Merrylands Primary School & Nursery
Years 3 and 4 Maths Guide

Contents

How to use this guide

This is a guide for parents, carers and staff at Merrylands Primary School and Nursery. The purpose of this document is to allow everyone to see the different methods, models and images that are used to teach addition, subtraction, multiplication and division. This will allow parents and carers to help their children at home and will also ensure consistency in teaching at school.

Maths at Merrylands uses the principles of **'Concrete, Pictorial, Abstract' (CPA)**. Children start off using 'Concrete' resources, such as blocks and counters, which they can move and manipulate to represent calculations. They then move on to the 'Pictorial' stage where they may use or draw pictures to represent calculations. Finally, they move on to the 'Abstract' stage where they use numbers and symbols to show calculations.

Concrete methods and equipment will be used at some point in all year groups – using practical resources instead of abstract methods does not necessarily mean that a child is working below age-related expectations. Children may also use a variety of different methods to solve reasoning problems; again, this does not necessarily mean that they are working below the level expected for their age.

This guide is divided into three sections. The first section shows you the different objectives and methods that your child will encounter at school. In this section, each calculation type has been colour coded.

Addition methods are orange

Subtraction methods are blue

Multiplication methods are green

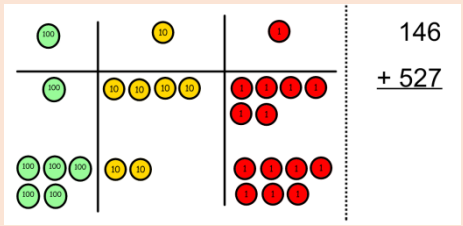
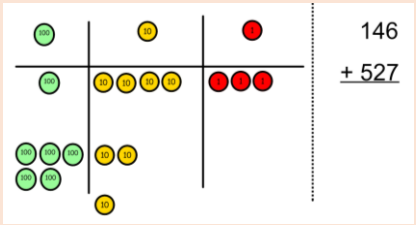
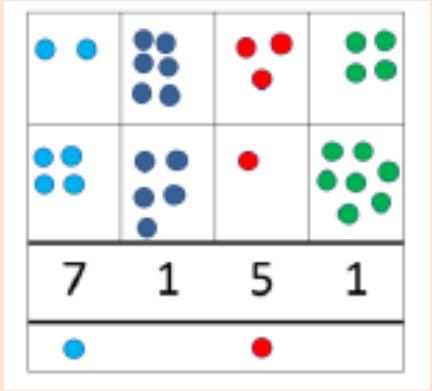
Division methods are yellow

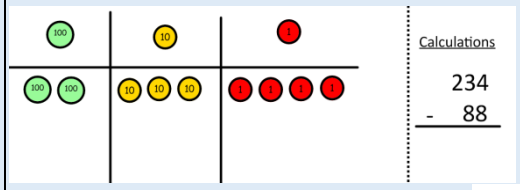
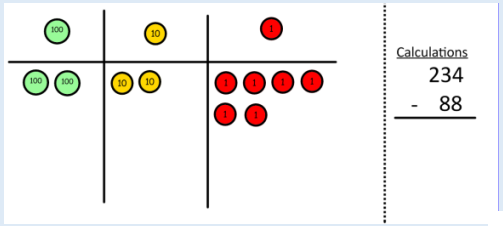
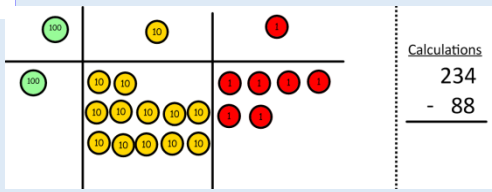
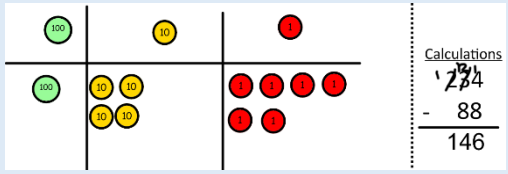
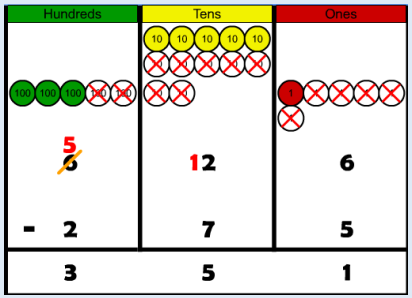
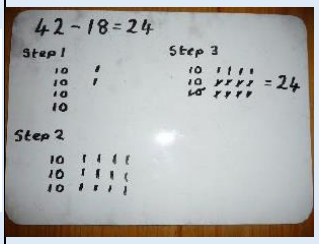
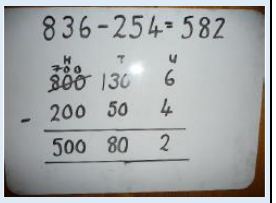
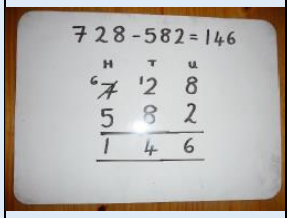
Each method shows you the concrete, pictorial and abstract ways to use each method. Different problems may require different methods – if your child finds a question difficult, see if they can use a different method to solve the problem.

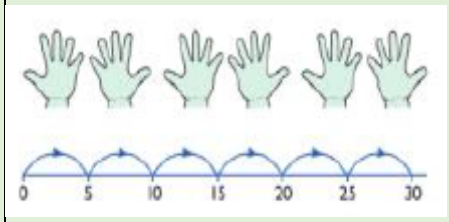
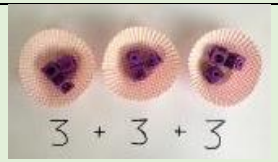
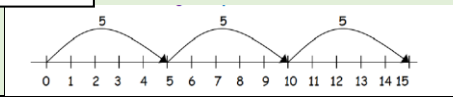
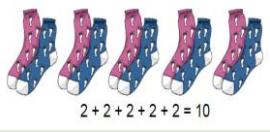
In the second section, you will find the National Curriculum objectives and the 'Big Ideas' for each year group. The Big Ideas are the key concepts that children need to understand in order to progress successfully. The National Curriculum objectives are what children need to achieve to be working at age-related expectations at the end of each year.

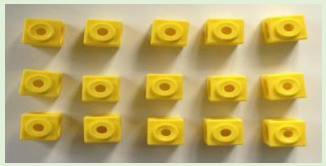
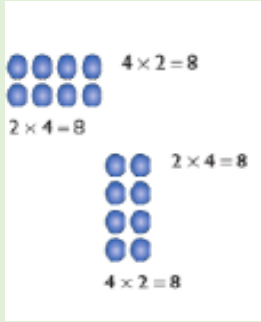
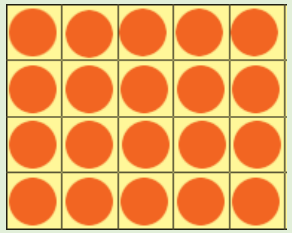
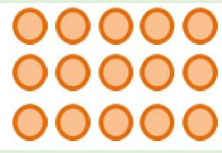
In the third section, you will find the new mathematical vocabulary that your child will encounter this year; this will build on the new words introduced and used in previous years.

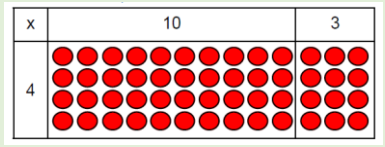
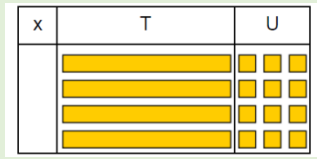
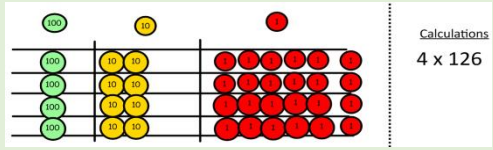
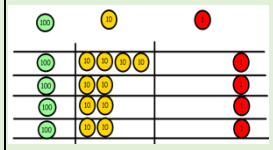
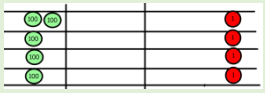
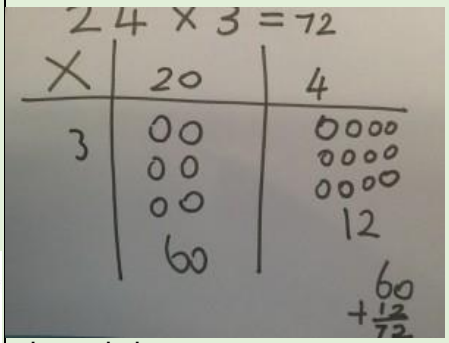
Years 3 and 4 Methods and Objectives

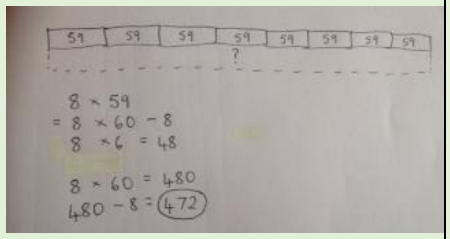
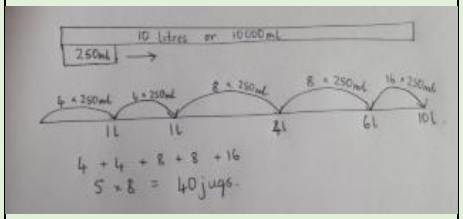
Objective and Strategies	Concrete	Pictorial	Abstract
Column method- regrouping Year 3 – 3 digit numbers Year 4 – 4 digit numbers	Make both numbers on a place value grid.  146 + 527 Add up the units and exchange 10 ones for one 10.  146 + 527 Add up the rest of the columns, exchanging the 10 counters from one column for the next place value column until every column has been added. This can also be done with Base 10 to help children clearly see that 10 ones equal 1 ten and 10 tens equal 100. As children move on to decimals, money and decimal place value counters can be used to support learning.	Children can draw a pictoral representation of the columns and place value counters to further support their learning and  7 1 5 1 understanding.	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. 536 + 85 621 1 1 20 + 5 40 + 8 60 + 13 = 73

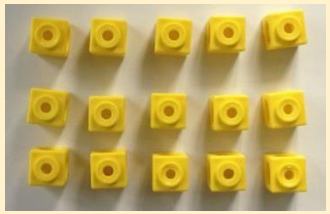
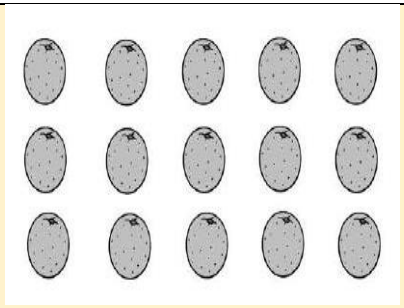
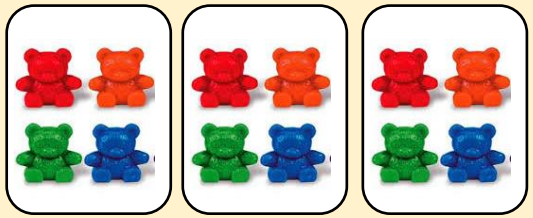
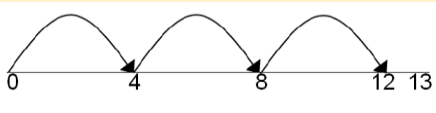
Objective and Strategies	Concrete	Pictorial	Abstract
Column method with regrouping Year 3 – 3 digit numbers Year 4 – 4 digit numbers	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges.  Calculations 234 - 88 Make the larger number with the place value counters Start with the ones, can I take away 8 from 4 easily? I need to exchange one of my tens for ten ones. Now I can subtract my ones.  Calculations 234 - 88 Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.  Calculations 234 - 88 Now I can take away eight tens and complete my subtraction Show children how the concrete method links to the written method alongside your working.  Calculations 234 - 88  Calculations ~~2~~1~~3~~4 - 88 146 Cross out the numbers when exchanging and show where we write our new amount.	 Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make. When confident, children can find their own way to record the exchange/regrouping.  Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.	 Children can start their formal written method by partitioning the number into clear place value columns.  Moving forward, the children use a more compact method.

Objective and Strategies	Concrete	Pictorial	Abstract
Counting in multiples	  Count in multiples supported by concrete objects in equal groups.	 Use a number line or pictures to continue support in counting in multiples.	Count in multiples of a number aloud. Write sequences with multiples of numbers. 2, 4, 6, 8, 10 5, 10, 15, 20, 25 , 30
Repeated addition	   Use different objects to add equal groups.	 	Write addition sentences to describe objects and pictures. 

Objective and Strategies	Concrete	Pictorial	Abstract
Arrays- showing commutative multiplication	Create arrays using counters/ cubes to show multiplication sentences.  	Draw arrays in different rotations to find **commutative** multiplication sentences.   Link arrays to area of rectangles .	Use an array to write multiplication sentences and reinforce repeated addition.  5 + 5 + 5 = 15 3 + 3 + 3 + 3 + 3 = 15 5 x 3 = 15 3 x 5 = 15

Objective and Strategies	Concrete	Pictorial	Abstract
Grid Method This might be used if children struggle with the column method of multiplication – it can help children if they are not fully secure with their knowledge of place value	Show the link with arrays to first introduce the grid method.  4 rows of 10 4 rows of 3 Move on to using Base 10 to move towards a more compact method.  4 rows of 13 Move on to place value counters to show how we are finding groups of a number.We are multiplying by 4 so we need 4 rows.  Calculations 4 x 126 Fill each row with 126.  Calculations 4 x 126 Add up each column, starting with the ones making any exchanges needed.   Then you have your answer.	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as  shown below.	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. Moving forward, multiply by a 2 digit number showing the different rows within the grid method. **X** | **30** | **5** **7** | **210** | **35** **210 + 35 = 245** | | **10** | **8** **10** | **100** | **80** **3** | **30** | **24** | X | **1000** | **300** | **40** | | **10** | 10000 | 3000 | 400 | | **8** | 8000 | 2400 | 320 |

Objective and Strategies	Concrete	Pictorial	Abstract
Column multiplication 2 and 3 digit numbers multiplied by a 1 digit number	Children can continue to be supported by place value counters at the stage of multiplication.  It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.   	Children in years 3 and 4 will use the formal method of short multiplication to solve problems. They may record it in different ways to show understanding. 3 x 23 20 3 3 x 20 = 60 3 x 3 = 9 60 + 9= 69 23 x 3 69

Objective and Strategies	Concrete	Pictorial	Abstract
Division within arrays	 Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg 15 ÷ 3 = 5 5 x 3 = 15 15 ÷ 5 = 3 3 x 5 = 15	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	Find the inverse of multiplication and division sentences by creating four linking number sentences. 7 x 4 = 28 4 x 7 = 28 28 ÷ 7 = 4 28 ÷ 4 = 7
Division with a remainder	14 ÷ 3 = Divide objects between groups and see how much is left over  	Jump forward in equal jumps on a number line then see how many  more you need to jump to find a remainder. Draw dots and group them to divide an amount and clearly show  a remainder.	Complete written divisions and show the remainder using r. 29 ÷ 8 = 3 REMAINDER 5 ↑ ↑ ↑ ↑ dividend divisor quotient r

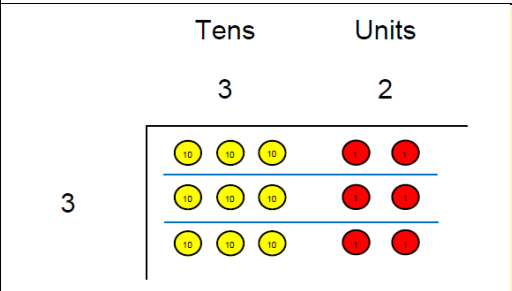
<table>
<tr><th>Objective and Strategies</th><th>Concrete</th><th>Pictorial</th><th>Abstract</th></tr>
<tr>
<td>

Short division

Year 3 – 2 digits divided by 1 digit

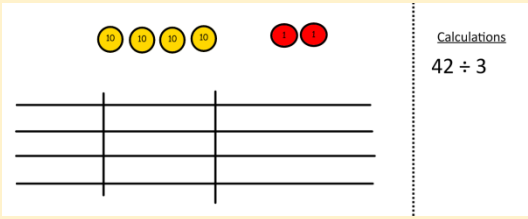
Year 4 – 3 digits divided by 1 digit

</td>
<td>

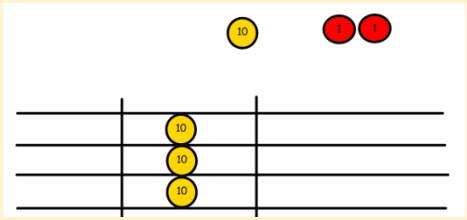


Use place value counters to divide using the bus stop method alongside 42 ÷ 3=

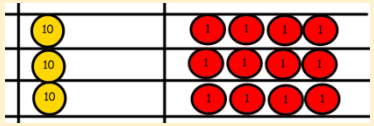
Start with the biggest place value, we are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over.



We exchange this ten for ten ones and then share the ones equally among the groups.

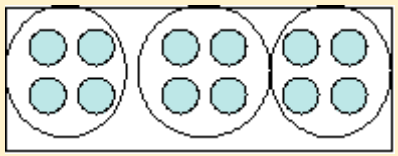


We look how much in 1 group so the answer is 14.



</td>
<td>

Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups.

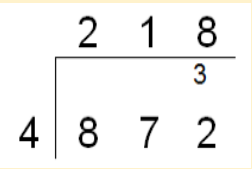


Encourage them to move towards counting in multiples to divide more efficiently.

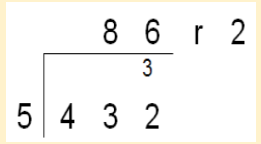
Children may use exchange boards to draw the Base 1- resources they used in the concrete stage.

</td>
<td>

Begin with divisions that divide equally with no remainder.



Move onto divisions with a remainder.



</td>
</tr>
</table>

Year 3 Curriculum Expectations and Big Ideas

End of Year 3 Expectations	Big Ideas
Pupils should be taught to: • count from 0 in multiples of 4, 8, 50 and 100 • work out if a given number is greater or less than 10 or 100 • recognise the place value of each digit in a 3-digit number (hundreds, tens, and ones) • solve number problems and practical problems involving these ideas • add and subtract numbers mentally, including: ○ a 3-digit number and ones ○ a 3-digit number and tens ○ a 3-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including 2-digit numbers times 1-digit numbers, using mental and progressing to formal written methods • solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which *n* objects are connected to *m* objects	• The value of a digit is determined by its position in a number. • Place value is based on unitising, treating a group of things as one 'unit'. This generalises to 3 units + 2 units = 5 units (where the units are the same size). • Relating numbers to 5 and 10 helps develop knowledge of the number bonds within 20. For example, given 8 + 7, thinking of 7 as 2 + 5, and adding the 2 and 8 to make 10, then the 5 to 15. This should then be applied when calculating with larger numbers. • Subtraction bonds can be thought of in terms of addition: for example, in answering 15 – 8, thinking what needs to be added to 8 to make 15. Counting on for subtraction is a useful strategy that can also be applied to larger numbers. • It is important for children not just to be able to chant their multiplication tables but also to understand what the facts in them mean, to be able to use these facts to figure out others and to use in problems. It is also important for children to be able to link facts within the tables (e.g. 5× is half of 10×). • They understand what multiplication means, see division as both grouping and sharing, and see division as the inverse of multiplication.

Year 4 Curriculum Expectations and Big Ideas

End of Year 4 Expectations	Big Ideas
Pupils should be taught to: • count in multiples of 6, 7, 9, 25 and 1000 • order and compare numbers beyond 1000 • count backwards through 0 to include negative numbers • round any number to the nearest 10, 100 or 1000 • add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate • solve addition and subtraction two-step problems in context, deciding which operations and methods to use and why • recall multiplication and division facts for multiplication tables up to 12 × 12 • 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 • recognise and use factor pairs and commutativity in mental calculations • multiply 2-digit and 3-digit numbers by a 1-digit number using formal written layout • solve problems involving multiplying and adding, including using the distributive law to multiply 2-digit numbers by 1-digit, integer scaling problems and harder • correspondence problems such as *n* objects are connected to *m* objects	• Imagining the position of numbers on a horizontal number line helps us to order them: the number to the right on a number line is the larger number. So 5 is greater than 4, as 5 is to the right of 4. But –4 is greater than –5 as –4 is to the right of –5. • Rounding numbers in context may mean rounding up or down. Buying packets of ten cakes, we might round up to the nearest ten to make sure everyone gets a cake. • Estimating the number of chairs in a room for a large number of people we might round down to estimate the number of chairs to make sure there are enough. • We can think of place value in additive terms: 456 is 400 + 50 + 6, or in multiplicative terms: one hundred is ten times as large as ten. • It helps to round numbers before carrying out a calculation to get a sense of the size of the answer. For example, 4786 – 2135 is close to 5000 – 2000, so the answer will be around 3000. Looking at the numbers in a calculation and their relationship to each other can help make calculating easier. For example, 3012 – 2996. Noticing that the numbers are close to each other might mean this is more easily calculated by thinking about subtraction as difference. • It is important for children not just to be able to chant their multiplication tables but to understand what the facts in them mean, to be able to use these facts to figure out others and to use them in problems. • It is also important for children to be able to link facts within the tables (e.g. 5× is half of 10×). • They understand what multiplication means and see division as both grouping and sharing, and to see division as the inverse of multiplication. • The distributive law can be used to partition numbers in different ways to create equivalent calculations. For example, 4 × 27 = 4 × (25 + 2) = (4 × 25) + (4 × 2) = 108. • Looking for equivalent calculations can make calculating easier. For example, 98 × 5 is equivalent to 98 × 10 ÷ 2 or to (100 × 5) – (2 × 5). The array model can help show equivalences.

New Vocabulary for Year 3

Number and place value	Addition and subtraction	Multiplication and division	Fractions
Numbers to one thousand	Column addition and subtraction	Product Multiples of four, eight, fifty and one hundred Scale up	Numerator, denominator Unit fraction, non-unit fraction Compare and order Tenths

New Vocabulary for Year 4

Number and place value	Multiplication and division	Fractions and decimals
Tenths, hundredths Decimal (places) Round (to nearest) Thousand more/less than Negative integers Count through zero Roman numerals (I to C)	Multiplication facts (up to 12x12) Division facts Inverse Derive	Equivalent decimals and fractions