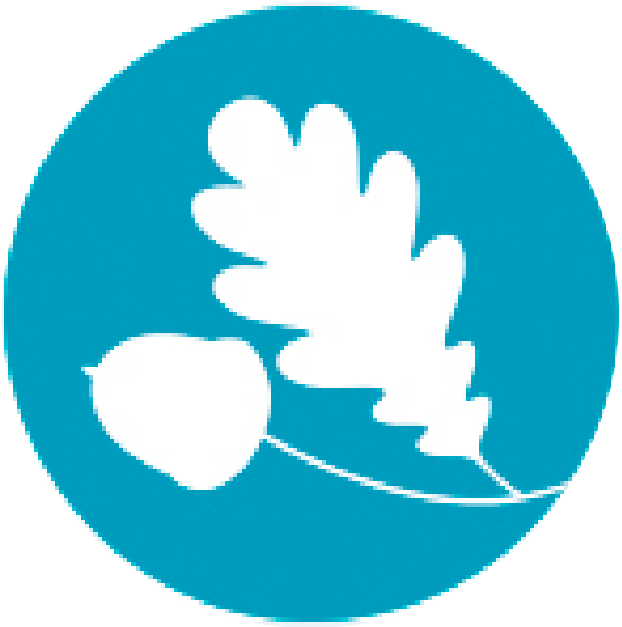
2017-2018

Merrylands Primary School & Nursery
Year 6 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

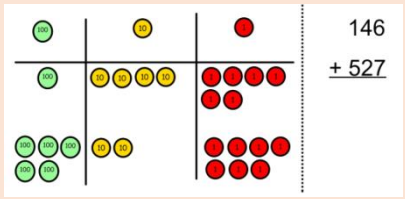
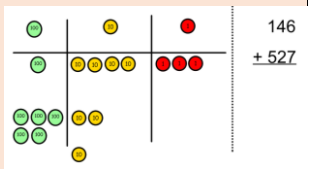
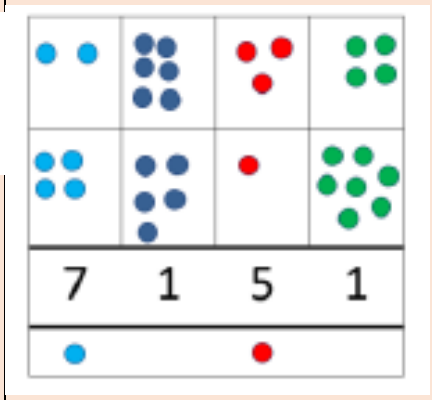
Division methods are yellow

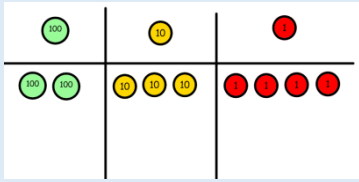
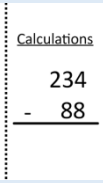
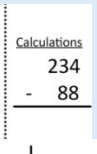
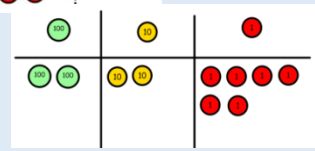
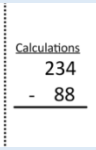
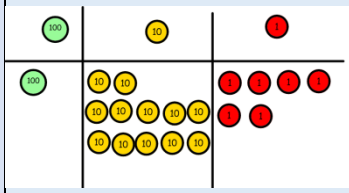
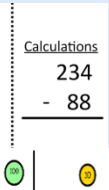
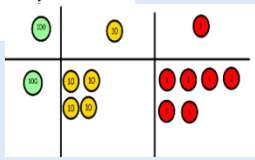
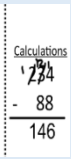
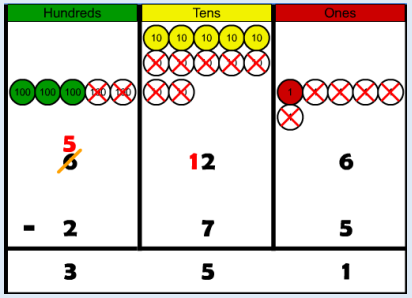
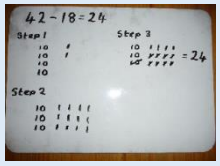
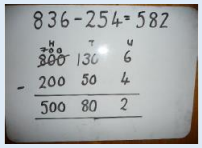
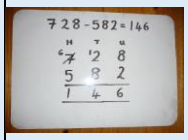
Each method shows you the concrete, pictorial and abstract ways to use each method. Different problems may require different methods – if your child finds a question difficult, see if they can use a different method to solve the problem.

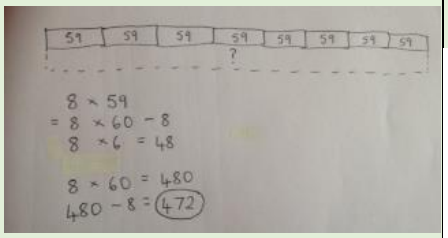
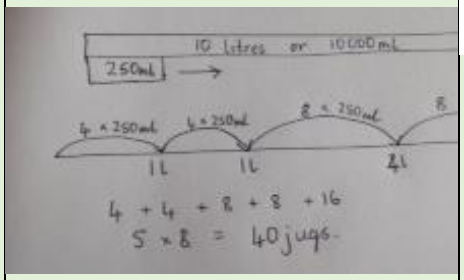
In the second section, you will find the National Curriculum objectives and the 'Big Ideas' for each year group. The Big Ideas are the key concepts that children need to understand in order to progress successfully. The National Curriculum objectives are what children need to achieve to be working at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

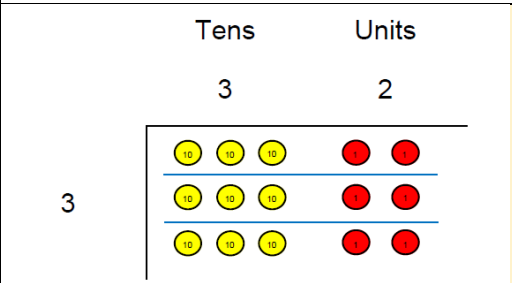
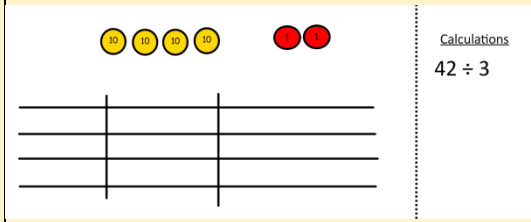
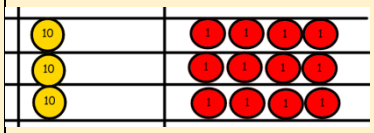
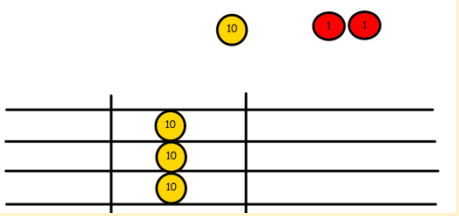
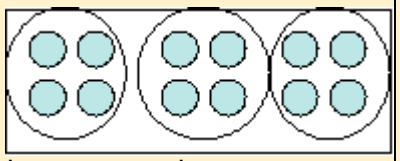
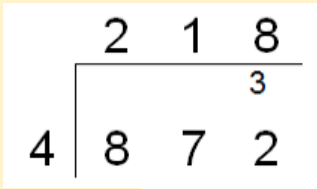
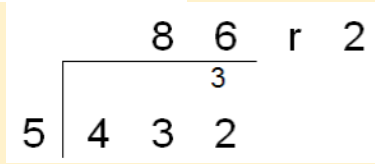
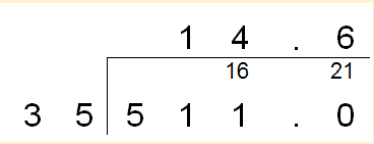
In the third section, you will find the new mathematical vocabulary that your child will encounter this year; this will build on the new words introduced and used in previous years.

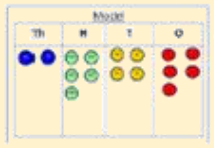
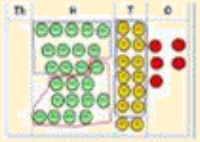
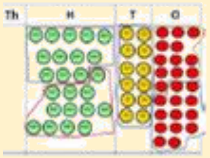
Year 6 Methods and Objectives

Objective and Strategies	Concrete	Pictorial	Abstract
Column method- regrouping Year 6 – add decimal numbers with different mounts of decimal places	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 understanding.  7 1 5 1	Start by partitioning the numbers before moving on to clearly show the exchange below the addition. 20 + 5 40 + 8 60 + 13 = 73 536 + 85 621 1 1 As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here. 72.8 + 54.6 127.4 1 1 £23.59 + £7.55 £31.14 1 1 1 23.361 9.080 59.770 + 1.300 93.511 2 1 2

Objective and Strategies	Concrete	Pictorial	Abstract
Column method with regrouping Year 6 – decimal numbers with different amounts of decimal places	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. 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.   Calculations 234 - 88   Calculations 234 - 88 Now I can subtract my ones. Now look at the tens, can I take away 8 tens easily? I need to exchange one hundred for ten tens.   Calculations 234 - 88   Calculations 234 - 88 Now I can take away eight tens and complete my subtraction   Calculations 234 - 88 146 Show children how the concrete method links to the written method alongside your working. 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. This will lead to an understanding of subtracting any number including decimals. 5 12 1 2 6 3 . 0 - 2 6 . 5 2 3 6 . 5

Objective and Strategies	Concrete	Pictorial	Abstract
Column multiplication Year 6 – multiply large numbers by 2 digit numbers	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.   	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 32 x 24 8 (4 x 2) 120 (4 x 30) 40 (20 x 2) 600 (20 x 30) 768 This moves to the more compact method. 1342 x 18 13420 10736 24156 74 x 63 12 210 240 + 4200 4662

Objective and Strategies	Concrete	Pictorial	Abstract
Short division Year 6 – divide large numbers by 2 digit numbers – interpret remainders as whole numbers, fractions or rounding where appropriate	 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.	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.	Begin with divisions that divide equally with no remainder.  Move onto divisions with a remainder. Finally move into decimal places to divide the total accurately.  

Objective and Strategies	Concrete	Pictorial	Abstract
Long Division Year 6 – divide large numbers by 2 digit numbers – interpret remainders as whole numbers, fractions or rounding where appropriate	 2544 ÷ 12 How many groups of 12 thousands do we have? None  Exchange 2 thousand for 20 hundreds.  How many groups of 12 are in 25 hundreds? 2 groups. Circle them. We have grouped 24 hundreds so can take them off and we are left with one.  Exchange the one hundred for ten tens so now we have 14 tens. How many groups of 12 are in 14? 1 remainder 2.  Exchange the two tens for twenty ones so now we have 24 ones. How many groups of 12 are in 24? 2	Children to represent the counters, pictorially and record the subtractions beneath.	Step one- exchange 2 thousand for 20 hundreds so we now have 25 hundreds. Step two- How many groups of 12 can I make with 25 hundreds? The 24 shows the hundreds we have grouped. The one is how many hundreds we have left. Exchange the one hundred for 10 tens. How many groups of 12 can I make with 14 tens? The 14 shows how many tens I have, the 12 is how many I grouped and the 2 is how many tens I have left. Exchange the 2 tens for 20 ones. The 24 is how many ones I have grouped and the 0 is what I have left. This is often a difficult concept for children to grasp – for other methods, please see the National Curriculum mathematics appendix 1.

Year 6 Curriculum Expectations and Big Ideas

End of Year 6 Expectations	Big Ideas
Pupils should be taught to: • read, write, order and compare numbers up to 10 000 000 and determine the value of each digit • round any whole number to a required degree of accuracy • use negative numbers in context, and calculate intervals across 0 • solve number and practical problems that involve all of the above • solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why • use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy • multiply multi-digit numbers up to four digits by a 2-digit whole number using the formal written method of long multiplication • divide numbers up to four digits by a 2-digit whole number using the formal written method of long division, and interpret remainders as whole number • remainders, fractions, or by rounding, as appropriate for the context • divide numbers up to four digits by a 2-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context • use their knowledge of the order of operations to carry out calculations involving the four operations • solve problems involving addition, subtraction, multiplication and division • multiply 1-digit numbers with up to two decimal places by whole numbers	• For whole numbers, the more digits a number has, the larger it must be: any 4-digit whole number is larger than any 3-digit whole number. But this is not true of decimal numbers: having more digits does not make a decimal number necessarily bigger. For example, 0 ·5 is larger than 0 ·35. • Ordering decimal numbers uses the same process as for whole numbers ie we look at the digits in matching places in the numbers, starting from the place with the highest value ie from the left. The number with the higher different digit is the higher number. For example, 256 is greater than 247 because 256 has 5 tens but 247 has only 4 tens. Similarly 1 ·0843 is smaller than 1 ·524 because 1 ·0843 has 0 tenths but 1 ·524 has 5 tenths. • Deciding which calculation method to use is supported by being able to take apart and combine numbers in many ways. For example, calculating 8 ·78 + 5 ·26 might involve calculating 8 ·75 + 5 ·25 and then adjusting the answer. • The associative rule helps when adding three or more numbers: 367 + 275 + 525 is probably best thought of as 367 + (275 + 525) rather than (367 + 275) + 525. • Standard written algorithms use the conceptual structures of the mathematics to produce efficient methods of calculation. • Standard written multiplication method involves a number of partial products. For example, 36 × 24 is made up of four partial products 30 × 20, 30 × 4, 6 × 20, 6 × 4. • There are connections between factors, multiples and prime numbers and between fractions, division and ratios.

New Vocabulary for Year 6

Number and place value	Addition and subtraction	Multiplication and division	Fractions, decimals and percentages	Algebra
Numbers to ten million	Order of operations	Order of operations Common factors, common multiples	Degree of accuracy Simplify	Linear number sequence Substitute Variables Symbol Known values