

# **Botley C of E Primary School**

## **Calculation Policy**



A guide to mental, written calculations and other strategies used in our school.



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## Aims:

This policy aims to ensure consistency in the mathematical written methods and approaches to calculation across years 1-6.

There is separate information for Year R children in our Maths in EYFS document.

The document is organised according to age related expectation, it is not intended for children to access methods and techniques designed for a different age group.

As part of a child's learning in calculation, they need to be taught how to select the best method according to the numbers. The hierarchy of thinking should be:

*Can I do it in my head?*

A blue thought bubble with a scalloped edge and a tail pointing towards the top left.

*Can I use some jottings to help me?*

A red thought bubble with a scalloped edge and a tail pointing towards the top left.

*Should I use a written method?*

A green thought bubble with a scalloped edge and a tail pointing towards the top left.



## Our Key Questions:

As with all subjects, deep and effective questioning is an important part of teaching and learning.

Maths is not just solving calculations; we also want children to be able to understand the theory behind the written methods and be able to reason deeply about the subject.

In class, we use the following 'Key Questions' to stimulate a deeper understand of the subject.

# 5 Key Questions ?

**A: What if I change .....?**

**B: What is the same and what is different?**

**C: Can you show me an example of ... and another...and another?**

**D: If I know ..... then what else do I know ?**

**E: Which is harder and which is easier?**





## What does the National Curriculum Say?

<https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study>

### Maths in Years 1 and 2:

The principal focus of mathematics teaching in key stage 1 is to ensure that pupils develop confidence and mental fluency with whole numbers, counting and place value. This should involve working with numerals, words and the four operations, including with practical resources [for example, concrete objects and measuring tools].

At this stage, pupils should develop their ability to recognise, describe, draw, compare and sort different shapes and use the related vocabulary. Teaching should also involve using a range of measures to describe and compare different quantities such as length, mass, capacity/volume, time and money.

By the end of year 2, pupils should know the number bonds to 20 and be precise in using and understanding place value. An emphasis on practice at this early stage will aid fluency.

Pupils should read and spell mathematical vocabulary, at a level consistent with their increasing word reading and spelling knowledge at key stage 1.

### Maths in Years 3 and 4:

The principal focus of mathematics teaching in lower key stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the 4 operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word-reading knowledge and their knowledge of spelling.



## Maths in Years 5 and 6

The principal focus of mathematics teaching in upper key stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of year 6, pupils should be fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly.



## **Progressive list of written strategies:**

The following pages contain explanations, examples, tips and hints for the written methods recommended to be taught in each year group. Again, **it is not recommended for children to move beyond the methods taught in each year group** although going back to **consolidate understanding of previous methods** may sometimes prove advantageous.

**MATHEMATICS**  
is not about  
numbers, equations,  
computations, or  
algorithms:  
it is about  
**UNDERSTANDING.**

*William Paul Thurston*



# ADDITION

**Key vocabulary:** add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse, decimal places, decimal point, tenths, hundredths, thousandths.

## Year 1

### 1) Using concrete resources to solve simple addition number sentences

Children will start learning how to solve addition number sentences by counting concrete resources such as counters. It may be represented by a 10 frame – see the examples below:



$$3 + 3 = 6$$



There are  white bears.

There are  brown bears.

There are  bears altogether.



Answers which add together to make a number larger than 10 may need more than one 10 frame.

$$\square + \square = \square$$

Children will also be encouraged to use facts they know already to help them derive further facts. For example:



$$6 + 6 = 12$$

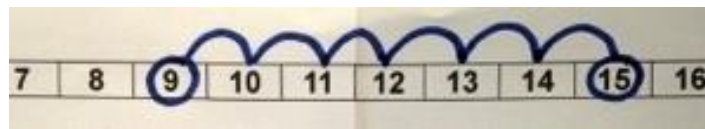
$$7 + 6 = \square$$



$$6 + 6 = 12$$

$$6 + 5 = \square$$

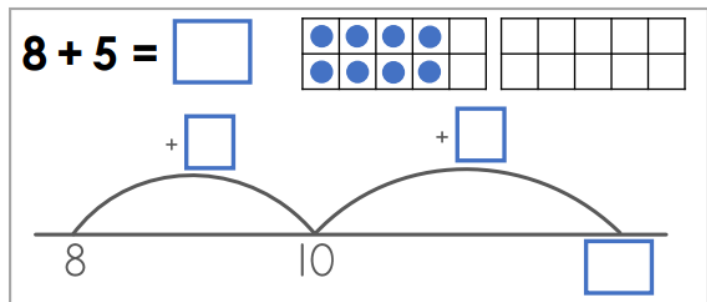
## 2) Relating addition to counting on a numberline



Children will also be taught to count on using a numberline in jumps of one to start.

Children will be encouraged when more confident to use their number bonds to 10 to help them add together two numbers.

For instance,  $8 + 5 = 8 + 2 + 3$



## Just Know It! Year 1

Year 1 children just have to know their number bonds to 10.

$$0 + 10 = 10$$

$$1 + 9 = 10$$

$$2 + 8 = 10$$

$$3 + 7 = 10$$

$$4 + 6 = 10$$

$$5 + 5 = 10$$

$$10 + 0 = 10$$

$$9 + 1 = 10$$

$$8 + 2 = 10$$

$$7 + 3 = 10$$

$$6 + 4 = 10$$

$$5 + 5 = 10$$

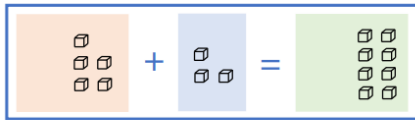


# Year 2

## 1) Counting in multiples of 1s and 10s

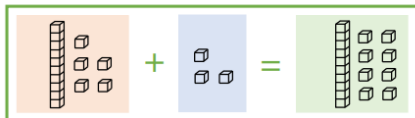
In Year 2, children will consolidate their methods and pictorial models from Year 1.

I know... so...



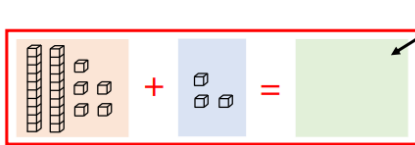
$5 + 3 = \square$

Children will use their growing knowledge of number and place value to add larger numbers together.



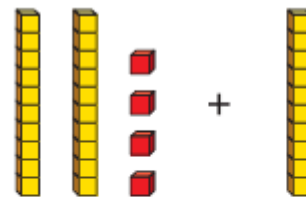
$15 + 3 = \square$

In this example, children are building numbers using block 10 and adding more blocks on to represent the number sentence.



$25 + 3 = \square$

In this example, children are building a two-digit number with multi-link and then adding on another 10.



$\square + \square = \square$

## 2) Partition and Recombine

		Tens	Ones
+			

Children will then learn to add two 2-digit numbers using this partition and recombine method.

In this example, there is no crossing the 10s boundary.

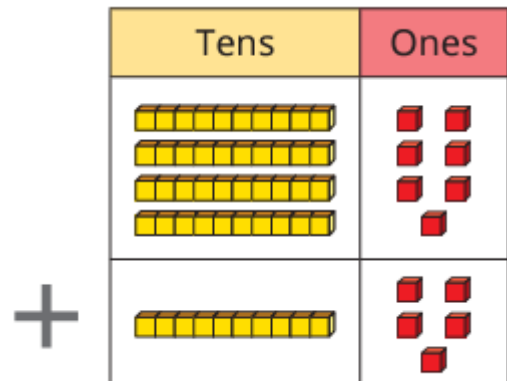
$43 + 21 = 64$



In this example, the 10s boundary is crossed.

$$47 + 15 = 62$$

As such, 10 of the ones blocks will be exchanged into 1 ten block.



In KS1, there is no requirement for children to use a formal column method for any addition or subtraction. However, completing problems in the method detailed above is setting up their understanding to start doing so in KS2.



# Year 3

## 1) Counting in multiples of 1s, 10s and 100s

Counting in multiples of 1s, 10s and 100s is a logical progression from the learning children will have completed during their Number and Place Value unit.

Complete the additions.

Children should be confident counting on in 100s, 10s and 1s such as in the example opposite.

This is a key skill in which children should be fully confident before moving on.

a)

b)

A Hundreds, Tens and Ones (or Hundreds, Tens and Units/HTU) grid is a fantastic resource to support with moving on to learning about the addition of larger and more complex numbers.

H	T	O

**328 + 36 = 364**

Here, 328 has been made using 'block 10' and represented on a HTU grid. Figure 1 then shows 36 (or 3 'tens' and 6 'ones') added on in the row below.

To find the answer, count up the hundreds, tens and ones altogether.

Note that in this example, there are more than 10 'ones' and as such another 'ten' has been carried to the middle column.

Figure 1

These questions can also be represented by 'block 10' without the HTU grid.

**325 + 25 = 340**

The solution here has been found by counting up the total of 'hundreds', 'tens' and 'ones'.

Again, 10 'ones' have been carried over to make an additional 'ten'.



## 2) Moving towards a formal written method – Column Addition

Later on in Year 3, children will be introduced to a traditional Column Addition method.

This can be supported by using HTU grids and place value counters.

Take care to notice when to 'carry across' to the next column.

$572 + 45$

H	T	O
100 100	10 10	1 1
100 100	10 10	
100	10 10	
	10	

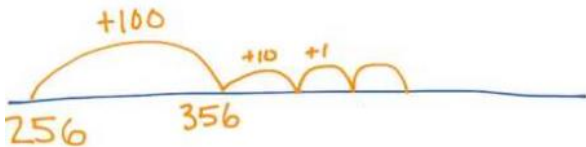
	H	T	O
	5	7	2
+		4	5
	6	1	7
	1		

+

	10 10	1 1
	10 10	1 1
		1

Open Number Line

$$256 + 137 =$$



These addition problems may also be represented on a numberline as shown opposite.

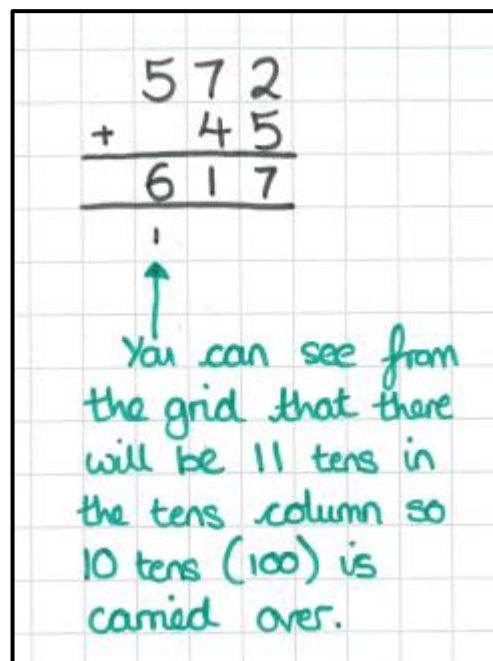
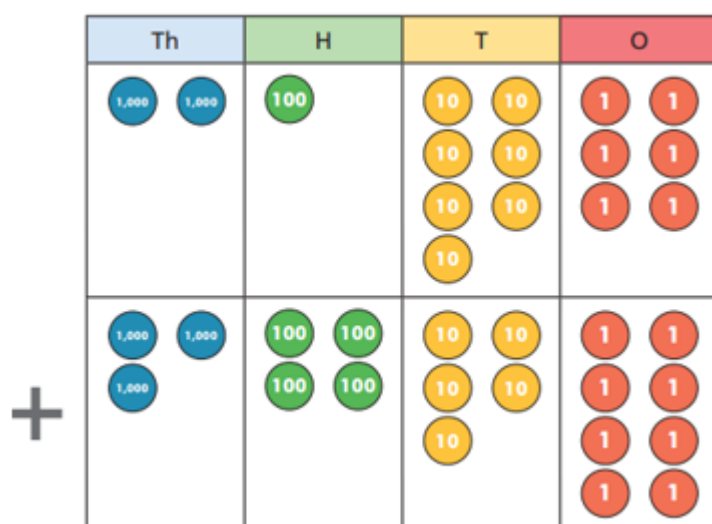


## Year 4

### 1) Column Addition: 4 digit + 4 digit

Children will continue to improve their understanding of Column Addition.

Again, place value counters and HTU grids can be used to support learning.



Nijah

	Th	H	T	O
	4	8	2	6
+	1	7	8	
	6	6	0	6
	1	1		

“Explain what mistake Nijah has made”

These types of questions are excellent for checking a child’s understanding of what they have been taught.



## Year 5

### 1) Column Addition: Larger Numbers (up to 5 digits) and decimals, including money.

Year 5 children will begin adding larger numbers. They may also add more than 2 numbers together at once using the same column method as previously taught.

$$\begin{array}{r}
 23,467 \\
 + 18,743 \\
 \hline
 42,210 \\
 \hline
 1 \quad 1 \quad 1 \quad 1
 \end{array}$$

$$\begin{array}{r}
 4,827 \\
 + 12,543 \\
 + \quad 864 \\
 \hline
 18,234 \\
 \hline
 2 \quad 1 \quad 1
 \end{array}$$

← Important to ensure all the columns are aligned

Children will also begin to use column addition to add together amounts of money. This will follow on from learning about decimals and the 'tenths', 'hundredths' and 'thousandths' place value columns. Using money to introduce numbers including decimals is useful as children see the prices of different items written when shopping!

$$\pounds 3.29 + \pounds 1.47 = \pounds 4.76$$

$$\begin{array}{r}
 3.29 \\
 + 1.47 \\
 \hline
 4.76 \\
 \hline
 \uparrow \\
 \text{Decimal points} \\
 \text{stay still!}
 \end{array}$$

← Start adding from the 'smallest' column as usual - in this case the hundredths.



## Year 6

### 1) Column Addition: Larger Numbers (up to 7 digits) and decimals.

By Year 6, children will be confident in using the column method. They will begin to add numbers up to 10 million.

$$4,328,761 + 2,997,418 = 7,326,179$$

	4	3	2	8	7	6	1	
+	2	9	9	7	4	1	8	
<hr/>								
	7	3	2	6	1	7	9	
<hr/>								
		,	,	,				

Year 6 children will also continue to find the sum of numbers involving decimals.

$$35.78 + 14.4 = 50.18$$

	3	5	.	7	8	
+	1	4	.	4		
<hr/>						
	5	0	.	1	8	
<hr/>						
		,				

Ensure you line up the decimal point in the right place

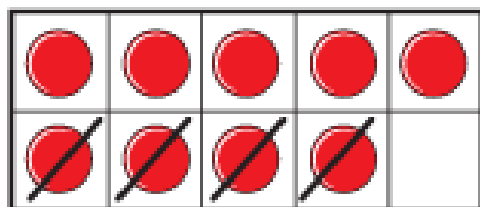


# SUBTRACTION

**Key vocabulary** equal to, take, take-away, less, minus, subtract, leaves, distance between, how many more, how many fewer/less than, most, least count back, how many left, how much less is..., difference, count on, strategy, partition, tens units, take and make, exchange, digit, value, hundreds, inverse, tenths, hundredths, decimal point, decimal.

## Year 1

### 1) Using concrete resources to solve simple subtraction number sentences

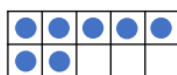


$$9 - 4 = 5$$

This crossing out method is one concrete and pictorial model which will be used to introduce subtraction to Year 1 learners.

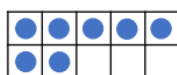
More confident learners would be able to reason and explain patterns in a series of problems like the one opposite.

### Spot the pattern



$7 - 5 = \square$

What do you notice?



$7 - 4 = \square$



$7 - 3 = \square$

Explain what mistake Nijal has made

These types of questions are excellent for checking a child's understanding of what they have been taught.



## 2) Counting back, or finding the difference, on a numberline

Children will be taught to subtract on a number by starting at the larger number and counting backwards in jumps of one.



$$15 - 3 = 12$$

More confident children may be able to count back in larger jumps. Ideally, children will be confident in counting back in a fewer number of jumps using their numberbonds.

$$16 - 9 = \square$$



In this example, children might jump back 6 from 16, and then jump back in 3.

i.e.  $16 - 9 = 16 - 6 - 3 = 7$

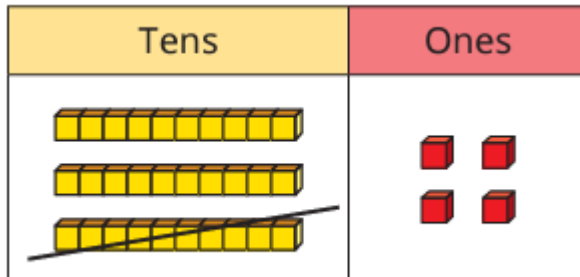
Children may also be taught to find the difference between two numbers to solve subtraction questions. To do this, they would start at the lower number and count up until they get to the larger number.

## Year 2

### 1) Counting in multiples of 1s and 10s

In Year 2, children will consolidate their methods and pictorial models from Year 1.

Children will also use their growing understanding of Number and Place Value to subtract 1s and 10s from two-digit numbers.



This shows  $34 - 10 = 24$

34 has been made using block 10 before one ten has been taken away.

### 2) Partition and Recombine

Children will continue to use block 10 to support subtraction of two-digit numbers.



This represents the number 38.

By crossing out tens and ones, we have now taken away 25.



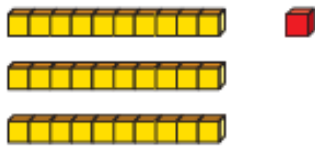
 This leaves us with 13.

$$38 - 25 = 13$$



Sometimes when subtracting, we need to exchange a ten for 10 ones to help us cross the tens boundary.

$$31 - 13 = 18$$



First we make 31 out of block 10.

We then exchange 1 ten for 10 ones as shown opposite – we still have 31 but shown in a different way.



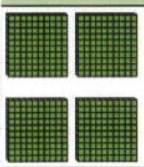


From here, it is easy to takeaway 13 via the same crossing out method detailed above.

Again, there is no requirement for KS1 children to use a formal written column method for subtraction but using block 10 to model exchanging in this way prepares them for KS2.

## Year 3




### 1) Counting back in multiples of 1s, 10s and 100s

Similar to addition, Year 3 children will begin to subtract numbers (up to 3 digit – 3 digit) using concrete resources such as ‘Block 10’ and place value counters.

H	T	O
		

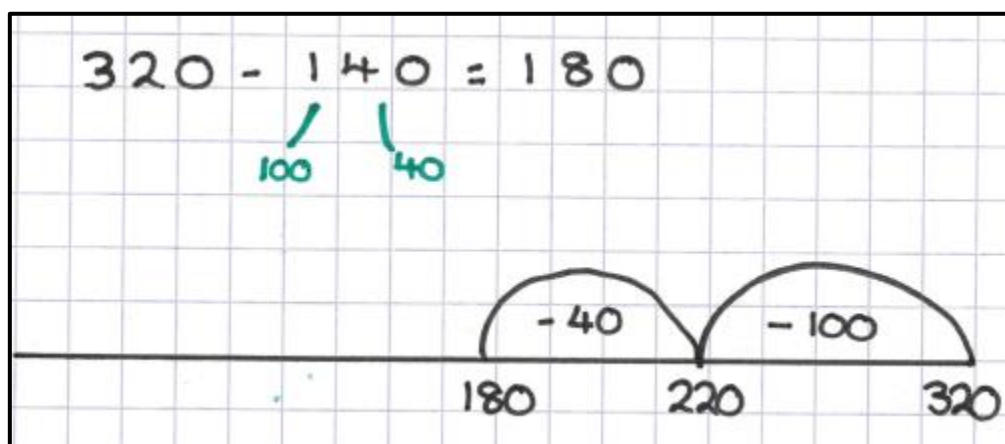
$$\begin{array}{r} 427 \\ - 15 \\ \hline 412 \end{array}$$

By crossing out one 10 and five 1s, you can see how much is left.

H	T	O
		

$$\begin{array}{r} 536 \\ - 214 \\ \hline 322 \end{array}$$

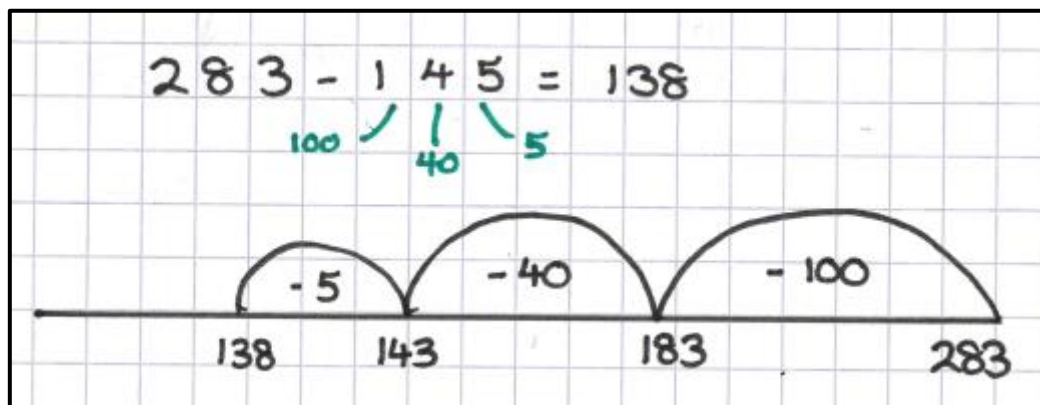
Representing subtraction on a numberline is another important tool.



In this example, 140 has been partitioned into 1 hundred and 4 tens. Each ‘jump back’ is then made mentally and recorded on the numberline.



Another example can be seen here:



This method of subtraction again relies heavily on children's excellent understanding of place value and counting in 1s, 10s and 100s.

These are both examples of an 'unstructured numberline' as there are no regular intervals or numbers already written underneath the numberline

## 2) Moving towards a formal written method – Column Subtraction

Again, children will be taught the more formal method of column subtraction later on in Year 3.

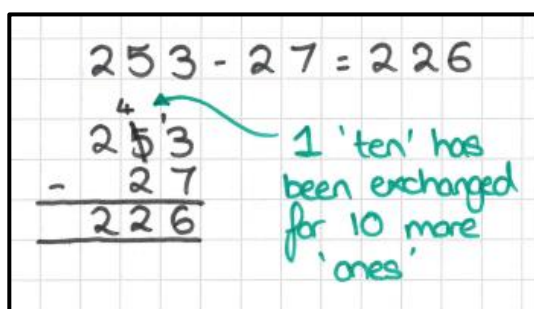
HTU grids can be used to support this process so that children understand why they may sometimes need to 'borrow' from another column. This is also sometimes called 'exchanging'.

Hundreds	Tens	Ones

In this example, 7 is bigger than 3;  $3 - 7$  will give a negative number as an answer.

If we exchange 1 'ten' for 10 more 'ones', then we can do  $13 - 7 = 6$ .

This exchanging can be represented practically using 'Block 10' or place value counters.





$$\begin{array}{r}
 7 \quad \quad \quad 1 \\
 483 \\
 - 256 \\
 \hline
 227
 \end{array}$$

Year 3 children will learn to subtract numbers up to 3 digits from 3 digit numbers.

Important note: sometimes you may have to exchange and borrow from more than one column.

$$\begin{array}{r}
 400 - 83 = 317 \\
 3 \quad \quad \quad 9 \quad \quad \quad 1 \\
 400 \\
 - 83 \\
 \hline
 317
 \end{array}$$

Here, 1 'hundred' has been exchanged for 10 'tens'. Then, one of these 'tens' has been exchanged for 10 'ones'.

## Year 4

### 1) Column Subtraction (up to 4-digit – 4-digit numbers)

Year 4 children will continue to develop their understanding of column subtraction. 'HTU' grids can be used to support when needed.

$$\begin{array}{r}
 3,764 - 2,994 = 770 \\
 2 \quad \quad \quad 6 \quad \quad \quad 1 \\
 3,764 \\
 - 2,994 \\
 \hline
 770
 \end{array}$$

Always start from the 'smallest column'

'Borrowing', or 'exchanging' is still a key skill.



## Year 5

### 1) Column Subtraction (up to 5-digit – 5-digit numbers)

Column subtraction will continue to be practised in Year 5 for larger numbers.

$$42,034 - 8,976 = 33,058$$

Ensure the place value columns are aligned!

## Year 6

### 1) Column Subtraction (with numbers up to 10 million, and numbers including decimals)

In Year 6, children will work with increasingly large numbers. Calculations involving decimals can be solved in many different contexts, for example, mass and volume.

$$2,154,784 - 84,654 =$$

$$105.419 \text{ kg} - 36.08 \text{ kg} = 69.339 \text{ kg}$$

Empty decimal places can be filled with zero as needed.

# MULTIPLICATION

**Key vocabulary** groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, sets of, equal groups, times as big as, once, twice, three times..., partition, grid method, multiple, product, tens, units, value, inverse, square, factor, integer, decimal, short/long multiplication, 'carry', tenths, hundredths.

## Year 1

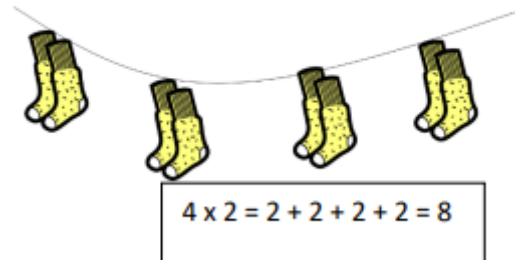
### 1) Counting in multiples

Children will begin understanding multiplication by counting in multiples of numbers. For instance, children might complete activities that help them become fluent in counting in 2s.

The idea of multiplication being repeated addition is important as is representing the multiplication in many ways.

Numicon is a good resource to show the 'groups' or 'lots of' or children can make groups of items with hoops and beanbags, or multi-link eg.

How many socks on the line?

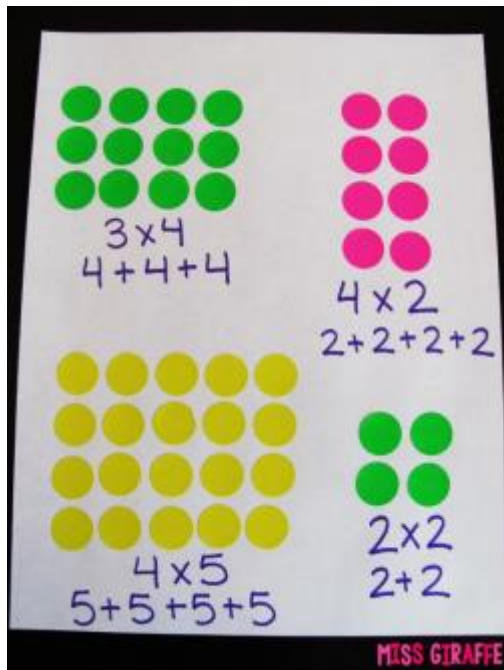


$$3 \times 4 = 4 + 4 + 4 = 12$$



$$4 \times 3 = 3 + 3 + 3 + 3 = 12$$

## 2) Constructing arrays



Arrays are a wonderful representation to support the understanding of multiplication and division.

3 x 4 can be shown by 3 rows of 4 counters (or 4 columns of 3 counters).

This model reinforces the idea that multiplication is repeated addition as children can see the same row repeated.

In year 1, children will record arrays using concrete resources such as counters and may start to draw their own arrays.

## Year 2

Children will continue to complete activities related to repeated addition and constructing simple arrays to represent times tables.

### 1) Recording number sentences using arrays.



$$3 \times 6 = 18$$

$$6 \times 3 = 18$$

Year 2 children will become more confident with constructing arrays for a wider range of times tables facts.

They will draw arrays and record the corresponding number sentences.



$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \times \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

$$\underline{\quad} \div \underline{\quad} = \underline{\quad}$$

Children will also be taught the corresponding division facts: one array can make 4 multiplication and division facts.

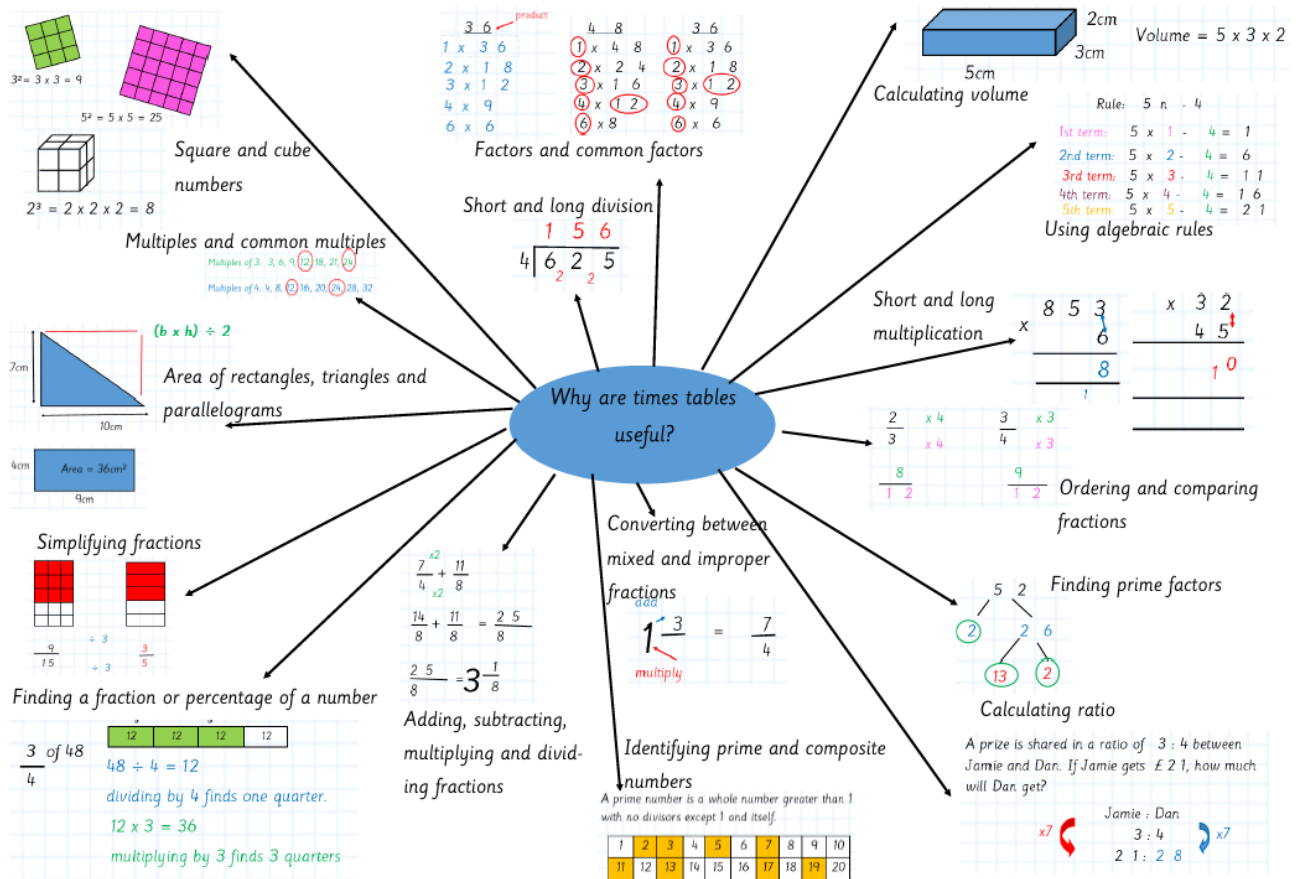
These facts are called fact families.



# Year 3

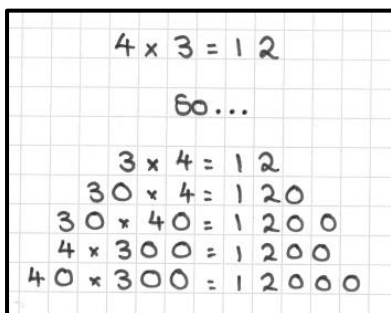
## 1) Becoming fluent with times tables

Rapid recall of times tables is key in so many areas of maths. See the diagram below:



To ensure children are learning their times table facts, the government have introduced a new national assessment. From the 2019-20 academic year, all year 4 children will be expected to complete an online, national times table test. This is in line with the expectation in the national curriculum that all children should be able to rapidly recall times tables facts to 12 x 12, along with the associated division facts by the end of year 4.

To start in year 3, children will be taught their times tables and how to use that knowledge to derive related number facts, eg.



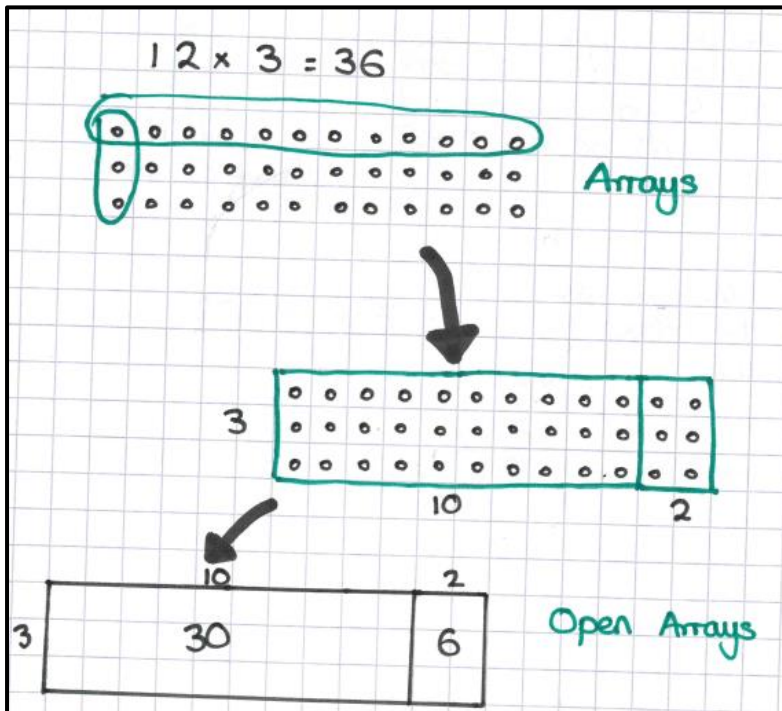
Place Value Sliders are used to support.



## 2) Open Arrays

Year 3s will continue to use arrays to represent multiplication and division facts.

Later in Year 3, children will start to multiply larger numbers using open arrays. This is a good 'bridge' towards using a more formal written method.



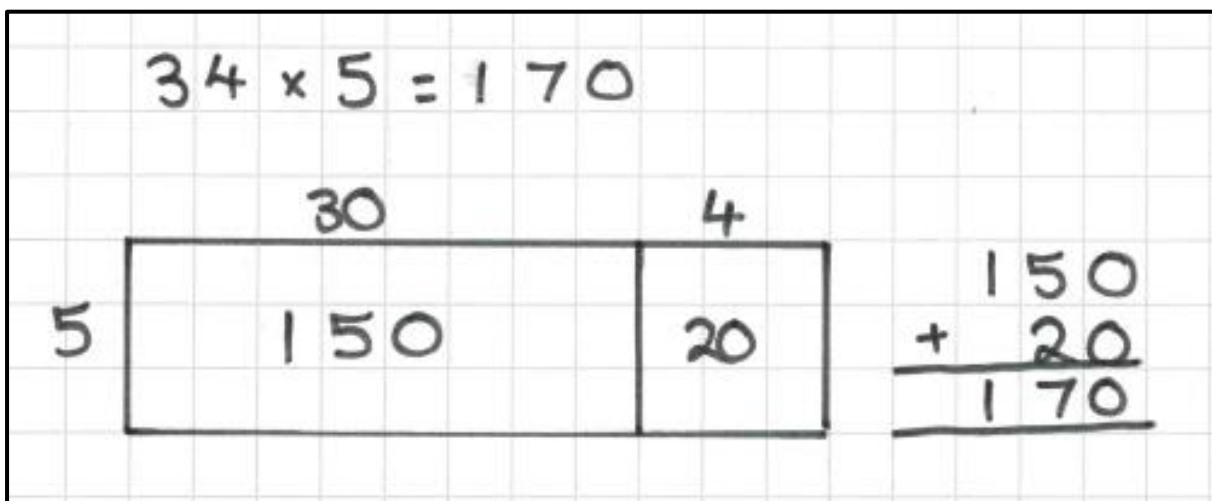
By drawing rectangles around the array, you can start to split the calculation into parts.

For instance, in the middle diagram, the array has been organised into 3 x 10 and 3 x 2.

You can then draw an open array showing this, without having to draw 36 circles!

This then uses times table facts to solve the problem.

Another example of an open array:





### 3) Grid Method

Finally, Year 3 children will be taught how to use the grid method. This is one more step on from open arrays.

**Open Arrays**

$$24 \times 3 = 72$$

	20	4
3	60	12

$60 + 12 = 72$

$2 \times 3 = 6$   
 so,  $20 \times 3 = 60$

**Grid method**

$$24 \times 3 = 72$$

x	20	4
3	60	12

60
+ 12
72

The grid method is a logical way to complete any multiplication problem.

By partitioning the two-digit number into 'tens' and 'units', children can use times table facts to solve their calculation.

In Year 3, children will solve 2-digit x 1-digit calculations.

Another example of the grid method for 2-digit x 1-digit number.

$$43 \times 6 = 258$$

x	40	3
6	240	18

240
+ 18
258

Add the numbers in the grid to find the total.



## Year 4

### 1) Grid method (up to 3-digit x 1-digit numbers)

Year 4 children will continue to develop their understanding of multiplication through the use of open arrays and the grid method. They will also continue to practice their rapid times tables recall to prepare them for the Multiplication Tables Check national assessment at the end of the year.

$245 \times 3 = 735$

X	200	40	5
3	600	120	15

$$\begin{array}{r} 600 \\ 120 \\ + 15 \\ \hline 735 \end{array}$$

$108 \times 7 = 756$

X	100	8
7	700	56

$$\begin{array}{r} 700 \\ + 56 \\ \hline 756 \end{array}$$

In this example, there are no 'tens'.



# Year 5

## 1) Moving towards Short Multiplication

**Grid Method**

x	40	3
6	240	18

$$43 \times 6 = 258$$

$$\begin{array}{r} 240 \\ + 18 \\ \hline 258 \end{array}$$

↓

**Short Multiplication - Expanded**

43	
x 6	
18	$(3 \times 6)$
240	$(40 \times 6)$
258	

These are the same calculations but in a different representation.

↓

**Short Multiplication**

43
x 6
18
258

3 x 6 is 18. The ten is carried over to the 'tens' column.

Children will begin to use a formal written method in Year 5.

Short multiplication is used when multiplying by a 1-digit number.

In each of these representations of the calculation  $43 \times 6$ , the same 'workings' are used:

$40 \times 6$  and  $3 \times 6$ .

For short multiplication, the digits are carried over to the next place value column when necessary.

Another example of short multiplication:

243
x 5
1215
21

Start with  $5 \times 3$  and carry over as needed



## 2) Long Multiplication

Year 5 children will also learn how to use the long multiplication method.

$243 \times 27 = 6561$

$$\begin{array}{r} 243 \\ \times 27 \\ \hline 1701 \\ 4860 \\ \hline 6561 \end{array}$$

1st line as short multiplication  $7 \times 3$ , then  $7 \times 4$  and so on...

2nd line needs a place holder because  $\times$  by 20, not 2! Then continue to multiply by 2:  $2 \times 3$ ,  $2 \times 4$  and so on...

Add the 2 lines to finish

Long multiplication is used to multiply by 2 digit numbers.

In year 5, children will learn to multiply numbers with up to 4-digits by 2-digits.

This will continue in Year 6.

## Year 6

### 1) Short Multiplication, including decimals

Children in Year 6 will multiply numbers with decimals by a 1 digit number. Again, money is a fantastic context to use in order to introduce this skill.

$\pounds 3.19 \times 6 =$

Keep decimal points lined up

$$\begin{array}{r} 3.19 \\ \times 6 \\ \hline 19.14 \end{array}$$

start with  $6 \times 9$



# DIVISION

**Key vocabulary** share, share equally, one each, two each..., group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, 'carry', remainder, multiple, divisible by, factor quotient, prime number, prime factors, composite number (non-prime) common factor

## Year 1 and 2

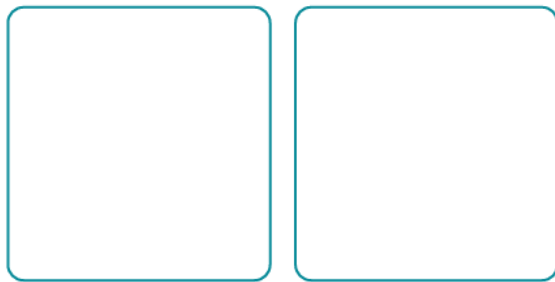
### 1) Using concrete resources to share small quantities of amounts

Jo has 12 apples.



She shares them equally into 2 boxes.

a) Show how Jo shares the apples equally.



Children will use concrete amounts to share into equal groups.

For example, to solve this problem from the White Rose Hub, children would share 12 apples into 2 equal groups of 6.

In year 1, children would not be expected to record their work as division number sentences.

b) Complete the sentences.

There are 12 apples.

There are  boxes.

There are  apples in each box.

In year 2, children would begin to record their work as division number sentences.

i.e.  $12 \div 2 = 6$

Children would also be linking arrays to division as noted above in the multiplication section.

Example of more division questions children are expected to solve by the end of year 2:

4 30 flowers are shared equally between 5 vases.



a) Complete the division.

$\div$   =

Take 20 cubes.

a) Share the cubes into 2 equal groups. Complete the sentences.

There are 20 cubes.

There are  groups.

There are  cubes in each group.

b) Share the cubes into 5 equal groups. Complete the sentences.

There are 20 cubes.

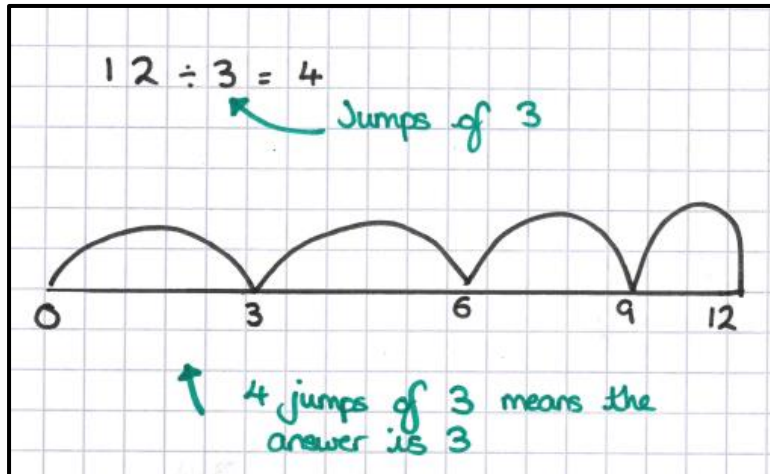
There are  groups.

There are  cubes in each group.

## Year 3

### 1) 'Chunking' on numberlines

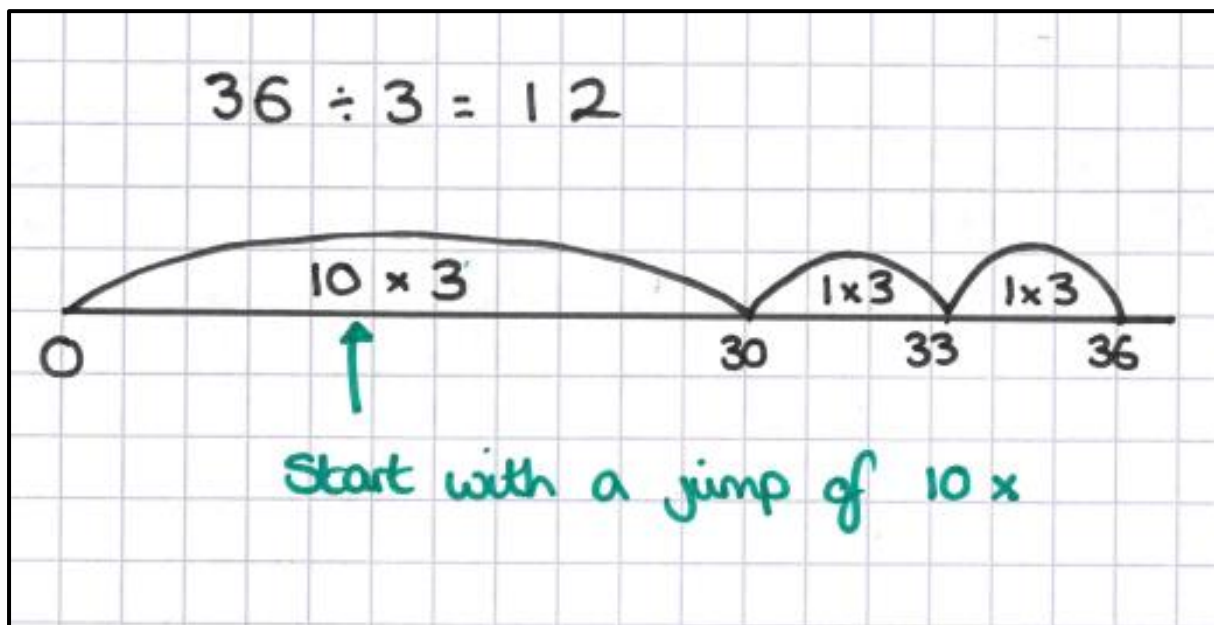
Children will begin to record division calculation using a numberline.



Starting at 0, children will count up to solve division problems.

The next step is learning to start with a jump of '10 x'

See the example below.





## 2) Partitioning method for division

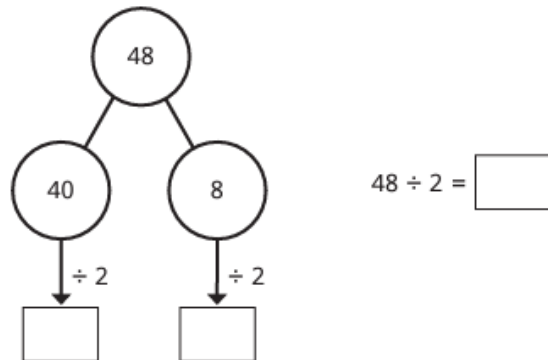
Another method children will be taught is the partitioning method for division.

In this method, larger numbers are partitioned into their tens and ones, with each part being divided.

In this example, 48 has been partitioned into 40 and 8.

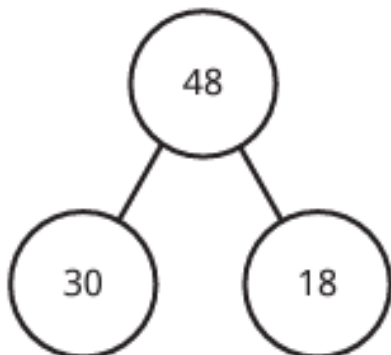
$40 \div 2 = 20$  and  $8 \div 2 = 4$ .

We then add the 20 and the 4 back together to find our answer.



Sometimes this method may need flexible partitioning.

$$48 \div 3 = \square$$



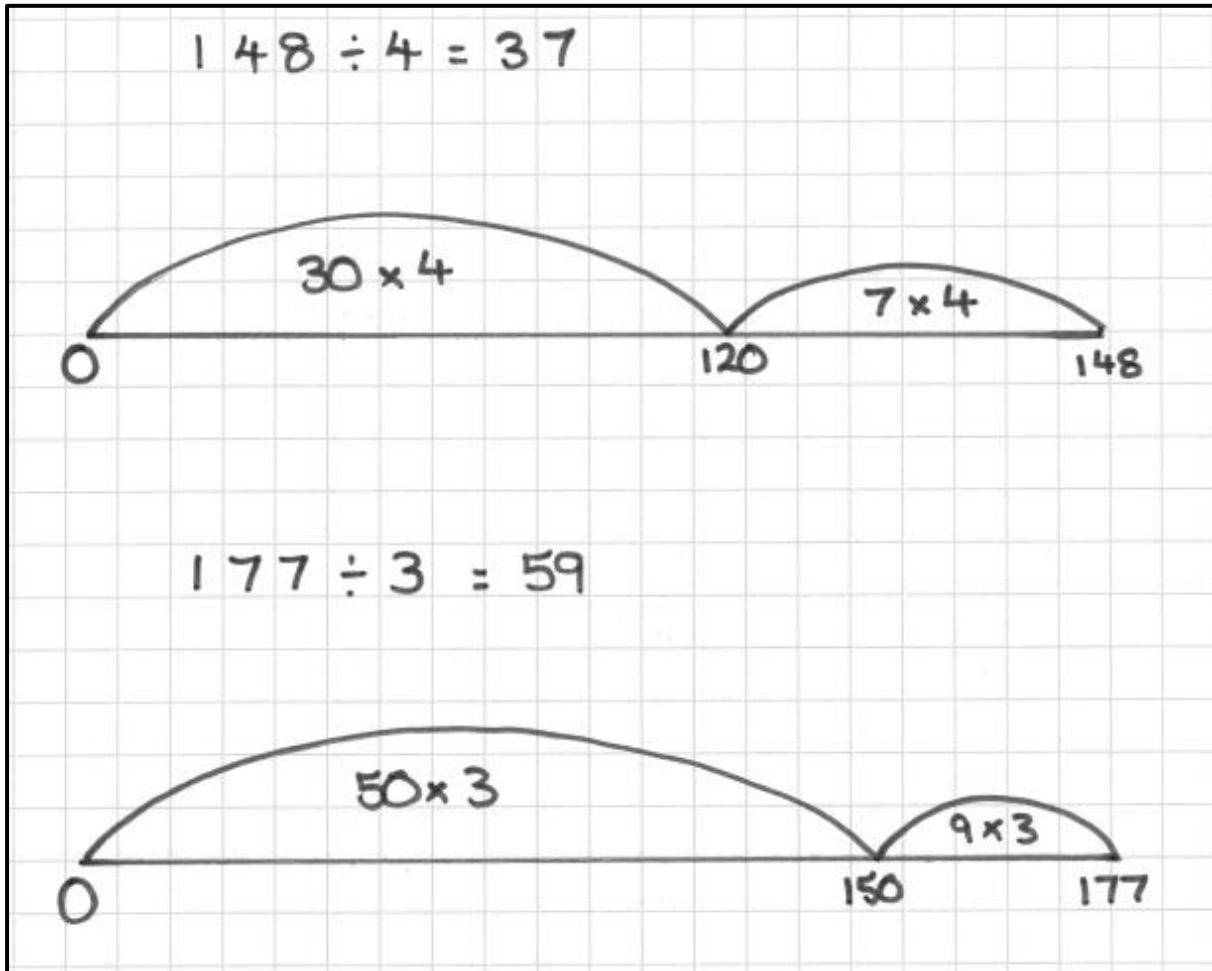
In this example, 48 has been partitioned into 30 and 18 which are both multiples of 3.



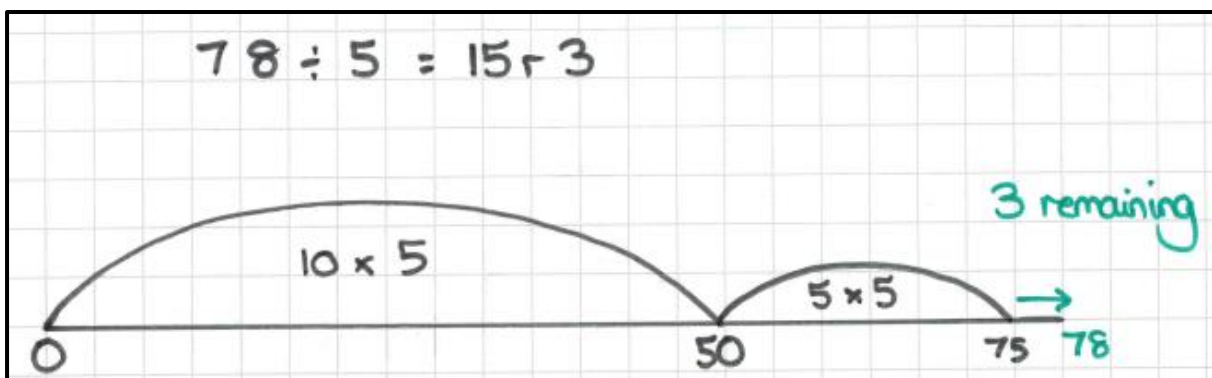
## Year 4

### 1) 'Chunking' on numberlines – continued from Year 3 (see above)

In year 4, children will be encouraged to solve problems in as few jumps as possible. This relies on a strong understanding of times tables. For example:



Remainders can also be shown on numberlines.





# Year 5

## 1) Short Division

$48 \div 2 = 24$

Both of these show there are 20 lots of 2 in 40!

Tens and units column

4 lots of 2 in 8.

Year 5 children will start to use short division (or the 'Bus Stop' method).

This is another method which relies on a rapid recall of times table facts.

In Year 5, children will divide numbers with up to 4 digits by a 1 digit number.

Another example of short division:

The only method where you start with the 'largest' column.

$292 \div 4 = 73$

$7 \times 4 = 28$

$3 \times 4 = 12$

4 does not 'go into' 2 so the 2 is carried over



Remainders can also be represented using a short division method.

$474 \div 5 =$

In Years 5 and 6, remainders may be given as fractions or decimals.  
eg:  $94\frac{4}{5}$  or  $94.8$

$5 \overline{) 474} \begin{array}{l} 94 \\ \underline{45} \\ 24 \\ \underline{20} \\ 4 \end{array}$

## Year 6

### 1) Short Division – with numbers with up to 2 decimal places.

As well as dividing whole numbers which may give decimal answers, children in Year 6 will learn to divide decimals by whole numbers.

$4.31 \div 5 = 0.862$

$5 \overline{) 4.3100}$

write in more 0s if you need to carry more →

↑  
Again, the decimal point does not move



## 2) Long Division

Finally, in Year 6 children will be taught how to divide numbers up to 4-digits by a 2-digit number. This is long division.

Long division is a simple method, but does involve many steps to complete.

To ensure children do not miss out a step, we use McDonald's burgers as a reminder!

The phrase 'Does McDonald's Serve Burgers' helps to remind children to:

- Divide
- Multiply
- Subtract
- Bring down



How to Divide!



Does

÷ (divide)

McDonald's

X (multiply)

Serve

- (subtract)

Burgers?

↓ (bring down)

Sometimes this process will have to be repeated more than once.

$3,828 \div 29$	D ✓✓ M ✓✓ S ✓✓ B ✓	Does M <sup>c</sup> Donald's Serve Burgers
$  \begin{array}{r}  132 \\  29 \overline{) 3828} \\  \underline{29} \phantom{0} \phantom{0} \phantom{0} \\  92 \phantom{0} \phantom{0} \phantom{0} \\  \underline{87} \phantom{0} \phantom{0} \phantom{0} \\  58 \phantom{0} \phantom{0} \phantom{0} \\  \underline{58} \phantom{0} \phantom{0} \phantom{0} \\  0 \phantom{0} \phantom{0} \phantom{0}  \end{array}  $	29 58 87 116 135 164 193 222	← My 29 times table. Helps to divide 29 into the number required.
0 at the bottom and no more digits to bring down. This means we are finished.		



Showing remainders using long division:

$15,702 \div 43$

$365 \text{ r } 7$

$$\begin{array}{r}
 43 \overline{) 15702} \\
 \underline{129} \phantom{0} \phantom{0} \phantom{0} \\
 280 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{258} \phantom{0} \phantom{0} \phantom{0} \\
 222 \phantom{0} \phantom{0} \phantom{0} \\
 \underline{215} \phantom{0} \phantom{0} \phantom{0} \\
 7
 \end{array}$$

D ✓✓✓  
M ✓✓✓  
S ✓✓✓  
B ✓✓

43  
86  
129 ← jottings  
172  
215  
258  
301

$365 \text{ r } 7$

or  $365 \frac{7}{43}$



## See also:

- Maths Knowledge Organisers for each Year group: documents can be downloaded listing the expected knowledge for each year group from the 'Maths' tab of the school website –use the QR code opposite!
- 'Progression in Times Tables' Document. This can also be found on the 'Maths' tab of the school website.



The only way  
to learn  
**mathematics**  
is to do  
**mathematics.**

PAUL HALMOS