digit number (hundreds, tens, ones) | | MMS3 Daily Practice Block 1 - 6; MMS3 Arithmetic 1 Block 1 Lessons 3, 4; Block 2 Lessons 3, 4; Block 3 Lessons 2 - 4; Block 4 Lesson 3; Block 5 Lesson 4; Block 6 Lessons 3, 4; MMS3 Reasoning Block 1 Lessons 1 - 4 (four-digit numbers) | In MMS3 Arithmetic 2 Block 5, understanding of place value is extended to 1 decimal place. |
| compare and order numbers up to 1000 | | MMS3 Reasoning Block 1 Lessons 3, 4 | Children were taught to order numbers to 1000 in MMS2 and this should be continued in arithmetic contexts throughout MMS3 when calculating with four-digit numbers. |
| identify, represent and estimate numbers using different representations | | MMS3, all strands, Block 1 - Block 6 (varied contexts); MMS3 Arithmetic 2 Block 3 Lessons 3, 4 (rounding to nearest 10 and 100) | In MMS3, the following are used to identify and represent numbers: cups; fraction cups/cards; place value cards; 0 - 99 grid extended e.g. 700 - 799; rulers and other measuring scales as number lines; ratio sticks and drawings for fractions as operators; negative number cards to represent lumps of earth and holes; axes to co-ordinate geometry. The right hand margin is to be developed for mental imagery to make jottings, moving from concrete to more abstract ways of working. Estimation should be integral to all calculation activities. |
| read and write numbers up to 1000 in numerals and in words | | MMS3 Daily Practice Block 1 - Block 6; MMS3 Arithmetic 1 Block 1 Lessons 3, 4; Block 2 Lessons 3, 4; Block 3 Lessons 2 - 4; Block 4 Lesson 3; Block 5 Lesson 4; Block 6 Lessons 3, 4; MMS3 Reasoning Block 1 Lessons 1 - 4 | Writing numbers in words may be practised in English problem solving contexts when children compose their own word problems. |
| solve number problems and practical problems involving these ideas. | | MMS3 Arithmetic 2 Block 1 - Block 6; Data and Measure Block 1 - Block 6; Reasoning Block 1 - Block 6 | Throughout MMS3 in varied contexts, use and apply these number and practical problem ideas, particularly in Arithmetic 2, Reasoning and Data and Measure. |

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|--|---|--|
| Addition and subtraction | Pupils practise solving varied addition and subtraction questions. For mental calculations with two-digit numbers, the answers could exceed 100. | | |
| Pupils should be taught to: | | | |
| add and subtract numbers mentally, including: a three-digit number and ones a three-digit number and tens a three-digit number and hundreds | Pupils 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 (see Appendix 1). | MMS3 Daily Practice Block 1 - Block 6 | |
| add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction | | MMS3 Daily Practice Block 1 - Block 6; MMS3 Arithmetic 1 Block 1 Lessons 3, 4 (tricky units); Arithmetic 1 Block 2 Lessons 3, 4 (tricky tens); Arithmetic 1 Block 3 Lessons 2 - 4 (tricky units, tens or both); Arithmetic 1 Block 4 Lesson 3; Arithmetic 1 Block 5 Lessons 3, 4; Arithmetic 1 Block 6 Lessons 3, 4 (with one tricky units, tens or hundreds column); MMS3 Arithmetic 2 Block 5 Lesson 3; MMS3 Reasoning Block 1 Lessons 1 - 3 | Appendix 1 of the 2014 PoS illustrates the identical column method for addition and subtraction used in MMS. In MMS this is referred to as Funny Writing (addition) and Funny Counting (subtraction). Columnar addition and subtraction is taught with up to 4-digits from MMS1 (no tricky columns) and MMS2 (tricky units column only for bridging and decomposition). In MMS3 Arithmetic 2 Block 5, this extends to numbers with 1 decimal place. |
| estimate the answer to a calculation and use inverse operations to check answers | | MMS3 Arithmetic 2 Block 3 Lessons 3, 4 (rounding to nearest 10 and 100) | Estimating the answer to a calculation and using inverse operations to check answers is not explicit in MMS3, however, it is implicit in that all calculations should be checked, inverse strategies having been taught in MMS2 Reasoning Blocks 1, 2 and 6. In MMS2 Reasoning Daily Practice Block 6, calculators are introduced as a mathematical tool for checking answers. In MMS3 Daily Practice, children continue to use calculators with precision to check answers. |
| solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction. | | MMS3 Arithmetic 1 Block 1 - Block 6; Arithmetic 2 Block 5, Block 6; MMS3 Reasoning Block 1, Block 4, Block 5 (whole number complements to 100; fraction complements to 1; rearranging); MMS3 Data and Measure Block 3 (sums/differences); Block 4 (data); Block 5 (money); Block 6 (area) | |

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|--|---|---|
| Multiplication and division | Pupils 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. | | |
| Pupils should be taught to: | | | |
| recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables | Pupils develop efficient mental methods, for example, using commutativity and associativity (e.g. $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$) and multiplication and division facts (e.g. using $3 \times 2 = 6$, $6 \div 3 = 2$ and $2 = 6 \div 3$) to derive related facts ($30 \times 2 = 60$, $60 \div 3 = 20$ and $20 = 60 \div 3$). | MMS3 Daily Practice Block 1 ($\times 2, 5, 10$); Block 2, Block 3 ($\times 2, 3, 4, 5, 10$); Block 4, Block 5, Block 6 ($\times 2, 3, 4, 5, 6, 10$); MMS4 Daily Practice Block 1, Block 2 (facts to 10×10); Block 3 ($\times 3, 4, 5, 6, 7, 9, 10$); Block 4, ($\times 8, 9, 10$); Block 5 ($\times 1, 5, 7, 9$); Block 6 ($\times 5, 7, 8, 10$) | All tables practised can be extended to 12×12 . The Daily Practice screens in MMS3 are designed to be easily adapted to whichever tables are appropriate for the pupils. The $\times 6$ table could be changed to $\times 8$ in the Daily Practice in MMS3. In either case doubling of the 3 or 4 times table should be practised. |
| write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods | Pupils 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. Pupils solve simple problems in contexts, deciding which of the four operations to use and why, including 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 (e.g. 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4 children; 4 cakes shared equally between 8 children). | MMS2 Reasoning Block 2, Block 6; MMS3 Arithmetic 2 Block 3; MMS3 Reasoning Block 3 | MMS2 Reasoning gives a concrete model for the grid method as a picture of the Maths Story. This enables children to visualise with arrays of cups drawn in the grid, the commutativity of multiplication and to reason the inverse of times is divide and vice versa. MMS3 Arithmetic 2 Block 3 covers two-digit times one-digit calculations using a grid and MMS3 Reasoning Block 3 by partitioning and calculating the sum of the two products, e.g. $52 \times 7 = 50 \times 7 + 2 \times 7 = 350 + 14 = 364$. |
| solve problems, including missing number problems, involving multiplication and division, including integer scaling problems and correspondence problems in which n objects are connected to m objects. | | MMS3 Arithmetic 1 Block 2 (using fifths); Block 3, Lessons 3, 4 (fifths/sevenths); Block 4, Lessons 3, 4; Block 5, Lesson 2; Block 6 (fractions and negative numbers); MMS3 Arithmetic 2 Block 3 (grid); Block 4 (division with remainders, with remainders expressed as a number and as a fraction); Block 5 (squares and square roots); Block 6 (word problems); MMS3 Reasoning Block 2, Block 4, Block 6 (word problems) | The multiplication grid used throughout MMS3, MMS4 and MMS5 builds deep conceptual understanding. The Big Idea of the Logic of the Language for derived facts leads in MMS6 to the long multiplication method, and finally the short method shown in Appendix 1. In division, pupils are taught word problems to identify Type 1 (grouping) and Type 2 (sharing) models. |

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|--|--|
| Fractions | Pupils connect tenths to place value, decimal measures and to division by 10. | | |
| Pupils should be taught to: | | | |
| 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 | They 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, relating this to measure. | MMS3 Arithmetic 2 Block 5 Lessons 1, 2, 3 | Counting in tenths is not explicit in MMS3, however, children naturally use the Big Idea of Denomination for counting in 'things called tenths' in Daily Practice. |
| recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators | Pupils understand the relation between unit fractions as operators (fractions of), and division by integers. | MMS3 Arithmetic 2 Block 1, Block 2; MMS3 Data and Measure Block 3 | Fraction work can be aided by using the Big idea of Ratio, writing $\frac{2}{3}$ from 2 compared to 3. |
| recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators | They continue to recognise fractions in the context of parts of a whole, numbers, measurements, a shape, or unit fractions as a division of a quantity. Pupils practise adding and subtracting fractions with the same denominator through a variety of increasingly complex problems to improve fluency. | MMS3 Arithmetic 1 Block 1 Lessons 1, 2; Block 2, Lessons 1, 2, 4; Block 3; MMS3 Arithmetic 2 Block 5 Lessons 1, 2, 3; MMS3 Data and Measure Block 3 (ratio 3:7 = $\frac{3}{7}$ so $\frac{31}{7} = 4\frac{3}{7}$); MMS3 Reasoning Block 5 (fractions as complements of 1) | |
| recognise and show, using diagrams, equivalent fractions with small denominators | | MMS4 Daily Practice Block 3, Block 4, Block 5, Block 6; MMS4 Data and Measure Block 5 | $\frac{1}{2} = \frac{2}{4}$ is shown by same-value swap with cups from MMS1. Children could work with the image of the 'bottom of the cup' as a circle cut into equal parts to know that $\frac{2}{8} = \frac{1}{4}$ etc. Equivalent fractions are carefully developed through MMS4 and MMS5 with the Big Idea of Ratio first introduced in MMS3 Arithmetic 2 Block 1. Children use 'Think Sticks', drawing $\frac{2}{3}$ as 2 sticks (numerator) compared to 3 sticks (denominator), realising that the basic stick is 1. If the top stick becomes 4, the basic stick is now 2, so the bottom stick becomes 6, so $\frac{4}{6} = \frac{2}{3}$. |
| add and subtract fractions with the same denominator within one whole (e.g. $\frac{5}{7} + \frac{1}{7} = \frac{6}{7}$) | | MMS3 Arithmetic 1 Block 1 Lessons 1, 2; Block 2, Lessons 1, 2, 4; Block 3; Arithmetic 2 Block 5 Lessons 1, 2, 3 | In MMS, adding and subtracting fractions with the same denominator within one whole extends immediately to using all 4 operations with fractions, e.g. $\frac{2}{5} \times 4 = \frac{8}{5} = 1\frac{3}{5}$; $1\frac{1}{5} \div \frac{2}{5} = 3$. |
| compare and order unit fractions, and fractions with the same denominators | | MMS3 Reasoning Block 5 Lessons 2, 4 (fractional complements to 1) | Daily Practice includes counting in fractional steps, and comparing/ordering unitary fractions by the number of equal parts. MMS5 Daily Practice places fractions on a number line. |
| solve problems that involve all of the above. | | MMS3 Arithmetic 1 Block 1 - Block 6; MMS3 Arithmetic 2 Block 1, Block 2, Block 4; MMS3 Reasoning Block 4; MMS3 Data and Measure Block 3 | |

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|---|--|---|--|
| MEASUREMENT | | | |
| Pupils should be taught to: | | | |
| measure, compare, add and subtract: lengths (m/cm/mm); mass (kg/g); volume/capacity (l/ml) | <p>Pupils continue to measure using the appropriate tools and units, progressing to using a wider range of measures, including comparing and using mixed units (e.g. 1kg and 200g) and simple equivalents of mixed units (e.g. 5m = 500cm).</p> <p>The comparison of measures includes simple scaling by integers (e.g. a given quantity or measure is twice as long or five times as high) and this connects to multiplication.</p> | MMS3 Daily Practice Block 1 - Block 6; MMS3 Data and Measure Block 1, Block 2, Block 4, Block 6 Length | MMS also uses dm in length. Pupils gain fluency at conversion between units using Same Value: Different Appearance in Daily Practice. In MMS3 Geometry Block 1, pupils learn that a line segment labelled AB has a defined length that can be measured and that the length of 'a line' is infinity. |
| measure the perimeter of simple 2-D shapes | <p>Pupils 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.</p> <p>Pupils use both analogue and digital 12-hour clocks and record their times. In this way they become fluent and prepared for using digital 24-hour clocks in year 4.</p> | MMS3 Data and Measure Block 4; Block 6 Lessons 2, 3 | Perimeter is first introduced in MMS1 Data and Measure with decimetre sticks for closed shapes, continued through MMS2. In MMS3 Data and Measure, children measure length accurately in mm. Perimeter is not explicitly taught again in MMS3 except in Data and Measure Block 4 Lesson 4, because pupils move on to measure area and volume. In each of these activities pupils would be looking at 2-D shapes and so would continue to measure perimeter. |
| add and subtract amounts of money to give change, using both £ and p in practical contexts | | MMS3 Daily Practice Block 1 - Block 6 (totals and change within £1); MMS3 Reasoning Block 6 Lesson 3; Data and Measure Block 5 Lessons 3, 4 | Fluency in adding and subtracting amounts of money to give change can be gained through Daily Practice and these ideas can be used and applied across the curriculum. |
| tell and write the time from an analogue clock, including using Roman numerals from I to XII, and 12-hour and 24-hour clocks | | MMS3 Daily Practice Block 5 (convert analogue/digital); Block 6 (earlier/later duration); MMS3 Data and Measure Block 1 Lessons 3, 4; MMS3 Reasoning Block 4 Lesson 2 | Roman numerals are not used explicitly in MMS. This is an opportunity for maths to be practiced across the curriculum, for example within a history topic on Romans or a technology topic on time. Daily Practice in MMS focuses on time. Clocks with Roman numerals could be used as Same Value: Different Appearance. |
| estimate and read time with increasing accuracy to the nearest minute; record and compare time in terms of seconds, minutes and hours; use vocabulary such as o'clock, a.m./p.m., morning, afternoon, noon and midnight | | MMS3 Daily Practice Block 5 (convert analogue/digital); Block 6 (earlier/later duration); MMS3 Data and Measure Block 1 Lessons 3, 4; MMS3 Reasoning Block 4 Lesson 2 | Fluency through estimating and reading time with increasing accuracy can be gained through Daily Practice and used and applied across the curriculum e.g. the daily class timetable, timing relays in PE, science experiments. |
| know the number of seconds in a minute and the number of days in each month, year and leap year | | MMS2 Daily Practice Block 1, Block 3 | Knowing the number of seconds in a minute and days in a month, year and leap year, is secured through MMS1 and MMS2. |
| compare durations of events, for example to calculate the time taken by particular events or tasks. | | | Fluency in comparing the duration of events can be gained through Daily Practice and used and applied across the curriculum, e.g. the daily class timetable, timing relays in PE, science experiments. |

Maths Makes Sense 3 and the 2014 National Curriculum

| Year 3 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|---|---|
| GEOMETRY | | | |
| Properties of shape | <p>Pupils' knowledge of the properties of shapes is extended at this stage to symmetrical and non-symmetrical polygons and polyhedra. Pupils 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.</p> <p>Pupils connect decimals and rounding to drawing and measuring straight lines in centimetres in a variety of contexts.</p> | | |
| Pupils should be taught to: | | | |
| draw 2-D shapes and make 3-D shapes using modelling materials; recognise 3-D shapes in different orientations and describe them | | MMS3 Geometry Block 1; MMS3 Data and Measure Block 2; MMS3 Geometry Block 3; MMS2 Geometry Block 6; MMS3 Geometry Block 4; MMS3 Geometry Block 5; MMS3 Geometry Block 6 | In MMS3, the use of compasses, set squares and protractors as mathematical drawing instruments is taught. Children draw line segments in Geometry Block 1 as a precursor for drawing hexagons with compasses in Data and Measure Block 2 and circles, hexagons and triangles in Geometry Block 6. Children name triangles in MMS2 Geometry Block 6 and MMS3 Geometry Block 6. Modelling materials could be used to extend units; in MMS pupils draw and measure lines (1-D) accurately to construct 2-D faces which they cut out and assemble to form nets of 3-D shapes (Block 6). |
| recognise that angles are a property of shape or a description of a turn | | MMS3 Geometry Block 1, Block 3 | MMS3 Geometry Block 1 uses both clockwise and anticlockwise directional turn instructions. Children recognise Same Value: Different Appearance for quadrants of a full turn as 90°, 180°, 270° and 360° and use 10° angle templates and use a set square. |
| identify right angles, recognise that two right angles make a half-turn, three make three quarters of a turn and four a complete turn; identify whether angles are greater than or less than a right angle | | MMS2 Geometry Block 4; MMS3 Geometry Block 3 | |
| identify horizontal and vertical lines and pairs of perpendicular and parallel lines. | MMS3 Geometry Block 2, Block 4 | Vertical and horizontal lines are identified in MMS1 with actions. In MMS3, Geometry Block 2 introduces the x and y axes and delves into co-ordinates. | |
| STATISTICS | | | |
| Pupils should be taught to: | <p>Pupils understand and use simple scales (e.g. 2, 5, 10 units per cm) in pictograms and bar charts with increasing accuracy.</p> <p>They continue to interpret data presented in many contexts.</p> | | |
| interpret and present data using bar charts, pictograms and tables | | MMS3 Data and Measure Block 1 Lessons 1, 2; Block 3; Block 5 Lessons 1, 2 | Pupils are taught to draw charts with precision. |
| solve one-step and two-step questions such as 'How many more?' and 'How many fewer?' using information presented in scaled bar charts and pictograms and tables. | | MMS3 Data and Measure Block 3, Block 5; MMS3 Data and Measure Block 1 Lessons 1, 2; Block 3, Block 5 Lessons 1, 2 | Enrich solving one-step and two-step problems through using and applying them across the curriculum, practicing with pupils own data in context. Scales can be more complex as pupils gain confidence. |



Maths Makes Sense 4
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OXFORD

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|---|---|--|
| NUMBER | | | |
| Number and place value | <p>Using a variety of representations, including measures, pupils 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.</p> <p>They begin to extend their knowledge of the number system to include the decimal numbers and fractions that they have met so far.</p> <p>They connect estimation and rounding numbers to the use of measuring instruments.</p> <p>Roman numerals should be put in their historical context so pupils understand that there have been different ways to write whole numbers and that the important concepts of zero and place value were introduced over a period of time.</p> | | |
| Pupils should be taught to: | | | |
| count in multiples of 6, 7, 9, 25 and 1000 | | MMS3 Daily Practice Block 1 - Block 6 (×2,3,4,5,6,10 and related division facts); MMS4 Daily Practice (× 3,4,5,6,7,9,10 and all multiplication and division facts to 100) | |
| find 1000 more or less than a given number | | | Fluency in counting is achieved through rigorous Daily Practice in MMS. This begins in Early Years Foundation Stage and continues with the Big Idea of Denomination through KS1 and KS2, e.g. start from 52,345 and count on/back in 1000s. |
| count backwards through zero to include negative numbers | | | Counting backwards through zero can be easily incorporated in MMS in the Daily Practice, e.g. start at 25 and count back in multiples of 5 beyond 0. |
| recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones) | | MMS4 Arithmetic 2 Block 2, Block 3 Lessons 3, 4; MMS4 Arithmetic 1 Block 3 Lesson 1; Block 4, Block 5 Lesson 4; Block 6 Lessons 3, 4; Reasoning Block 1, Block 2, Block 3 | In MMS4, recognising the place value of each digit in a four-digit number is extended to reading place value to 2 decimal places. MMS4 extends to read and write large products of ten as powers of 10, e.g. 100 000 as 10^5 . |
| order and compare numbers beyond 1000 | | MMS4 Reasoning Block 1, Block 2, Block 3 | Through the Big Idea of the Logic of the Language, children name and write large numbers precisely. In Daily Practice counting, and in all calculation contexts, larger numbers can be read and ordered for fluency. |
| identify, represent and estimate numbers using different representations | | | Pupils may continue to access place value cards and cups, the percentage disc, fraction cards, negative number imagery, 'lumps of earth' 'holes' or 'level ground' and related 1, -1, 0 cards. The learning system fosters strong mental imagery and pupils use the right hand margin for mental jottings with confidence. Mental agility and speed is encouraged through Daily Practice. With larger numbers, standard column methods are used for addition and subtraction and grid methods for multiplication and division. Pupils use estimation for rounding. This is implicit in all calculations. Use and apply for measures, selecting and reading scales on a variety of equipment, which is continued in MMS4. |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|--|---|
| round any number to the nearest 10, 100 or 1000 | | MMS3 Arithmetic 2 Block 3 Lessons 3, 4; MMS4 Arithmetic 1 Block 5 Lessons 3, 4 | Rounding to the nearest 10 & 100 in MMS3 is naturally extended to rounding to 1000 and should be practised in the context of estimation. In MMS4, pupils round 1 d.p. and 2d.p. to the nearest whole number. |
| solve number and practical problems that involve all of the above and with increasingly large positive numbers | | Throughout MMS4 in varied contexts | Use and apply solving number and practical problems, particularly in Arithmetic 2, Reasoning, Data and Measure and Geometry. |
| read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value | | | Roman numerals are not used explicitly in MMS. This is an opportunity for maths to be practiced across the curriculum, for example, within a history topic on Romans or a technology topic on time. Daily Practice in MMS focuses on time. Clocks with Roman numerals could be used as Same Value: Different Appearance. |
| Addition and subtraction | Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency (see Appendix 1). | | |
| Pupils should be taught to: | | | |
| add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate | | MMS3 Daily Practice Block 1 - Block 6; MMS3 Arithmetic 1 Block 1 Lessons 3, 4 (tricky units); Arithmetic 1 Block 2 Lessons 3, 4 (tricky tens); Arithmetic 1 Block 3 Lessons 2 - 4 (tricky units, tens or both); Arithmetic 1 Block 4 Lesson 3; Arithmetic 1 Block 5 Lessons 3, 4; Arithmetic 1 Block 6 Lessons 3, 4 (with one tricky units, tens or hundreds column); MMS3 Arithmetic 2 Block 5 Lesson 3; MMS3 Reasoning Block 1 Lessons 1 - 3; MMS4 Arithmetic 1 Block 3 Lessons 1, 2, 4; Block 4 Lesson 1 (any column tricky); Arithmetic 2 Block 2 Lesson 2 | MMS standard columnar methods are in line with Appendix 1. In MMS4, pupils use 4-digits with 2 d.p. in columnar calculations. In some lessons where calculator use is suggested, this could be used as a check after the calculations are performed with standard written methods. |
| estimate and use inverse operations to check answers to a calculation | | Throughout MMS4 in varied contexts, estimation should be integral to all calculation activities | Estimating and using inverse operations to check answers to a calculation is not explicit in MMS4, however, it is implicit in that all calculations should be checked. Inverse strategies were taught in MMS2 Reasoning Block 1, Block 2 and Block 6. In MMS2 Reasoning Daily Practice Block 6, calculators are introduced as a mathematical tool for checking answers. In MMS4 Daily Practice, calculators are used with precision to check. |
| solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why | | MMS4 Arithmetic 2 Block 1 Lesson 2; Block 2 Lessons 3, 4; Block 3, Block 4 (sums of products and totals/change with decimal notation £0.00); Block 6 | The associative law is used in MMS4 (Arithmetic 2, Block 3) to rearrange calculations efficiently. 'Think About the Word Problem' introduced in MMS2, analyses explicit and implicit information in word problems to identify operations. |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|--|--|
| Multiplication and division | Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency. | | |
| Pupils should be taught to: | | | |
| recall multiplication and division facts for multiplication tables up to 12×12 | Pupils practise mental methods and extend this to three-digit numbers to derive facts (for example $600 \div 3 = 200$ can be derived from $2 \times 3=6$). Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers (see Mathematics Appendix 1). | MMS3 Daily Practice Block 1 - Block 6 (x2,3,4,5,6,10 and related division facts); MMS4 Daily Practice (x3,4,5,6,7,9,10 and all multiplication and division facts to 100) | Facts up to 10×10 are practised in Daily Practice activities. Natural extension to 12×12 follows in MMS5 Daily Practice but could be started with confident children in MMS4. Multiplication and division facts to 100 are practised in use and apply contexts throughout MMS4 strands. |
| use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers | Pupils write statements about the equality of expressions (e.g. 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 e.g. $2 \times 6 \times 5 = 10 \times 6$. Pupils 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. | MMS3 Daily Practice Block 1 - Block 6; MMS4 Daily Practice; MMS4 Reasoning Block 2; MMS4 Reasoning Block 3 | Multiplying by 0 and 1 is explicitly demonstrated with cups in MMS1 and MMS2. All times tables are rehearsed with 0 and 1 times. The associative law for multiplication is used in multiplying together three numbers (Reasoning Block 3). In MMS4, pupils calculate the sum or difference of two products in expressions with multiple terms, identifying the terms through the learning system. The Big Idea of the Logic of the Language is used to derive facts, e.g. $3 \times 4=12$, $3000 \times 400 = 1\,200\,000$, $1\,200\,000 \div 3000 = 400$ and with tenths and hundredths, e.g. $0.2 \times .04 = 0.008$. |
| recognise and use factor pairs and commutativity in mental calculations | | MMS4 Reasoning Block 2; MMS4 Reasoning Block 5 | Commutativity was taught in MMS2. Pupils naturally use the commutativity of factors to aid mental calculation in MMS, e.g. $a \times b = c$, so a & b are factors of c and c is the product of a & b . The Big Idea of the Logic of the Language is then used for derived facts. The terms 'factor' and 'product' are used confidently. |
| multiply two-digit and three-digit numbers by a one-digit number using formal written layout | | MMS2 Reasoning Block 2, Block 6; MMS3 Arithmetic 2 Block 3 (2-digit \times 1-digit grid); MMS4 Arithmetic 2 Block 1 (2-digit \times 2-digit grid) | Extension in MMS2 Reasoning gives a concrete model for the grid method as a picture of the Maths Story. This enables children to visualise with arrays of cups drawn in the grid the commutativity of multiplication and to reason the inverse of times is divide and vice versa. The grid for division is used in MMS4 Arithmetic 1 Block 4 Lessons 2, 3 and 4. Here, partitioning in the grid, referencing the divisors times table (inverse) and making each part a multiple of the divisor before multiplying out, leads to the long division model shown in Appendix 1. Recording in the grid for each step ensures conceptual understanding before shortening the procedure. In MMS6, the 'bus stop' short method as shown in Appendix 1 is derived immediately from the long division grid. |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|---|--|--|--|
| <p>solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects</p> | | <p>MMS4 Arithmetic 1 Block 1, Block 2 Lessons 3, 4; Block 3 Lessons 3, 4; Block 6 Lesson 3; MMS4 Data and Measure Block 2; MMS4 Arithmetic 2 Block 1, Block 2 Lessons 3, 4; Block 4; Block 6</p> | <p>Doubling and halving and other scaling problems feature in word problems but can be included in Daily Practice connected to multiplication and division facts. Grid multiplication models the distributive law. Correspondence problems of increasing complexity feature in MMS4 multiplication and division word problems, particularly in determination of Type 1/2 problems and where a remainder is expressed as a fraction. In MMS4, pupils combine multiplication with both addition and subtraction and use positive and negative integers and vulgar and decimal fractions.</p> |
| <p>Fractions</p> <p>Pupils should be taught to:</p> <p>recognise and show, using diagrams, families of common equivalent fractions</p> | <p>Pupils should connect hundredths to tenths and place value and decimal measure.</p> <p>They extend the use of the number line to connect fractions, numbers and measures.</p> <p>Pupils understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths.</p> <p>Pupils make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities. Pupils use factors and multiples to recognise equivalent fractions and simplify where appropriate (e.g. $\frac{6}{9} = \frac{2}{3}$ or $\frac{1}{4} = \frac{2}{8}$).</p> | | |
| <p>count up and down in hundredths; recognise that hundredths arise when dividing an object by a hundred and dividing tenths by ten</p> | <p>Pupils continue practice in adding and subtracting fractions with the same denominator, to become fluent through a variety of increasingly complex problems beyond one whole.</p> | <p>MMS4 Daily Practice Block 3, Block 4, Block 5, Block 6; MMS4 Data and Measure Block 5 Lessons 1 - 4</p> | <p>Equivalent fractions are carefully developed through MMS4 and MMS5 with the Big Idea of Ratio first introduced in MMS3 Arithmetic 2 Block 1. Children use 'Think Sticks', drawing $\frac{2}{3}$ as 2 sticks (numerator) compared to 3 sticks (denominator), realising that the basic stick is 1. If the top stick becomes 4, the basic stick is now 2, so the bottom stick becomes 6, so $\frac{4}{6} = \frac{2}{3}$. Common equivalent fractions are practiced in MMS4 through same value swaps.</p> |
| <p>solve problems involving increasingly harder fractions to calculate quantities, and fractions to divide quantities, including non-unit fractions where the answer is a whole number</p> | <p>Pupils are taught throughout that decimals and fractions are different ways of expressing numbers and proportions.</p> <p>Pupils' 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.</p> | <p>MMS4 Arithmetic 1 Block 2, Block 5 Lesson 4; MMS4 Data and Measure Block 1 Lessons 2, 3, 4</p> | <p>The percentage disc is used as a concrete model for learning.</p> |
| <p>add and subtract fractions with the same denominator</p> | <p>They practise counting using simple fractions and decimals, both forwards and backwards.</p> | <p>MMS4 Arithmetic 1 Block 1 Lessons 1, 2; Block 2 Lessons 3, 4; Block 3 Lessons 1, 2, 4; Block 5 (% of quantity); MMS4 Data and Measure Block 6 (using ratio to convert measures); MMS4 Arithmetic 2 Block 2 Lesson 1, Arithmetic 2 Block 4 Lessons 3, 4 (word problems involving money and decimal notation); Arithmetic 2 Block 5; Block 6 Lesson 1</p> | |
| | | <p>MMS3 Arithmetic 1 Block 1 Lessons 1, 2; Block 2, Block 3, Arithmetic 2 Block 5 Lessons 1, 2, 3; MMS4 Arithmetic 1 Block 1 Lessons 1, 2; Block 2 Lessons 3, 4</p> | <p>In MMS4, all four operations are used with fractions, for example, multiplying a fraction by a whole number and dividing fractions with the same denominator or by a whole number, e.g. $\frac{4}{5} \div \frac{2}{5} = 2$ or $\frac{4}{5} \div 2 = \frac{2}{5}$.</p> |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|--|--|
| recognise and write decimal equivalents of any number of tenths or hundredths | Pupils 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. | MMS4 Daily Practice Block 1 - Block 6; MMS4 Arithmetic 1 Block 2 | |
| recognise and write decimal equivalents to $\frac{1}{4}$; $\frac{1}{2}$; $\frac{3}{4}$ | | MMS4 Daily Practice Block 1 - Block 6; MMS5 Arithmetic 1 Block 3 ($a/b = a \div b$) | Basic conversions are practised using a calculator to embed understanding. This is extended in MMS5. |
| find the effect of dividing a one- or two-digit number by 10 and 100, identifying the value of the digits in the answer as ones, tenths and hundredths | | MMS4 Arithmetic 1 Block 2, Block 5; MMS4 Reasoning Block 4 | Ones suits Maths Makes Sense denomination well. |
| round decimals with one decimal place to the nearest whole number | | MMS4 Arithmetic 2 Block 5 Lessons 3,4; Block 6 Lessons 3, 4 | MMS4 introduces 'approximates to' and the \approx symbol for rounding. |
| compare numbers with the same number of decimal places up to two decimal places | | MMS4 Data and Measure Block 1 | Comparison should be continuous through MMS4 Arithmetic Daily Practice when calculating with decimal numbers. |
| solve simple measure and money problems involving fractions and decimals to two decimal places | | MMS4 Daily Practice Block 1 - Block 6; MMS4 Arithmetic 2 Block 4, Block 5, Block 6 | |
| MEASUREMENT | Pupils build on their understanding of place value and decimal notation to record metric measures, including money. They 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. They relate area to arrays and multiplication. | | |
| Pupils should be taught to: | | | |
| Convert between different units of measure (e.g. kilometre to metre; hour to minute) | | MMS4 Daily Practice Block 1 - 6; MMS4 Data and Measure Block 1, Block 6 | Conversion of units uses the Big Idea of Ratio for deep conceptual understanding. |
| measure and calculate the perimeter of a rectilinear figure (including squares) in centimetres and metres | | MMS4 Data and Measure Block 2 | Pupils also measure the circumference of a circle in MMS4 Data and Measure Block 3. |
| find the area of rectilinear shapes by counting squares | | MMS4 Data and Measure Block 2 | It is important to use cm^2 and cm^3 as 'Denominations'. Area is calculated as $3\text{cm}^2 \times 4 = 12\text{cm}^2$ not yet as $3\text{cm} \times 4\text{cm} = 12\text{cm}^2$ which requires further algebraic understanding. MMS4 goes on to calculate volume similarly as $3\text{cm}^3 \times 4 = 12\text{cm}^3$. |
| estimate, compare and calculate different measures, including money in pounds and pence | | MMS4 Daily Practice Block 1 - Block 6; MMS4 Geometry Block 3, Block 4, Block 5; MMS4 Data and Measure Block 1, Block 2, Block 3, Block 6 | There are opportunities to embed different measures across the curriculum, in science, PE and everyday classroom contexts. |
| read, write and convert time between analogue and digital 12 and 24-hour clocks | | MMS3 Daily Practice Block 5 (convert analogue/digital); Block 6 (earlier/later duration); MMS3 Data and Measure Block 1 Lessons 3, 4; MMS3 Reasoning Block 4 Lesson 2; MMS4 Daily Practice Block 1 - 6; MMS5 Reasoning Block 1 | Daily Practice and everyday classroom contexts embed teaching from MMS3 throughout MMS4 ready for early MMS5. |
| solve problems involving converting from hours to minutes; minutes to seconds; years to months; weeks to days | | MMS4 Data and Measure Block 6, Lesson 4; MMS5 Reasoning Block 1, Block 6 | Daily Practice and everyday classroom contexts embed teaching from MMS3. MMS5 combines time problems with statistical analysis. |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|---|---|
| GEOMETRY | | | |
| Properties of shape | <p>Pupils continue to classify shapes using geometrical properties, extending to classifying different triangles (e.g. isosceles, equilateral, scalene) and quadrilaterals (e.g. parallelogram, rhombus, trapezium).</p> <p>Pupils compare and order angles in preparation for using a protractor and compare lengths and angles to decide if a polygon is regular or irregular.</p> <p>Pupils 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.</p> | | |
| Pupils should be taught to: | | | |
| compare and classify geometric shapes, including quadrilaterals and triangles, based on their properties and sizes | | MMS4 Daily Practice Block 1 - Block 6 | In MMS2, pupils sort triangles as isosceles/equilateral/right-angled and sort 4 sided shapes as named quadrilaterals. In MMS3, pupils add scalene and right-angled scalene as descriptors of triangles and recognise parallelograms, identifying parallel sides by the correct notation. In MMS2, pupils name polygons by counting the number of sides and sort 3-D shapes as polyhedra/not polyhedra and recognise prisms and pyramids. In MMS3, pupils draw polygons and use coordinates in geometry. Pupils also use compasses to draw circles and name arc, chord, circumference, radius and diameter in MMS4 Data and Measure Block 3, and construct triangles in MMS4 Data and Measure Block 5. |
| identify acute and obtuse angles and compare and order angles up to two right angles by size | | MMS4 Geometry Block 2 (including acute/right angle/obtuse/straight line/reflex); MMS4 Data and Measure Block 6 | |
| identify lines of symmetry in 2-D shapes presented in different orientations | | MMS4 Geometry Block 1, Block 4 | The work in MMS4 Daily Practice Block 1 - Block 6 on identifying 2-D shapes could be extended to include identifying lines of symmetry. |
| complete a simple symmetric figure with respect to a specific line of symmetry | | MMS4 Geometry Block 1, Block 4 | |
| Position and direction | <p>Pupils draw a pair of axes in one quadrant, with equal scales and integer labels. They read, write and use pairs of coordinates (2, 5) including using coordinate-plotting ICT tools.</p> | | |
| Pupils should be taught to: | | | |
| describe positions on a 2-D grid as coordinates in the first quadrant | | MMS3 Geometry Block 2; MMS4 Geometry Block 4 | In MMS3, children construct 2-D shapes from coordinates and progress to use all four quadrants in MMS4 to draw polygons and identify lines of symmetry. Plotting coordinates using ICT tools is a natural progression for enrichment of this block. |
| describe movements between positions as translations of a given unit to the left/right and up/down | | All transformations are taught in MMS6 Geometry Block 2 with vectors described | This is a carefully planned progression of geometry skills. It could be brought forward to MMS4 as an observation of directional translation. |
| plot specified points and draw sides to complete a given polygon | | MMS3 Geometry Block 2; MMS4 Geometry Block 4 | In MMS3, children construct 2-D shapes from coordinates and progress to use all four quadrants in MMS4 to draw polygons and identify lines of symmetry. |

Maths Makes Sense 4 and the 2014 National Curriculum

| Year 4 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|--|---|
| STATISTICS | Pupils understand and use a greater range of scales in their representations. | | |
| Pupils should be taught to: | | | |
| interpret and present discrete and continuous data using appropriate graphical methods, including bar charts and time graphs | Pupils begin to relate the graphical representation of data to recording change over time. | MMS3 Data and Measure Block 3, Block 5 | Interpreting and presenting discrete and continuous data should also be used and applied in contexts across the curriculum at this stage. The distinction between discrete and continuous data is carefully taught through MMS5 and MMS6. |
| solve comparison, sum and difference problems using information presented in bar charts, pictograms, tables and other graphs | | MMS3 Data and Measure Block 3, Block 5 | Solving comparison, sum and difference problems should also be used and applied in contexts across the curriculum at this stage. In MMS4 Data and Measure Block 4, pupils calculate the mean of a sample of cups by dividing the total number of cups in the sample by the number of piles of cups. |



Maths Makes Sense 5
and the National Curriculum
in England (2014)

OXFORD

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|--|---|--|
| NUMBER | | | |
| Number and place value | Pupils identify the place value in large whole numbers. | | |
| Pupils should be taught to: | | | |
| read, write, order and compare numbers to at least 1 000 000 and determine the value of each digit | They continue to use number in context, including measurement. Pupils extend and apply their understanding of the number system to the decimal numbers and fractions that they have met so far. They should recognise and describe linear number sequences, including those involving fractions and decimals, and find the term-to-term rule. | MMS4 Arithmetic 2 Block 2, Block 3 Lessons 3, 4; MMS4 Arithmetic 1 Block 3 Lesson 1; Block 4, Block 5 Lesson 4; Block 6 Lessons 3, 4; Reasoning Block 1, Block 2, Block 3; MMS5 Arithmetic 2 Block 2; MMS5 Reasoning Block 2 | In MMS4, reading, writing, ordering and comparing numbers is extended to reading place value to 2 decimal places. MMS4 extends to read and write large products of ten as powers of 10 e.g. 100 000 as 10^2 . In MMS5, a range of inequality symbols are used $< > \leq \geq$ e.g. in the form $10 \geq m \geq 8$. |
| count forwards or backwards in steps of powers of 10 for any given number up to 1 000 000 | | MMS4 Reasoning Block 1 | |
| interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero | They should recognise and describe linear number sequences (for example, $3, 3\frac{1}{2}, 4, 4\frac{1}{2} \dots$), including those involving fractions and decimals, and find the term-to-term rule in words (for example, add $\frac{1}{2}$). | MMS4 Geometry Block 4 (coordinate geometry in four quadrants) | In Daily Practice, pupils count through 0 with positive and negative whole numbers. |
| round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000 | | | Rounding any number up to 1 000 000 is not explicit in MMS5 but implicit in Daily Practice when using large numbers in calculation and real-life measures contexts. |
| solve number problems and practical problems that involve all of the above | | MMS4 Reasoning Block 2; MMS5 Arithmetic 1 Block 4 (grid multiplication 3-digit \times 2-digit decimal numbers up to 2 d.p.); MMS5 Arithmetic 1 Block 6 (multiply decimal numbers up to 3 d.p. by multiples of powers of 10 and divide decimal numbers by multiples of powers of 10) | The Big Idea of the Logic of the Language used from MMS1 enables confidence when working with larger (or smaller) numbers in place value contexts. |
| read Roman numerals to 1000 (M) and recognise years written in Roman numerals. | | | Roman numerals are not used explicitly in MMS. This is an opportunity for maths across the curriculum within a history topic on Romans or a technology topic on time. MMS Daily Practice focuses on time. Calendar dates with Roman numerals could be used as Same Value: Different Appearance on a history timeline. MMS5 Data and Measure Block 3 interprets calendar data and this would be a useful link to studying the Roman Calendar. |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|---|---|--|
| Addition and subtraction | <p>Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency (see Appendix 1).</p> <p>They practise mental calculations with increasingly large numbers to aid fluency (e.g. $12\,462 - 2\,300 = 10\,162$).</p> | | |
| Pupils should be taught to: | | | |
| add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction) | | MMS5 Arithmetic 1 Block 1 Lessons 1, 3, 4; Block 2 Lessons 1, 3, 4 | Quick mental calculation is practised through Daily Practice and implicitly so in calculation contexts where written methods may not be as efficient. Pupils should be encouraged to look for such opportunities. Children are fluent in columnar methods as illustrated in Appendix 1 at this stage, and activities can be adapted to more than 4 digits for natural extension. |
| add and subtract numbers mentally with increasingly large numbers | | MMS5 Daily Practice Block 1 - Block 6 | In MMS5, Daily Practice extends complements to 100 to bonds of larger multiples of 100 and 1000. In all arithmetic contexts pupils should be expected to estimate mentally or identify when mental or written methods are more efficient with large numbers. |
| use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy | | MMS5 Data and Measure Block 4 (round measures of distance and time) | Using rounding to check answers to calculations is implicit in all problem solving contexts at this stage. |
| solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why. | MMS4 Arithmetic 2 Block 3, Block 4; MMS5 Arithmetic 1 Block 1, Block 3 Lesson 2; MMS5 Arithmetic 2 Block 1; MMS5 Data and Measure Block 1, Block 3 Lesson 1; MMS5 Reasoning Block 3 (word problems and measures contexts) | Arithmetic lessons should be enriched and consolidated at the end of each block using supplementary word problems and 'Think About the Word Problem!', as a consistent approach to problem solving. | |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|---|---|---|
| Multiplication and division | Pupils practise and extend their use of the formal written methods of short multiplication and short division (see Appendix 1). They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations. | | |
| Pupils should be taught to: | | | |
| identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers. | They use and understand the terms factor, multiple and prime, square and cube numbers. | MMS4 Reasoning Block 2; Block 5; MMS5 Daily Practice Block 3, Block 4, Block 5, Block 6; MMS5 Arithmetic 2 Block 2, Block 3 | |
| know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers | Pupils 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 (e.g. $98 \div 4 = 24 \text{ r } 2 = 24\frac{1}{2} = 24.5 \approx 25$). | MMS5 Daily Practice Block 4, Block 5, Block 6; MMS5 Arithmetic 2 Block 4 | |
| establish whether a number up to 100 is prime and recall prime numbers up to 19 | Pupils use multiplication and division as inverses 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 a 1000 in converting between units such as kilometres and metres. | MMS5 Daily Practice Block 4, Block 5, Block 6; MMS5 Arithmetic 2 Block 4 | |
| multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers | Distributivity can be expressed as $a(b + c) = ab + ac$ in preparation for using algebra. | MMS5 Arithmetic 1 Block 4 | The grid method seamlessly moves to standard long multiplication as in Appendix 1 in MMS6 Block 1. Pupils may commence this work sooner if conceptual understanding is secure. Further use and apply opportunities for word problem solving should enrich the block. |
| multiply and divide numbers mentally drawing upon known facts | They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, $4 \times 35 = 2 \times 2 \times 35$; $3 \times 270 = 3 \times 3 \times 9 \times 10 = 9^2 \times 10$). | MMS5 Arithmetic 1 Block 4, Block 5, Block 6 | The Big Idea of the Logic of the Language supports multiplying and dividing numbers mentally e.g. $8 \times 9 = 72$, $7200 \div 8 = 900$ (7200 divided by 8 equals 900 etc). |
| divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context | Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, $13 + 24 = 12 + 25$; $33 = 5 \times \square$). | MMS5 Arithmetic 1 Block 5 | This block uses 3-digits by 1-digit. Once pupils are secure in their knowledge, extend to 4-digit numbers. In MMS5, pupils express answers as a remainder or a vulgar or decimal fraction appropriately. Further use and apply opportunities for word problem solving should enrich the block. |
| multiply and divide whole numbers and those involving decimals by 10, 100 and 1000 | | MMS5 Arithmetic 1 Block 6 | The Big Idea of the Logic of the Language supports multiplying and dividing whole numbers and those involving decimals. |
| recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3) | | MMS5 Arithmetic 2 Block 1; MMS5 Reasoning Block 4; MMS6 Arithmetic 2 Block 4 | Recognising and using square numbers and cube numbers should be linked to measuring area and volume in MMS5. The lessons on square numbers can be naturally extended during the block to include cube numbers or investigated in Reasoning Block 4 (puzzle solving directly related to dimensions). Cube numbers are met in MMS6. |

Maths Makes Sense 5 and the 2014 National Curriculum

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|--|--|---|---|
| solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes | | MMS5 Arithmetic 2 Block 3 (divisibility tests); Block 4 (numbers as products of their prime factors); MMS5 Daily Practice Block 5, Block 6; MMS6 Daily Practice Block 1 - Block 6 (mental strategies to multiply and divide by 15, 20, 25 and natural extension beyond) | Multiplication and division strategies can be practised in any problem solving context. |
| solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign | | MMS4 Reasoning Block 5; MMS5 Arithmetic 2 Block 5, Block 6 (evaluate terms in expressions); MMS5 Arithmetic 1 Block 3 (all four operations with combinations of positive and negative numbers, including tricky examples but not the product of two negative numbers); MMS5 Arithmetic 2 Block 1 (word problems with all four operations) | The Big Idea of Equals as Same Value: Different Appearance equivalence is conceptually understood in MMS from its introduction in Early Years Foundation Stage, KS1 and KS2 where same value swaps are used frequently for equivalences. Pupils now also use 'approximately' and 'equal to' in rounding \approx . |
| solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates. | | MMS5 Data and Measure Block 1; MMS5 Arithmetic 2 Block 1 | Supplementary problems should be used alongside arithmetic blocks for enrichment in MMS to secure confidence with 'Think About the Word Problem!'. |
| Fractions (including decimals and percentages) | Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions. | | |
| Pupils should be taught to: | | | |
| compare and order fractions whose denominators are all multiples of the same number | They extend their knowledge of fractions to thousandths and connect to decimals and measures. Pupils connect equivalent fractions > 1 that simplify to integers with division and fractions > 1 to division with remainders, using the number line and other models, and hence move from these to improper and mixed fractions. | MMS5 Daily Practice Block 6 | Comparing and ordering fractions is not explicit in MMS. However, conceptual understanding of fractions is secured early through the Big Idea of Symbols Speak To You. In Daily Practice, pupils can rehearse counting in fractions, ordering with inequalities $< >$ or placing fractions on a number line. |
| identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths | Pupils 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 . | MMS4 Data and Measure Block 5; MMS5 Arithmetic 1 Block 3; MMS5 Reasoning Block 3, Lessons 1, 4 (shading squares for equivalence) | |
| recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number (e.g. $\frac{2}{5} + \frac{4}{5} = \frac{6}{5} = \frac{11}{5}$) | Pupils 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. | MMS3 Arithmetic 1 Block 1 - Block 6; MMS4 Arithmetic 1 Block 1, 2, 3; MMS5 Arithmetic 1 Block 1 | In MMS5, pupils should use the right hand margin to visualise same value swaps rather than use concrete objects. |
| add and subtract fractions with the same denominator and denominators that are multiples of the same number | | MMS3 Arithmetic 1 Block 1 - Block 6; MMS4 Arithmetic 1 Block 1, 2, 3; MMS5 Arithmetic 1 Block 1 | |
| multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams | | MMS3 Arithmetic 1 Block 1 - Block 6; MMS4 Arithmetic 1 Block 1, 2, 3; MMS5 Arithmetic 1 Block 1 | |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|---|---|
| read and write decimal numbers as fractions (e.g. $0.71 = \frac{71}{100}$) | Pupils continue to practise counting forwards and backwards in simple fractions. | MMS3 Arithmetic 1 Block 1 - Block 6; MMS4 Arithmetic 1 Block 1, 2, 3; MMS5 Arithmetic 1 Block 1 | |
| recognise and use thousandths and relate them to tenths, hundredths and decimal equivalents | Pupils continue to develop their understanding of fractions as numbers, measures and operators by finding fractions of numbers and quantities. | MMS4 Arithmetic 1 Block 2; MMS5 Daily Practice Block 1 - Block 6 | Once complements to 100 are secure, Daily Practice in Block 1 - Block 6 can easily be adapted to decimal complements to 1. |
| round decimals with two decimal places to the nearest whole number and to one decimal place | Pupils extend counting from year 4, using decimals and fractions including bridging zero, for example on a number line. | MMS4 Arithmetic 2 Block 6, Lessons 3, 4 | |
| read, write, order and compare numbers with up to three decimal places | Pupils 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. | MMS4 Arithmetic 1 Block 2; MMS5 Daily Practice Block 1 - Block 6 | Compare numbers with up to 3 decimal places by using $<$ $>$ in Daily Practice and calculation contexts. |
| recognise the per cent symbol (%) and understand that per cent relates to “number of parts per hundred”, and write percentages as a fraction with denominator 100, and as a decimal | They mentally add and subtract tenths, and one-digit whole numbers and tenths. | MMS4 Arithmetic 1 Block 5; MMS4 Arithmetic 2 Block 5; MMS5 Data and Measure Block 1 (percentage increase/decrease problems) | The Big Idea of Ratio introduced in MMS3 and developed through MMS4 when % is first introduced, prepares pupils for extension in calculating percentage problems. |
| solve problems which require knowing percentage and decimal equivalents of $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{5}$, $\frac{2}{5}$, $\frac{4}{5}$ and those fractions with a denominator of a multiple of 10 or 25. | They practise adding and subtracting decimals, including a mix of whole numbers and decimals, decimals with different numbers of decimal places, and complements of 1 (e.g. $0.83 + 0.17 = 1$). Pupils should go beyond the measurement and money models of decimals, for example by solving puzzles involving decimals. Pupils should make connections between percentages, fractions and decimals (e.g. 100% represents a whole quantity and 1% is $\frac{1}{100}$, 50% is $\frac{50}{100}$, 25% is $\frac{25}{100}$) and relate this to finding ‘fractions of’. | MMS5 Daily Practice Block 4, 5, 6; MMS6 Daily Practice Block 1 - 6; MMS6 Arithmetic 2, Block 2, Block 3 | Enrich with supplementary word problems at the end of the block. |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|---|--|
| MEASUREMENT | Pupils use their knowledge of place value and multiplication and division to convert between standard units. | | |
| Pupils should be taught to: | | | |
| convert between different units of metric measure (e.g. kilometre and metre; centimetre and metre; centimetre and millimetre; gram and kilogram; litre and millilitre) | Pupils 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 $4 + 2b = 20$ for a rectangle of sides 2 cm and b cm and perimeter of 20cm. | MMS4 Data and Measure Block 1, Block 6; MMS5 Daily Practice Block 1 - Block 6; MMS5 Data and Measure Block 1 | |
| understand and use approximate equivalences between metric units and common imperial units such as inches, pounds and pints | | MMS5 Data and Measure Block 2, Block 5 | Maths Makes Sense is always precise and therefore approximate equivalences matches that precision. |
| measure and calculate the perimeter of composite rectilinear shapes in centimetres and metres | They calculate the area from scale drawings using given measurements. | MMS5 Data and Measure Block 5 (measure area of rectilinear shapes) | Children calculate the circumference of a circle in MMS5 Geometry Block 3. |
| calculate and compare the area of squares and rectangles including using standard units, square centimetres (cm ²) and square metres (m ²) and estimate the area of irregular shapes | Pupils use all four operations in problems involving time and money, including conversions (e.g. days to weeks, expressing the answer as weeks and days). | MMS4 Data and Measure Block 2; MMS5 Data and Measure Block 5 Lessons 3, 4; MMS5 Reasoning Block 5 Lesson 3 | It is important to use cm ² and cm ³ as 'Denominations'. Area is calculated as $3\text{cm}^2 \times 4 = 12\text{cm}^2$ not yet as $3\text{cm} \times 4\text{cm} = 12\text{cm}^2$ which requires further algebraic understanding. MMS4 goes on to calculate volume similarly as $3\text{cm}^3 \times 4 = 12\text{cm}^3$. |
| estimate volume (e.g. using 1 cm ³ blocks to build cubes and cuboids) and capacity (e.g. using water) | | MMS4 Data and Measure Block 2; MMS5 Data and Measure Block 5 Lessons 3, 4 | |
| solve problems involving converting between units of time | | MMS4 Data and Measure Block 6 Lesson 4; MMS5 Daily Practice Block 1 - Block 6; MMS5 Reasoning Block 6; MMS5 Data and Measure Block 6 | |
| use all four operations to solve problems involving measure (e.g. length, mass, volume, money) using decimal notation including scaling. | | MMS5 Data and Measure Block 1, Block 2, Block 3, Block 4, Block 5, Block 6; MMS5 Reasoning Block 1, Block 3, Block 4, Block 5, Block 6 | |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|--|---|--|
| GEOMETRY | | | |
| <p>Properties of shape</p> <p>Pupils should be taught to:</p> | <p>Pupils 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.</p> <p>Pupils 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.</p> <p>Pupils use angle sum facts and other properties to make deductions about missing angles and relate these to missing number problems.</p> | | <p>In MMS2, pupils sort triangles as isosceles/equilateral/right-angled and sort 4 sided shapes as named quadrilaterals. In MMS3, pupils add scalene and right-angled scalene as descriptors of triangles and recognise parallelograms, identifying parallel sides by the correct notation. In MMS2, pupils name polygons by counting the number of sides and sort 3-D shapes as polyhedra/not polyhedra and recognise prisms and pyramids. In MMS3, pupils draw polygons in coordinate geometry. Pupils also use compasses to draw circles and name arc, chord, circumference, radius and diameter in MMS4 Data and Measure Block 3 and construct triangles in MMS4 Data and Measure Block 5.</p> |
| <p>identify 3-D shapes, including cubes and other cuboids, from 2-D representations</p> | | <p>MMS5 Data and Measure Block 1, Block 4; MMS5 Reasoning Block 4</p> | <p>Identifying 3-D shapes is secured in MMS2 and MMS3 and practised through Daily Practice in MMS4. Now in MMS5 Reasoning Block 4, pupils investigate dimensions using pictures of 2-D and 3-D shapes. MMS3 Geometry Block 6 identifies nets for prisms and pyramids. In MMS5, pupils' knowledge of properties of 2-D shapes is extended to sketching polygons including the range of quadrilaterals and triangles. MMS5 Data and Measure Block 1 makes nets for simple 3-D shapes and investigates how a cube cut through one diagonal forms 2 congruent triangular prisms. MMS5 Data and Measure Block 4 solves puzzles using pictures of 2-D and 3-D shapes. Maths used across the curriculum, in technology and art for example, should continue to develop pupils' application and knowledge of 2-D and 3-D shapes in precision measuring with rulers, protractors, set-squares and compasses to make nets for constructing 3-D models.</p> |
| <p>know angles are measured in degrees: estimate and compare acute, obtuse and reflex angles</p> | | <p>MMS4 Geometry Block 2, Block 6; MMS5 Geometry Block 2</p> | |
| <p>draw given angles, and measure them in degrees (°)</p> | | <p>MMS4 Geometry Block 2, Block 6; MMS5 Geometry Block 2</p> | |
| <p>identify: angles at a point and one whole turn (total 360°) angles at a point on a straight line and $\frac{1}{2}$ a turn (total 180°) other multiples of 90°</p> | | <p>MMS3 Geometry Block 3; MMS5 Daily Practice Block 1 - Block 6</p> | |

Maths Makes Sense 5 and the 2014 National Curriculum

| Year 5 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|---|---|
| use the properties of rectangles to deduce related facts and find missing lengths and angles | | MMS5 Reasoning Block 4 (puzzles using pictures of 2-D and 3-D shapes); MMS5 Data and Measure Block 5 (investigations involving 2-D and 3-D shapes); MMS6 Geometry Block 5 (use the properties of triangles to deduce related facts and find missing angles) | Extension of rectangle properties can be found in MMS5 Geometry Block 2 where pupils name and calculate vertically opposite and supplementary angles. MMS5 Geometry Block 4 recognises corresponding angles, opposite interior angles in a parallelogram and shows they have the same value. It is also possible to learn in Block 5 that the sum of exterior angles for any polygon is 360° . |
| distinguish between regular and irregular polygons based on reasoning about equal sides and angles. | | Established in MMS2 and MMS3 and in MMS5 Daily Practice, the description of properties of shapes should be integral to naming/classifying a shape. 3-D shapes could be included in Daily Practice activities. | |
| Position and direction | Pupils 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. | | |
| Pupils should be taught to: | | | |
| identify, describe and represent the position of a shape following a reflection or translation, using the appropriate language, and know that the shape has not changed. | | All transformations are taught explicitly in MMS6 Geometry Block 2 with vectors described. In MMS5 Geometry Block 1, pupils name images of objects that are points, line segments or polygons in a symmetrical shape, and know the line of symmetry is a perpendicular bisector. Additionally pupils name two congruent shapes in a shape with an axis of symmetry. | This is a carefully planned progression in geometry skills. It could be brought forward to MMS5 as observations of reflection or translation. |
| STATISTICS | Pupils connect their work on coordinates and scales to their interpretation of time graphs. | | |
| Pupils should be taught to: | They begin to decide which representations of data are most appropriate and why. | | |
| solve comparison, sum and difference problems using information presented in a line graph | | MMS5 Data and Measure Block 4 (construct and interpret distance-time graphs) | Maths across the curriculum should provide enrichment opportunities e.g. science experiments. |
| complete, read and interpret information in tables, including timetables. | | MMS5 Data and Measure Block 3; MMS5 Reasoning Block 6 | MMS uses analysis of text/grids from early KS1. Pupils extract explicit information from which implicit information is determined in order to ask and answer questions. This should be experienced in cross curricula applications where pupils select appropriate charts. |



Maths Makes Sense 6
and the National Curriculum
in England (2014)

OXFORD

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|--|---|---|
| NUMBER | | | |
| Number and place value | Pupils use the whole number system, including saying, reading and writing numbers accurately. | | |
| Pupils should be taught to: | | | |
| read, write, order and compare numbers up to 10 000 000 and determine the value of each digit | | MMS4 Reasoning Block 1, Block 2, Block 3; MMS5 Reasoning Block 2; MMS6 Daily Practice Block 1 - Block 6; MMS6 Daily Practice Block 2 Reasoning (includes number line practice) | In MMS4, reading, writing, ordering and comparing numbers is extended to reading place value to 2 decimal places. MMS4 extends to reading and writing large products of ten as powers of 10 e.g. 100 000 as 10^2 . In MMS5, a range of inequality symbols are used $< > \leq \geq$, e.g. in the form $10 \geq m \geq 8$. In MMS6 this practice would continue in context and in Daily Practice counting and ordering. |
| round any whole number to a required degree of accuracy | | MMS6 Daily Practice Block 1 - Block 6; MMS6 Arithmetic 1 Block 1, Block 2 | Rounding any whole number to a required degree of accuracy is implicit in all problem solving contexts at this stage. |
| use negative numbers in context, and calculate intervals across zero | | MMS6 Reasoning Block 3 Lessons 3, 4 | In MMS6 Arithmetic 1 Block 4, pupils calculate with negative numbers using all four operations (using $1 + -1 = 0$ with tricky addition and subtraction examples). |
| solve number and practical problems that involve all of the above. | MMS6 Arithmetic 1 Block 1 - Block 6; Arithmetic 2 Block 1 - Block 6; Reasoning Block 3, Block 4, Block 5, Block 6; Data and Measure Block 1, Block 3, Block 5, Block 6 | Use and apply contexts for solving number and practical problems feature throughout MMS6 strands. | |
| Addition, subtraction, multiplication and division | | | |
| Pupils should be taught to: | Pupils 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 (see Appendix 1). They undertake mental calculations with increasingly large numbers and more calculations. Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency. Pupils round answers to a specified degree of accuracy, e.g. to the nearest 10, 20, 50 etc, but not to a specified number of significant figures. Pupils 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. | | |
| multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication | | MMS6 Arithmetic 1 Block 1 (grid); MMS6 Arithmetic 2 Block 1 (short method with 'funny writing') | The grid method seamlessly moves to standard short multiplication as in Appendix 1 in MMS6 Block 1. Pupils may commence this work sooner if conceptual understanding is secure. Further use and apply opportunities for word problem solving should enrich the Block. |
| divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context | | MMS6 Arithmetic 1 Block 2 (grid); MMS6 Arithmetic 2 Block 1 (short method-'bus stop'); MMS6 Arithmetic 2 Block 4 (word problems) | The grid method seamlessly moves to standard short division as in Appendix 1 in MMS6 Block 1. Pupils may commence this work sooner if conceptual understanding is secure. Further use and apply opportunities for word problem solving should enrich the Block. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|---|---|--|--|
| divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context | | MMS6 Arithmetic 1 Block 2 (grid); MMS6 Arithmetic 2 Block 1 (short method – ‘bus stop’); MMS6 Arithmetic 2 Block 4 (word problems) | The grid method seamlessly moves to standard short division as in Appendix 1 in MMS6 Block 1. Pupils may commence this work sooner if conceptual understanding is secure. Further use and apply opportunities for word problem solving should enrich the Block. |
| perform mental calculations, including with mixed operations and large numbers | | MMS6 Daily Practice Block 1 - Block 6 | The values in MMS6 Daily Practice can be extended using the Big Idea of the Logic of the Language for advancing fluency with mental calculations. |
| identify common factors, common multiples and prime numbers | | MMS5 Arithmetic 2 Block 4; MMS5 Daily Practice Block 4, Block 5, Block 6; MMS6 Daily Practice Block 1 - Block 6; MMS6 Arithmetic 1 Block 1, Block 2, Block 3; Arithmetic 2 Block 4 (word problems); Arithmetic 2 Block 5 (numbers represented algebraically); Arithmetic 2 Block 6 (algebraic formulae) | MMS6 extends to identify quotients and algebraic representation and writing a number as a product of its prime factors. |
| use their knowledge of the order of operations to carry out calculations involving the four operations | | MMS5 Arithmetic 2, Block 5, Block 6; MMS6 Reasoning Block 4 | The learning system is used to accurately identify terms in an expression, and teaches that addition and subtraction separate terms, calculating each term from left to right. Brackets are used strictly to change the order of precedence. In MMS5, children evaluate terms in an expression with brackets; insert brackets in an expression to give a specified value and recognise superfluous brackets. |
| solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why | | MMS5 Reasoning Block 3 (money); MMS6 Arithmetic 2 Block 3, Block 4, Block 5, Block 6; MMS6 Data and Measure Block 1, Block 3, Block 4, Block 5, Block 6; MMS6 Geometry Block 1, Block 3, Block 5 | Arithmetic lessons should be enriched and consolidated at the end of each Block using supplementary word problems and ‘Think About the Word Problem!’, as a consistent approach to solving these. |
| solve problems involving addition, subtraction, multiplication and division | | MMS6 Daily Practice Block 1 - Block 6; MMS6 Geometry Block 1, Block 3, Block 5; MMS6 Data and Measure Block 1, Block 3, Block 4, Block 5, Block 6 | In MMS6, pupils calculate using each of the four operations and combinations of the operations with place value to 3 d.p, vulgar fractions, negative numbers and algebraically. Additionally in MMS6 Reasoning Block 1 - Block 6 Daily Practice, pupils solve puzzles (word problems and number puzzles) on a weekly basis. |
| use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy. | | MMS6 Arithmetic 1 Block 1, Block 2 | Using estimation to check answers is implicit in all problem solving contexts at this stage. The precision use of calculators has been taught as a checking tool from MMS2. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|---|--|--|---|
| Fractions (including decimals and percentages) | Pupils should 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 (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{5}{8}$) and progress to varied and increasingly complex problems. | | |
| Pupils should be taught to: | | | |
| use common factors to simplify fractions; use common multiples to express fractions in the same denomination | Pupils should 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. | MMS6 Arithmetic 1 Block 3 | Equivalent fractions are carefully developed through MMS4 and MMS5 with the Big Idea of Ratio first introduced in MMS3 Arithmetic 2 Block 1. Children use Think sticks!, drawing $\frac{2}{3}$ as 2 sticks (numerator) compared to 3 sticks (denominator), realising that the basic stick is 1. If the top stick becomes 4, the basic stick is now 2, so the bottom stick becomes 6, so $\frac{4}{6} = \frac{2}{3}$. The stick drawing secures conceptual understanding so that using common factors to simplify fractions as a procedure is understood. |
| compare and order fractions, including fractions >1 | Pupils 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 | MMS6 Daily Practice Block 2, Block 4 (place decimal fractions on a number line) | Daily Practice secures understanding of counting in fractional parts. |
| add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions | (e.g. if $\frac{1}{4}$ of a length is 36cm, then the whole length is $36 \times 4 = 144\text{cm}$). | MMS6 Arithmetic 1 Block 3 | MMS carefully teaches adding and subtracting fractions with different denominators and mixed numbers with tricky fractions to add, subtract and divide using equivalent fractions. |
| multiply simple pairs of proper fractions, writing the answer in its simplest form (e.g. $\frac{1}{4} \times \frac{1}{2} = \frac{1}{8}$) | They practise with simple fractions and decimal fraction equivalents to aid fluency, including listing equivalent fractions to identify fractions with common denominators. | MMS5 Arithmetic 1 Block 2 (multiply two vulgar fractions where the denominator of one and the numerator of the other are equal) MMS6 Arithmetic 1 Block 3 | MMS uses equivalent fractions in a special way. When we see the product of two fractions we think of replacements and use cups. Think sticks! $\frac{1}{4} \times \frac{4}{8} = \frac{1}{8}$ (Everytime you see 8, replace with 4, everytime you see 4 replace with 1, resulting in 1 compared to 8). MMS teaches $\frac{1}{4} \times \frac{1}{2}$ as Think sticks! $\frac{1}{4} \times \frac{4}{8}$. Pupils can then extend this concrete knowledge to the abstract procedure finding the product of the numerator over the product of the denominator. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|---|--|--|---|
| divide proper fractions by whole numbers (e.g. $\frac{1}{3} \div 2 = \frac{1}{6}$) | Pupils can explore and make conjectures about converting a simple fraction to a decimal fraction (e.g. $3 \div 8 = 0.375$). 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. Pupils multiply and divide numbers with up to two decimal places by one-digit and two-digit whole numbers. Pupils 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. | MMS5 Arithmetic 1 Block 1 (multiply and divide vulgar fractions by a whole number) | Type 1 and Type 2 division is first taught in MMS2 Reasoning Block 4 and Block 6. Pupils are taught to identify Type 1 (grouping) or Type 2 (sharing) models. The example $\frac{1}{3} \div 2 = \frac{1}{6}$ is calculated with same value swap. $\frac{2}{6}$ divided by 2 equal parts = $\frac{1}{4}$ 1/6 in each part. Whereas $\frac{1}{3} \div \frac{2}{3} = \frac{1}{2}$ - you can't make a proper sized pile of $\frac{2}{3}$, you can only make a fraction of a pile, 1 compared to 2 or $\frac{1}{2}$. This illustrates how clearly MMS teaches conceptual understanding in calculating with fractions as opposed to procedural methods. |
| associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375) for a simple fraction (e.g. $\frac{3}{8}$) | Pupils are introduced to the division of decimal numbers by one-digit whole numbers and, initially, in practical contexts involving measures and money. They recognise division calculations as the inverse of multiplication. | MMS5 Arithmetic 1 Block 3 (use a/b and a÷b interchangeably); MMS6 Daily Practice Block 1 - Block 6; MMS6 Arithmetic 1 Block 6 (to 3 d.p and writing recurring decimals with a dot above the digit/series of digits that are recurring) | MMS6 Arithmetic 2 Block 2, Block 6 and MMS6 Reasoning Block 6 converts between vulgar fractions, decimal fractions and percentages. |
| identify the value of each digit in numbers given to three decimal places and multiply and divide numbers by 10, 100 and 1000 giving answers up to three decimal places | Pupils 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. | MMS4 Reasoning Block 1, Block 2, Block 3, Block 4; MMS5 Arithmetic 1 Block 6; MMS6 Daily Practice Block 1 - Block 6 | The Big Idea of the Logic of the Language enables pupils to use basic facts and derived facts with fluency. |
| multiply one-digit numbers with up to two decimal places by whole numbers | | MMS4 Reasoning Block 1, Block 2, Block 3, Block 4; MMS5 Arithmetic 1 Block 6; MMS6 Daily Practice Block 1 - Block 6 | The Big Idea of the Logic of the Language enables pupils to use basic facts and derived facts with fluency. |
| use written division methods in cases where the answer has up to two decimal places | | MMS6 Arithmetic 2 Block 1; Arithmetic 1 Block 2 | The grid used in MMS6 Arithmetic 2 Block 1 and Arithmetic 1 Block 2 for short methods with the Big Idea of the Logic of the Language can be extended to deal with remainders and calculate answers up to 2d.p. |
| solve problems which require answers to be rounded to specified degrees of accuracy | | MMS6 Daily Practice Block 1 - Block 6; MMS6 Arithmetic 1 Block 6 (includes recurring decimals) | Problem solving contexts throughout MMS5 and MMS6 require rounding to be used appropriately. |
| recall and use equivalences between simple fractions, decimals and percentages, including in different contexts. | | MMS4 Daily Practice Block 1 (same value swaps); Block 2, Block 4, Block 5, Block 6 (convert decimal and vulgar fraction equivalents for tenths); Block 3 - 6 (find common equivalent fractions); MMS5 Daily Practice Block 1 - 2 (find equivalent fractions); Block 3 - 6 (convert between fractions, decimals and percentages); MMS6 Daily Practice Block 1 - 6 (convert between fractions, decimals and percentages including measures contexts) | Problem solving throughout MMS5 and MMS6 provides further use and apply contexts. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|--|--|
| RATIO AND PROPORTION | Pupils recognise proportionality in contexts when the relations between quantities are in the same ratio (e.g. similar shapes, recipes). | | |
| Pupils should be taught to: | | | |
| solve problems involving the relative sizes of two quantities where missing values can be found by using integer multiplication and division facts | Pupils link percentages or 360° to calculating angles of pie charts. | MMS5 Data and Measure Block 6 (use a double number line to solve distance/time problems); MMS6 Daily Practice Reasoning Block 1 - Block 6 | The puzzles and word problems in MMS6 Daily Practice Reasoning provide many opportunities to double, triple halve, quarter etc. |
| solve problems involving the calculation of percentages (e.g. of measures) such as 15% of 360 and the use of percentages for comparison | Pupils 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. | MMS6 Arithmetic 2 Block 3 | MMS6 Arithmetic 2 Block 3 contains measure word problems involving percentage increases and decreases. |
| solve problems involving similar shapes where the scale factor is known or can be found | Pupils solve problems involving unequal quantities e.g. '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. | MMS5 Reasoning Block 4, Block 5 (investigations involving dimensions, shapes, numbers); MMS6 Data and Measure Block 3 (mass scaling problems) | Scaling up and down with a recipe is just one example of where a scale factor is used. Scale factors can be found and worked with algebraically for extension. Maths used across the curriculum provides opportunities to enrich, e.g. building scale models to full scale and making scale maps in geography or orienteering. |
| solve problems involving unequal sharing and grouping using knowledge of fractions and multiples. | | MMS5 Arithmetic 2 Block 1 (word problems involving all 4 operations); MMS5 Data and Measure Block 1; MMS6 Arithmetic 2 Block 1 (short division, with remainders expressed as fractions) MMS6 Daily Practice Reasoning Block 1 - Block 6 Lessons 1 - 4 | MMS3 Reasoning Block 3 introduces division with remainders and Type 1 and Type 2 word problems to solve. This continues in MMS5 Data and Measure Block 1. The puzzles and word problems in the MMS6 Daily Practice Reasoning strand provide further opportunities. |
| ALGEBRA | Pupils should be introduced to the use of symbols and letters to represent variables and unknowns in mathematical situations that they already understand, such as: | | |
| Pupils should be taught to: | | | |
| use simple formulae | <ul style="list-style-type: none"> 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 (e.g. what two numbers can add up to). | MMS5 Arithmetic 1 Block 3 ($a/b = a \div b$); MMS6 Arithmetic 1 Block 5; MMS6 Data and Measure Block 5; MMS6 Arithmetic 2 Block 5, Block 6 | Algebraic formulae is introduced from MMS5. Formula is used for area of rectilinear shapes from MMS5 Geometry Block 3 and in MMS6 Arithmetic 1 Block 5 for diameter, circumference, area of a circle, area of a triangle, area of rectilinear compound shapes and volume of cuboids and cylinders. In MMS6 Arithmetic 2 Block 5, algebraic notation e.g. sum $m+n$; difference $m-n$; product mn ; quotient m/n is used. In MMS6 Arithmetic 2 Block 6, children recognise algebraic representations of odd and even numbers. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|---|--|
| generate and describe linear number sequences | | MMS6 Daily Practice Reasoning Block 1 - 6 Lessons 1 - 4; MMS6 Reasoning Block 5 (linear equations) | The puzzles and word problems in the MMS6 Daily Practice Reasoning strand provide further opportunities to describe linear sequences. |
| express missing number problems algebraically | | MMS5 Arithmetic 1 Block 1; MMS6 Daily Practice Reasoning Block 1 - Block 6 Lessons 1 - 4 | The puzzles and word problems in the MMS6 Daily Practice Reasoning Strand provide further opportunities. |
| find pairs of numbers that satisfy an equation with two unknowns | | MMS6 Arithmetic 2 Block 5 | Children use inequalities to identify a range of possible values for a number, e.g. $15 < m < 20$ and m is a whole number. MMS4 refers to equations and this language is now embedded. |
| enumerate possibilities of combinations of two variables. | | | This is not explicit at this basic level in MMS6, but through Daily Practice missing number grids and in context in problem solving, it is practised. In MMS6 Arithmetic 2 Block 5 and Block 6, algebra is used for number puzzle solving. |
| MEASUREMENT | | | |
| Pupils should be taught to: | They connect conversion (e.g. from kilometres to miles) to a graphical representation as preparation for understanding linear/proportional graphs. | | |
| solve problems involving the calculation and conversion of units of measure, using decimal notation up to three decimal places where appropriate | They know approximate conversions and are able to tell if an answer is sensible. Using the number line, pupils use, add and subtract positive and negative integers for measures such as temperature. | MMS6 Data and Measure Block 1, Block 3, Block 4, Block 5, Block 6 | Solving problems involving the calculation and conversion of units of measure is secured through MMS4 and MMS5. In MMS6, using and applying this enables pupils to demonstrate conversion confidently. |
| use, read, write and convert between standard units, converting measurements of length, mass, volume and time from a smaller unit of measure to a larger unit, and vice versa, using decimal notation to up to three decimal places | They relate the area of rectangles to parallelograms and triangles, e.g. by dissection, and calculate their areas, understanding and using the formulae (in words or symbols) to do this. | MMS4 Data and Measure Block 1, Block 6; MMS5 Data and Measure Block 2, Block 3, Block 5 | |
| convert between miles and kilometres | Pupils could be introduced to compound units for speed, such as miles per hour, and apply their knowledge in science or other subjects as appropriate. | MMS5 Data and Measure Block 5 | |
| recognise that shapes with the same areas can have different perimeters and vice versa | | MMS6 Data and Measure Block 5 | |
| recognise when it is possible to use formulae for area and volume of shapes | | MMS6 Arithmetic 1 Block 5; MMS6 Data and Measure Block 5 | |
| calculate the area of parallelograms and triangles | | MMS6 Arithmetic 1 Block 5 | Calculating the area of parallelograms and triangles could be extended to learning the formula for a parallelogram, as in MMS3 Geometry Block 4, children identify properties of a parallelogram. |
| calculate, estimate and compare volume of cubes and cuboids using standard units, including cubic centimetres (cm ³) and cubic metres (m ³), and extending to other units [for example, mm ³ and km ³]. | | MMS6 Data and Measure Block 5 (cm ³ and m ³) | Through maths across the curriculum, in contexts such as science and geography, other units could be investigated. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | Maths Makes Sense | Maths Makes Sense Notes |
|--|--|--|--|
| GEOMETRY | | | |
| Properties of Shape | <p>Pupils draw shapes and nets accurately, using measuring tools and conventional markings and labels for lines and angles.</p> <p>Pupils describe the properties of shapes and explain how unknown angles and lengths can be derived from known measurements.</p> <p>These relationships might be expressed algebraically e.g. $d = 2 \times r$; $a = 180 - (b + c)$.</p> | | |
| Pupils should be taught to: | | | |
| draw 2-D shapes using given dimensions and angles | | MMS5 Geometry Block 5, Block 6; MMS6 Geometry Block 6 | In MMS6 Geometry Block 6, pupils draw the perpendicular bisector of an angle, the circumcircle of a triangle and the incircle of a triangle. This acts as a transition unit to secondary Geometry. |
| recognise, describe and build simple 3-D shapes, including making nets | | MMS5 Data and Measure Block 1 Lesson 3 | |
| compare and classify geometric shapes based on their properties and sizes and find unknown angles in any triangles, quadrilaterals, and regular polygons | | MMS6 Geometry Block 1, Block 3, Block 5 | In MMS6 Geometry Block 1, pupils also calculate the sum of exterior and interior angles of any polygon. This can be investigated and extended to encompass writing algebraic formulae. In MMS6 Geometry Block 5, pupils calculate the exterior/interior angles of a polygon and calculate the third angle in a triangle. |
| illustrate and name parts of circles, including radius, diameter and circumference and know that the diameter is twice the radius | | MMS4 Geometry Block 3 | Pupils use compasses to draw circles and name arc, chord, circumference, radius and diameter in MMS4 Geometry Block 3. |
| recognise angles where they meet at a point, are on a straight line, or are vertically opposite, and find missing angles. | | MMS6 Geometry Block 1, Block 5 | |
| Position and direction | <p>Pupils 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.</p> <p>Pupils draw and label rectangles (including squares), parallelograms and rhombuses, specified by coordinates in the four quadrants, predicting missing coordinates using the properties of shapes. These might be expressed algebraically e.g. translating vertex (a, b) to $(a-2, b+3)$; (a, b) and $(a+d, b+d)$ being opposite vertices of a square.</p> | | |
| Pupils should be taught to: | | | |
| describe positions on the full coordinate grid (all four quadrants) | | MMS3 Geometry Block 2; MMS4 Geometry Block 4; MMS6 Geometry Block 3 | In MMS3, children construct 2-D shapes from coordinates and progress to use all four quadrants in MMS4 to draw polygons and identify lines of symmetry. In MMS6, children complete coordinates of missing corners of a named shape given its properties. Plotting coordinates using ICT tools is a natural progression for enrichment of this block. |
| draw and translate simple shapes on the coordinate plane, and reflect them in the axes. | | MMS6 Geometry Block 2 (reflection, enlargement and rotation as transformations using precise vector notation in all 4 quadrants) | MMS6 Geometry Block 3 focuses on finding the angle of rotation for an object and its image polygon. In MMS6 Geometry Block 4, pupils learn to draw the lines of symmetry of any polygon and identify and write the order of rotational symmetry for any polygon. |

Maths Makes Sense 6 and the 2014 National Curriculum

| Year 6 Programme of Study (statutory requirements) | Programme of Study Notes and Guidance (non-statutory) | <i>Maths Makes Sense</i> | <i>Maths Makes Sense Notes</i> |
|--|---|--|---|
| STATISTICS | Pupils connect their work on angles, fractions and percentages to the interpretation of pie charts. | | |
| Pupils should be taught to: | Pupils both encounter and draw graphs relating two variables, arising from their own enquiry and in other subjects. | | |
| interpret and construct pie charts and line graphs and use these to solve problems | They should connect conversion from kilometres to miles in measurement to its graphical representation. Pupils know when it is appropriate to find the mean of a data set. | MMS3 Data and Measure Block 3; MMS3 Data and Measure Block 2; MMS5 Data and Measure Block 2; MMS5 Data and Measure Block 4; MMS6 Reasoning Block 3 | MMS3 Data and Measure Block 3 introduces pupils to analysing explicit and implicit information in pie charts. Compass skills are taught from MMS3 Data and Measure Block 2. In MMS5 Data and Measure Block 2, pupils draw pie charts from data in a frequency table. In MMS5 Data and Measure Block 4 pupils construct line graphs for continuous data. In MMS6 Reasoning Block 3 children interpret line graphs in different contexts. Distance and time and temperature fall or rise line graphs, bar charts and/or pie charts should be used as data representation for statistical analysis in contexts such as science or geography linked to computer skills. |
| calculate and interpret the mean as an average. | | MMS4 Data and Measure Block 4; MMS5 Data and Measure Block 3 (mode); MMS5 Daily Practice Block 3, Block 5; MMS6 Reasoning Block 1 (mean/mode/range); MMS6 Data and Measure Block 4 (creates data for analysis) | MMS6 Data and Measure Block 4 introduces the mean of a sample and could extend to calculate mean, mode and median. In MMS6 Data and Measure, pupils are taught to distinguish between discrete and continuous data and to choose appropriate chart representations. There will be many cross curricula applications for data analysis. |