Ravenbank SCHOOL

Guidance for Teaching Calculations in Mathematics

Working Together

To Achieve Success

March 2016

Introduction

This document is a statement of the aims, principles and strategies for teaching and learning of calculation strategies in Mathematics at Ravenbank Primary School.

It has been designed in accordance with the National Curriculum and helps to develop the three main aims of **Fluency, Reasoning and Problem Solving**.

The calculation guidance is organised according to age related expectations as set out in the National Curriculum. However, it is vital that pupils are taught according to the stage that they are currently working at, moving on only when they are secure.

It is important that calculations are given a **real life context** or **problem solving approach** to help build children's understanding of the purpose of the calculation and help them to recognise when to use certain operations and methods when faced with problems.

Please note that early learning teaching in number and calculations in Foundation follows the 'Development Matters' EYFS document.

Overall Aims

The aim is that by the end of Key Stage 2, the great majority of children should be able to use an efficient written method for each operation with confidence and understanding. Children will develop the ability to use what are commonly known as 'standard' written methods - methods that are efficient and work for any calculations, including those that involve whole numbers or decimals. They are compact and consequently help children to keep track of their recorded steps. Being able to use these written methods gives children an efficient set of tools they can use when they are unable to carry out the calculation in their heads. We want children to know that they have such a reliable, written method to which they can turn when the need arises.

In setting out these aims, the intention is that there will be a consistent approach to the learning of calculation strategies and that all teachers understand the progression of skills and key concepts.

The calculation guidance is organised according to age standard expectations; however, it is vital that pupils are taught accordingly the stage that they are currently working at greater depths

At Ravenbank Primary School we believe that children should be introduced to the processes of calculation through practical, oral and mental activities. As children begin to understand the underlying ideas they develop ways of recording to support their thinking and calculation methods, use particular strategies that apply to special cases, and learn to interpret and use the signs and symbols involved.

Choosing the appropriate strategy, recording in mathematics and in calculation in particular is an important tool both for furthering the understanding of ideas and for communicating those ideas to others. A formal written method is one that helps children carry out a calculation and can be understood by others.

Written methods are complementary to mental methods and should not be seen as separate from them. The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. It is important children acquire secure mental methods of calculation and explain answers explicitly. They need to develop one efficient written method of calculation for addition, subtraction, multiplication and division which they know they can rely on when mental methods are not appropriate.

By the end of Year 6, children should be able to choose an efficient method; (mental or written) that is appropriate to a given task.

This guidance contains the key pencil and paper procedures that will be taught within our school alongside practical resources when appropriate. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement.

Developmental Aims:

- ✓ To introduce children to the processes of calculation through practical, oral and mental activities.
- ✓ To support children in developing ways of recording to support their thinking and calculation methods
- ✓ Enable children to learn to interpret and use the signs and symbols.
- ✓ To facilitate children's use of models and images, such as empty number lines to support their mental and informal written methods of calculation.
- ✓ To enable children to strengthen and refine their mental methods in order to develop informal written methods.
- ✓ To support children in becoming more efficient and succinct in their recordings which will ultimately lead to efficient written methods that can be used more generally.
- ✓ By the end of Key Stage 2 children should be equipped with mental and written methods for calculation that they understand and can use correctly.
- ✓ By the end of Key Stage 2, when faced with a calculation, children will be able to decide which method is most appropriate and have strategies to check its accuracy.
- ✓ At whatever stage in their learning, and whatever method is being used, children's methods of calculating will be underpinned by a secure and appropriate knowledge of number facts, along with the mental skills that are needed to carry out the process and judge if it was successful.

The overall aims when children leave primary school are for them to:

- ✓ have a secure understanding of mental maths facts to apply to written mathematics;
- ✓ have a secure knowledge of number facts and a good understanding of the four operations
- ✓ have an efficient, reliable, compact written method of calculation for each operation that children can apply with confidence when undertaking calculations that they cannot carry out mentally;
- ✓ be able to use this knowledge and understanding to solve problems.

Good practice in Calculation

- ✓ Establish mental methods based on good understanding of place value in numbers and multiplication table facts.
- ✓ Show children how to set out written calculations vertically, initially using expanded layouts starting with adjustments of 'carrying' and introducing this adjustment slowly and systematically.
- ✓ Link practical, mental and written methods.
- ✓ Make strong links between inverse operations of additional/subtraction and multiplication/ division.
- ✓ Make sure the children always look out for special cases that can still be done entirely mentally.
- ✓ Gradually refine the written record into a more compact standard method.
- ✓ Extend to larger numbers and decimals.
- ✓ Ensure that the understanding of remainders, and what to do with them in context, is taught alongside division throughout.
- ✓ Once written methods are introduced, keep mental skills sharp by continuing to develop and apply them to appropriate examples. (Encourage children to try mental methods first).
- ✓ Encourage children to identify the best method and make choices.
- ✓ Encourage children to use tools to support their learning e.g. number lines, 100 squares, until they are secure.

Solving a Calculation

Read the question

Understand the question

Choose an operation

Solve the question

Answer the question

Check your answer

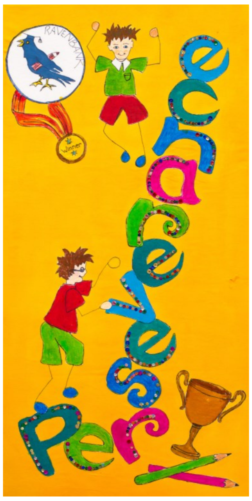
PRACTICAL ⇨	VISUAL ⇨	WRITTEN RECORDING
Using hands on resources	**Developing mental methods supported by jottings and visual images e.g. number lines.**	**Establishing written recording, moving towards more efficient methods over time.**

Mental methods of calculation

Oral and mental mathematics is essential, particularly so in calculation. Early practical, oral and mental work lays the foundations by providing children with a good understanding of how the four operations build on efficient counting strategies and a secure knowledge of place value and number facts. Later learning and skill development must ensure that children recognise how the operations relate to one another and how the rules and laws of arithmetic are to be used and applied. Ongoing oral and mental mathematics learning provides practice and consolidation of these ideas. It must give children the opportunity to apply what they have learned to particular cases, exemplifying how the rules and laws work, and to general cases where children make decisions and choices for themselves.

The ability to calculate mentally forms the basis of all methods of calculation and has to be maintained and refined. A good knowledge of numbers or a 'feel' for numbers is the product of structured practice and repetition. It requires an understanding of number patterns and relationships developed through directed enquiry, use of models and images and the application of acquired number knowledge and skills. Secure mental calculation requires the ability to:

- recall key number facts instantly - for example, all addition and subtraction facts for each number to 20 together with multiples of 10 that make 100 and doubles and halves (Year 2), multiples of 10 and 5 that make 100 (Year 3)
- recall all times tables up to 12 x 12 (by the end of year 4). Learnt as follows:
  - ◊ **Foundation** – by end of year begin counting sequences
  - ◊ **Year 1** – counting in multiples of 2, 10 and 5. By the end of year 1, children can start learning 2, 10 and 5 times tables.
  - ◊ **Year 2** – Recall 2, 10, 5 times tables. Learn 3 times tables.
  - ◊ **Year 3** – Recall 2, 10, 5, 3, times tables. Learn 4 and 8 times tables.
  - ◊ **Year 4**- Recall 2, 10, 5, 3, 4, 8 times tables. Learn 6, 7, 9, 11, 12 times tables.
- use taught strategies to work out the calculation - for example, recognise that addition can be done in any order and use this to add mentally a one-digit number or a 2 digit number to 20 (Year 1), partition two-digit numbers in different ways including into multiples of ten and one and add the tens and ones separately and then recombine (Year 2), add and subtract mentally 1, 10 and 100 to any 3 digit number.
- understand how the rules and laws of arithmetic are used and applied - for example, to add or subtract mentally combinations of one-digit and two-digit numbers (Year 3), and to calculate mentally with whole numbers and decimals (Year 6). Check calculations through use of strategies such as estimation, approximation and inverse.



Addition

Addition

Year 1 - Add with numbers up to 20

Use numbered number lines to add, by counting on in ones. Encourage children to start with the **larger** number and count on.

6+3=9

Children should:

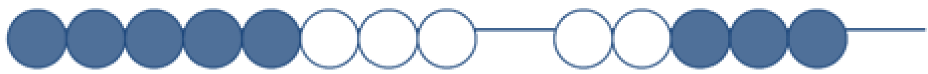
- Have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different contexts.
- Read and write the addition (+) and equals (=) signs within number sentences.
- Interpret addition number sentences and solve missing box problems, using concrete objects and number line addition to solve them:

8 + 3 = ☐ 15 + 4 = ☐ 5 + 3 + 1 = ☐ ☐ + ☐ = 6

This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.

Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

8 + 5



Key vocabulary:
add, more, plus, and, make, altogether, total, equal to, equals, double, most, count, numberline

Key skills for addition at Y1:

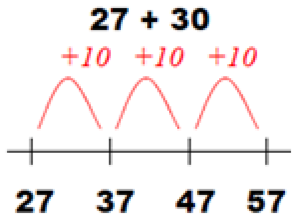
- Read and write numbers to 100 in numerals, incl. 1—20 in words
- Recall bonds to 10 and 20, and addition facts within 20
- Count to and across 100
- Count in multiples of 1 2, 5 and 10
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

Addition

Year 2 - Add with 2-digit numbers

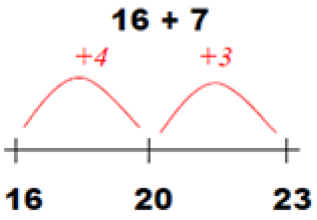
Developing mental fluency with addition and place value involving 2-digit numbers, then establish more formal methods.

Add 2-digit numbers and tens:



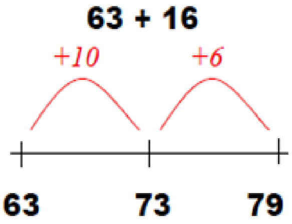
Add 2-digit numbers and units:

Use empty number lines, concrete equipment, hundred squares etc. to build confidence and fluency in mental addition skills



Add pairs of 2-digit numbers, moving to the partitioned column method when secure adding tens and units:

STEP 1: Only provide examples that do not cross the tens boundary until they are secure with the method itself.



23 + 34:

	2	0	+	3	
+	3	0	+	4	
	5	0	+	7	
			=	5	7

STEP 2: Once children can add a multiple of ten to a 2-digit number mentally (e.g. 80+11), they are ready for adding pairs of 2-digit numbers that DO cross the tens boundary (e.g. 58 + 43).

58 + 43:

5	0	+	8	
4	0	+	3	
9	0	+ 1	1	
		=1	0	1

STEP 3: Children who are confident and accurate with this stage should move onto the expanded addition methods with 2 and 3-digit numbers (see Y3).

To support understanding, pupils may physically make and carry out the calculation with Dienes Base 10 apparatus or place value counters, then compare their practical version to the written form, to help them to build an understanding of it.

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*

Key skills for addition at Y2:

- Add a 2-digit number and ones (e.g. 27 + 6)
- Add a 2-digit number and tens (e.g. 23 + 40)
- Add pairs of 2-digit numbers (e.g. 35 + 47)
- Add three single-digit numbers (e.g. 5 + 9 + 7)
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 (30 + 70 etc.)
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using < > and = signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.

Addition

Year 3 - Add numbers with up to 3-digits.
Introduce the expanded column addition methods:

	2	3	6
+		7	3
			9
	1	0	0
	2	0	0
	3	0	9

Add the units first, in preparation for the compact method.

In order to carry out this method of addition:

- **Children need to recognise the value of the hundreds, tens and units without recording the partitioning.**
- **Pupils need to be able to add in columns.**

MOVE TO THE COMPACT COLUMN ADDITION METHOD, WITH 'CARRYING':

Add units first

$$\begin{array}{r} 236 \\ +\ \ 73 \\ \hline 309 \\ \hline 1\ \ \ \end{array}$$

'Carry' numbers underneath the bottom line

Children who are very secure and confident with 3-digit expanded column addition should be moved onto the **compact column addition** method, being introduced to 'carrying' for the first time. Compare the expanded method to the compact column method to develop an understanding of the process and the reduced number of steps involved.

Remind pupils the actual value is '**three tens** add **seven tens'**, not 'three add seven', which equals **ten** tens

Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact*

Key skills for addition at Y3:

- Read and write numbers to 1000 in numerals and words.
- Add 2-digit numbers mentally, incl. those exceeding 100.
- **Add a three-digit number and ones mentally (175 + 8)**
- **Add a three-digit number and tens mentally (249 + 50)**
- **Add a three-digit number and hundreds mentally (381 + 400)**
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using
- number facts, place value, and more complex addition.
- Recognise place value of each digit in 3-digit numbers (hundreds, tens, ones.)
- Continue to practice a wide range of mental addition strategies, i.e. number bonds, adding the nearest multiple of 10, 100, 100 and adjusting, using near doubles, partitioning and recombining.

Addition

Year 4 - Add numbers with up to 4 digits.
Move from expanded addition to the compact column method, adding units first, and 'carrying' numbers underneath the calculation. Also include money and measure contexts.

e.g. 3517 + 396 = 3913

$$\begin{array}{r} 3517 \\ +\ \ 396 \\ \hline 3913 \\ \hline {\scriptstyle 1\,1\ } \end{array}$$

Add units first

'Carry' numbers underneath the bottom line

Introduce the compact column addition method by asking children to add the two given numbers together using the method that they are familiar with (expanded column addition - see Y3). Teacher models the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.

Reinforce correct place value by reminding them the actual value is 5 hundreds add 3 hundreds, not 5 and 3, for example

Use and apply this method to money and measurement values.

Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, „carry", expanded, compact, thousands, hundreds, digits, inverse*

Key skills for addition at Y4:

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practice a wide range of mental addition strategies, i.e. number bonds, add the nearest multiple of 10, 100, 1000 and adjust, use near doubles, partitioning and recombining.
- Add numbers with up to 4 digits using the formal written method of column addition
- Solve 2-step problems in contexts, deciding which operations and methods to use and why.
- Estimate and use inverse operations to check answers to a calculation.

Addition

Add numbers with more than 4 digits.

Including money, measures and decimals with different numbers of decimal places.

£23.59
+ £7.55
£31.14

The decimal point should be aligned in the same way as the other place value columns, and must be in the same column in the answer.

Numbers should exceed 4 digits —>

23481
+ 1362
24843

19.01
3.65
+ 0.70
23.36

Pupils should be able to add more than two values, carefully aligning place value columns.

Empty decimal places can be filled with zero to show the place value in each column.

Say '6 tenths add 7 tenths' to reinforce place value.

Children should:

- Understand the place value of **tenths and hundredths** and use this to align numbers with different numbers of decimal places.

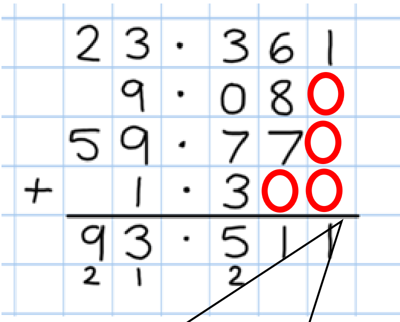
Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, „carry", expanded, compact, vertical, thousands, hundreds, digits, inverse & decimal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

Key skills for addition at Y5:

- Add numbers mentally with increasingly large numbers, using and practicing a range of mental strategies i.e. add the nearest multiple of 10, 100, 100 and adjust; use near doubles, inverse, partitioning and
- re-combining; using number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in contexts, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1 000 000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using formal written method of columnar addition.

Add several numbers of increasing complexity.

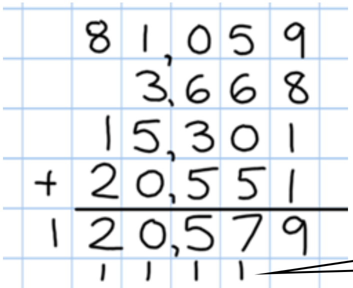
Addition



Adding several numbers with different numbers of decimal places (including money and measures):

- Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.
- Zeros could be added into any empty decimal places, to show there is not value to add.

Empty decimal places can be filled with zero to show the place value in each column



Adding several numbers with more than 4 digits.

Position of subscripts is flexible

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

Key skills for addition at Y6:

- Perform mental calculations, including with mixed operations and large numbers, using and practicing a range of mental strategies.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers up to 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.

Subtraction

Subtraction

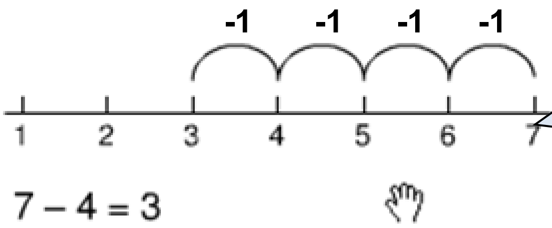
Subtract from numbers up to 20

Children consolidate understanding of subtraction practically, showing subtraction on bead strings, using cubes etc. and in familiar contexts, and are introduced to more formal recording using number line as below:

Read, Write and interpret number sentences with - and = signs

SUBTRACT BY TAKING AWAY

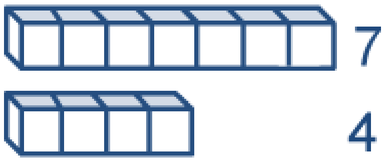
Count back in ones on a numbered number line to take away, with numbers up to 20:



Model subtraction using hundred squares and numbered number lines/ tracks and practically.

FIND THE 'DISTANCE BETWEEN'

This will be introduced practically with the language '**find the distance between**' **and 'how many more?'** in a range of familiar contexts.



'Seven is 3 more than four'

'I am 2 years older than my sister'

MENTAL SUBTRACTION

Children should start recalling subtraction facts up to and within 10 and 20, and should be able to subtract zero.

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 _?*

Key skills for subtraction at Y1:

- Given a number, say **one more or one less.**
- Count to and over 100, **forward and back**, from any number.
- Represent and use **subtraction facts to 20 and within 20**.
- Subtract with **one-digit and two-digit** numbers to 20, including zero.
- Solve one-step problems that involve addition and subtraction, using concrete objects (i.e. bead string, objects, cubes) and pictures, and missing number problems.
- Read and write numbers from 0 to 20 in numerals and words.

Subtract with 2-digit numbers

Subtraction

Use Dienes blocks for subtraction calculations too.

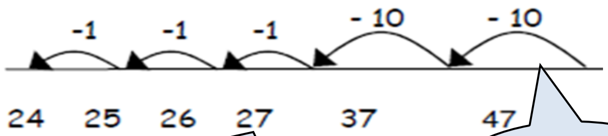
Subtract on a number line by counting back, aiming to develop mental subtraction skills.

This strategy will be used for:

- **2-digit numbers subtract units** (by taking away/counting back) e.g. 36-7
- **2-digit numbers subtract tens** (by taking away/counting back) e.g. 48-30
- **Subtracting pairs of 2-digit numbers** (see below:)

Subtracting pairs of 2-digit numbers on a number line:

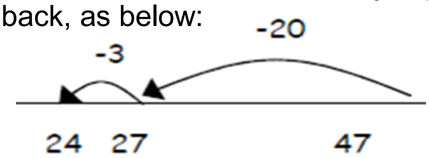
47 - 23 = 24 Partition the second number and subtract it in tens and units, as below:



Then subtract units.

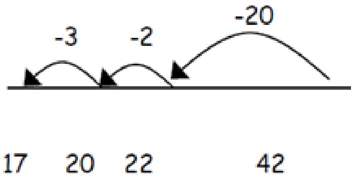
Subtract tens first.

Move towards more efficient jumps back, as below:



Combine methods with use of a hundred square to reinforce understanding number value and order.

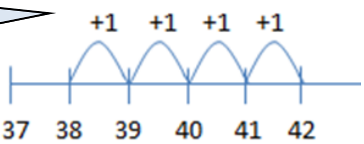
Teaching children to **bridge through ten** can help them to become more efficient, for example 42-25:



Mental strategy - subtract numbers close together by **counting on**:

Start with the smaller number and count on to the largest.

42 – 38 = 4



Many mental strategies are taught. Children are taught to recognize that when numbers are close together, it is more efficient to count on the difference. They need to be clear about the relationship between addition and 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*

Key skills for subtraction at Y2:

- Recognise the place value of each digit in a two-digit number.
- Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Subtract using concrete objects, pictorial representations, 100 squares and mentally, including: a two-digit number and ones, a two-digit number and tens, and two two-digit numbers.
- Show that subtraction of one number from another cannot be done in any order.
- Recognise and use inverse relationship between addition and subtraction, using this to check calculations and missing number problems.
- Solve simple addition and subtraction problems including measures, using concrete objects, pictorial representation, and also applying their increasing knowledge of mental and written methods.
- Read and write numbers to at least 100 in numerals and in words.

Subtracting with 2 and 3-digit numbers.

Introduce **partitioned column subtraction** method.

Subtraction

STEP 1: introduce this method with examples where **no exchanging** is required.

89 – 35 = 54

80 + 9

<u>- 30 + 5</u>

50 + 4

When learning to 'exchange' explore 'partitioning in different ways' so that pupils understand that when you exchange, the VALUE is the same i.e. 72 =70+2 = 60+12 = 50+22 etc. Emphasise that the value hasn't changed, we have just partitioned it in a different way.

STEP 2: introduce 'exchanging' through practical subtraction. Make the larger number with Base 10, then subtract 47 from it.

72 - 47

60

~~70~~ + 2

- 40 + 7

20 + 5 = **<u>25</u>**

Before subtracting '7' from the 72 blocks, they will need to exchange a row of 10 for ten units. Then subtract 7, and subtract 4 tens.

STEP 3: Once pupils are secure with the understanding of 'exchanging' they can use the partitioned column method to subtract any 2 and 3-digit numbers.

2 3 8 - 1 4 6 = 9 2

1 0 0

~~2 0 0~~ + ¹3 0 + 8

- 1 0 0 + 4 0 + 6

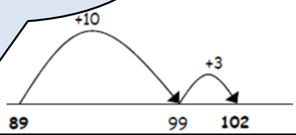
0 + 9 0 + 2

Subtracting money: partition into e.g. £1 + 30p = 8p

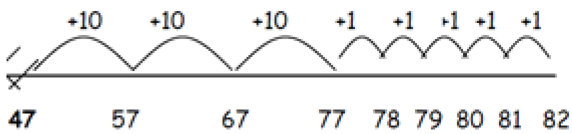
Counting on as a mental strategy for subtraction:

Continue to reinforce counting on as a strategy for close-together numbers (e.g. 121-118), and also for numbers that are 'nearly' multiples of 10, 100, 10000 or £s, which make it easier to count on (e.g. 102-89, 131-79, or calculating change from £1 etc.)

Because counting on in tens is the way we use a 100 square



Start at the smaller number and count on in tens first, then count on in units to find the rest of the difference:



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 exchange, decrease, hundreds, value, digit

Key skills for subtraction at Y3:

- Subtract mentally a: **3-digit number and ones, 3-digit number and tens, 3-digit number and hundreds** .
- Estimate answers and use inverse operations to check.
- Solve problems, including missing number problems.
- Find 10 or 100 more or less than a given number.
- Recognise the place value of each digit in a 3-digit number .
- Counting up differences as a mental strategy when numbers are close together or near multiples
- of 10 (see examples above)
- Read and write numbers up to 1000 in numerals and words.
- Practise mental subtraction strategies, such as subtracting near multiples of 10 and adjusting (e.g. subtracting 19 or
- 21), and select most appropriate methods to subtract, explaining why.

Subtract with up to 4-digit numbers

Partitioned column subtraction with 'exchanging' (decomposition)

Subtraction

$2754 - 1562 = 1192$

$$\begin{array}{r} 2000 + \overset{600}{\cancel{700}} + {}^{1}50 + 4 \\ -\ 1000 + 500 + 60 + 2 \\ \hline 1000 + 100 + 90 + 2 \end{array}$$

As introduced in Y3, but moving towards more complex numbers and values. Use place value counters to reinforce 'exchanging'

Subtracting money: partition into £1 + 30 + 5 for example.

Compact column subtraction

$$\begin{array}{r} 2\,\overset{6}{\cancel{7}}\,{}^{1}5\,4 \\ -\ 1\,5\,6\,2 \\ \hline 1\,1\,9\,2 \end{array}$$

To introduce the compact method, ask children to perform a subtraction calculation with the familiar partitioned column subtraction then display the compact version for the calculation they have done. Ask pupils to consider how it relates to the method they know, what is similar and what is different, to develop an understanding of it

Give plenty of opportunities to apply this to money and measures.

Always encourage children to consider the best method for the numbers involved - mental, counting on, counting back or written method .

Mental Strategies
A variety of mental strategies must be taught and practiced, including counting on to find the difference where numbers are closer together, or where it is easier to count on

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 exchange, decrease, hundreds, value, digit, inverse

Key skills for subtraction at Y4:

- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, choosing which operations and methods to use and why.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.
- Find 1000 more or less than a given number.
- Count backwards through zero, including negative numbers.
- Recognise place value of each digit in a 4-digit number Round any number to the nearest 10, 100 or 1000
- Solve number and practical problems that involve the above, with increasingly large positive numbers.

Subtract with at least 4-digit numbers
Including money, measures, decimals

Subtraction

Compact column subtraction

(with 'exchanging')

	$^{2}\cancel{3}$	$^{10}\cancel{1}$	$^{1}0$	$^{4}\cancel{5}$	$^{1}6$
−		2	1	2	8
	2	8,	9	2	8

Children who are still not secure with number facts and place value will need to remain on the partitioned column method until ready for the compact method.

Subtracting with larger integers.

	$^{6}\cancel{7}$	$^{10}\cancel{1}$	$^{1}6$	$^{8}\cancel{9}$	.	$^{1}0$
−		3	7	2	.	5
	6	7	9	6	.	5

Subtract with decimal values, including mixtures of integers and decimals, aligning the decimal point

Add a ' zero' in any empty decimal places to aid understanding of what to subtract in that column.

Create lots of opportunities for subtracting and finding differences with money and measures

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 exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Y5:

- Subtract numbers mentally with increasingly large numbers .
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy .
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Count forwards or backwards in steps of powers of 10 for any given number up to 1 million.
- Interpret negative numbers in context, counting forwards and backwards with positive and negative integers through 0.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10 000 and 100 000.

Subtracting with increasingly large and more complex numbers and decimal values.

Subtraction

	$^{0}\cancel{1}$	$^{14}\cancel{5}$	$\overset{9}{\cancel{10}}$,	$^{1}6$	9	9
−		8	9,	9	4	9
		6	0,	7	5	0

Using the compact column method to subtract more complex integers.

	$^{0}\cancel{1}$	$\cancel{10}$	$^{1}5$	·	$^{3}\cancel{4}$	$^{1}1$	9 kg
−		3	6	·	0	8	0 kg
		6	9	·	3	3	9 kg

Using the compact column method to subtract money and measures, including decimals with different numbers of decimal places.

Empty decimal places can be filled with **zero** to show the place value in each column.

Pupils should be able to apply their knowledge of a range of mental strategies, mental recall skills and informal and formal written methods when selecting the most appropriate method to work out subtraction problems.

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 exchange, decrease, hundreds, value, digit, inverse, tenths, hundredths, decimal point, decimal

Key skills for subtraction at Y6:

- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers up to 10 million 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 zero.
- Children need to utilise and consider a range of mental subtraction strategies, jottings and written methods before choosing how to calculate.

Multiplication

Multiply with concrete objects, arrays and pictorial representations.

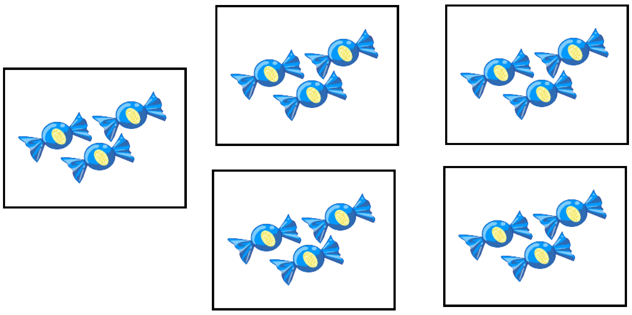
Multiplication

How many legs will 3 Rockys have?

2 + 2 + 2 + = 6

There are 3 sweets in one bag. How many sweets are in 5 bags altogether?

3+3+3+3+3+= 15



- Give children experience of counting equal group of objects in 2s, 5s and 10s.
- Present practical problem solving activities involving counting equal sets or groups, as above.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count

Key skills for multiplication at Y1:

- Count in multiples of 2, 5 and 10.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects,
- pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in twos, fives and tens.
- Begin to understand doubling using concrete objects and pictorial representations.

Multiply using arrays and repeated addition (using at least 2s, 5s and 10s)

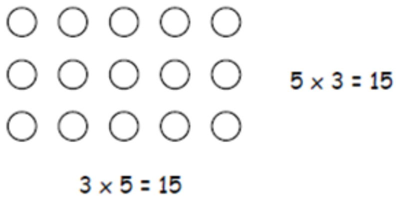
Multiplication

Use repeated addition on a number line:

Starting from zero, make equal jumps on a number line to work out multiplication facts and write multiplication statements using x and = signs

4 X 5 = 20

Use arrays:



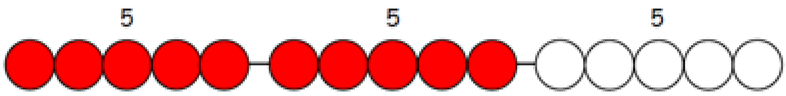
5 x 3 = 3 + 3 + 3 + 3=15

3 x 5 = 5 + 5 + 5 = 15

Use arrays to help teach children to understand the commutative law of multiplication, and give examples such as 3 x _____ = 6.

Use practical apparatus:

5 x 3 = 5 + 5 + 5



Use mental recall:

- Children should begin to recall multiplication facts for 2, 5 and 10 times tables through practice in counting and understanding of the operation.

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times as big as, once, twice, three times...

Key skills for multiplication at Y2:

- Count in steps of 2, 3 and 5 from zero, and in 10s from any number.
- Recall and use multiplication facts from the **2, 5 and 10** multiplication tables, including recognising odds
- and evens.
- Write and calculate number statements **using the x and = signs**.
- Show that multiplication can be done in any order (commutative).
- Solve a range of problems involving multiplication, using concrete objects, arrays, repeated addition,
- mental methods, and multiplication facts.
- Pupils use a variety of language to discuss and describe multiplication.

Multiply 2-digits by a single digit number

Multiplication

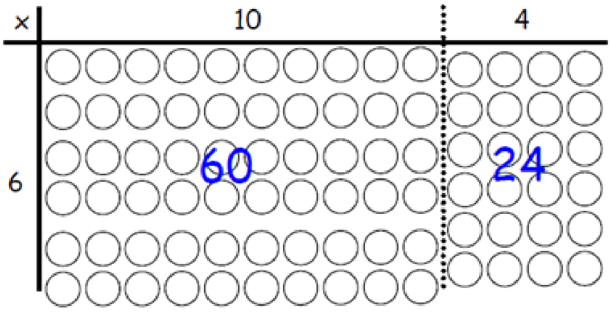
Introduce the grid method for multiplying 2-digit by single-digits:

Link the layout of the grid to an array initially:

Eg. 23 x 8 = 184

X	20	3
8	160	24

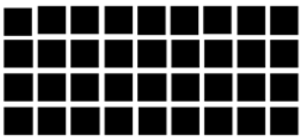
160 + 24 = 184



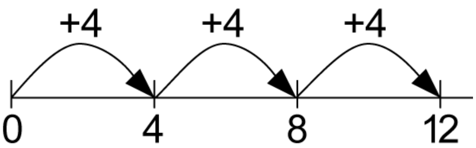
Introduce the grid method with children physically making an array to represent the calculation (e.g. make 8 lots of 23 with 10s and 1s place value counters), then translate this to grid method format .

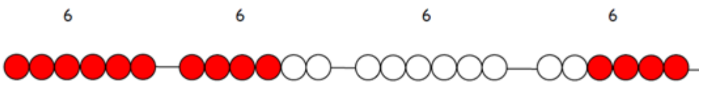
To do this, children must be able to:

- Partition numbers into tens and units
- Multiply multiples of ten by a single digit (e.g. 20 x 4) using their knowledge of multiplication facts and place value.
- Recall and work out multiplication facts in the 2, 3, 4, 5, 8 and 10 timetables.
- Work out multiplication facts not known by repeated addition or other taught mental strategies (e.g. by commutative law, working out near multiples and adjusting using doubling etc.) Strategies to support this are repeated addition using a number line, bead bars and arrays:



9 x 4 = 36





Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, column, row, commutative, sets of, equal groups, times, _times as big as, once, twice, three times...,
partition, grid method, multiple, product, tens, units, value

Key skills for multiplication:

- Recall and use multiplication facts for the **2, 3, 4, 5, 8 and 10** multiplication tables, and multiply
- multiples of 10.
- Write and calculate number statements using the multiplication tables they know, including **2-digit x single-digit**, drawing upon mental methods, and progressing to reliable written methods.
- Solve multiplication problems, including missing number problems.
- Develop mental strategies using commutativity (e.g. 4 x 12 x 5 = 4 x 5 x 12 = 20 x 12 = 240)
- Solve simple problems in contexts, deciding which operations and methods to use.
- Develop efficient mental methods to solve a range of problems e.g using commutativity (**4 × 12 × 5** = 4 × 5 × 12 **= 20 × 12** = 240) and for missing number problems ? x 5 = 20, 3 x ? = ?, x ?= 32

Multiplication

Multiply 2 and 3-digits by a single digit, using all multiplication tables up to 12 x 12

Developing the grid method:

Eg. 136 x 5 = 680

X	100	30	6
5	500	150	30

$$\begin{array}{r} 500 \\ 150 \\ +\ \ 30 \\ \hline 680 \end{array}$$

Encourage column addition to add accurately.

Move onto short multiplication (see Y5) if and when children are confident and accurate multiplying 2 and 3-digit numbers by a single digit this way and are already confident in 'carrying' for written addition.

Children should be able to:

- Approximate before they calculate, and make this a regular part of their calculating, going back to the approximation to check the reasonableness of their answer e.g.:
  "346 x 9 is approximately 350 x 10 = 3500"
  Record an approximation to check the final answer against
- Multiply multiples of ten and one hundred by a single-digit, using their multiplication table knowledge.
- Recall all times tables up to 12 x 12

Key vocabulary: groups of, lots of, times, array, altogether, multiply, count, multiplied by, repeated addition, array, column, row, commutative, groups of, sets of, lots of, equal groups, times, multiply, times as big as, once, twice, three times... partition, grid method, total, multiple, product, sets of, inverse

Key skills for multiplication at Y4:

- Count in multiples of 6, 7, 9, 25 and 1000
- Recall multiplication facts for **all multiplication tables up to 12 x 12.**
- Recognise place value of digits in up to 4-digit numbers
- Use place value, known facts and derived facts to multiply mentally, e.g. multiply by 1, 10, 100, by 0, or to
- multiply 3 numbers.
- Use commutativity and other strategies mentally 3 x 6 = 6 x 3 , 2 x 6 x 5 = 10 x 6 , 39x7 = 30 x 7 + 9 x 7.
- Solve problems with increasingly complex multiplication in a range of contexts.
- Count in multiples of 6, 7, 9, 25 and 1000
- Recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)

Multiply up to 4-digits by 1 or 2 digits.

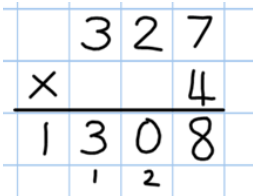
Multiplication

Introducing column multiplication

- Introduce by comparing a grid method calculation to a short multiplication method to see how the steps are related, but notice now there are less steps involved in the column method.
- Children need to be taught to approximate first, e.g. for 72 x 38, they will use rounding: 72 x 38 is approximately 70 x 40 = 2800, and use the approximation to check the reasonableness of their answer against.

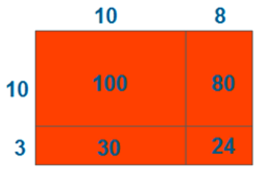
Short multiplication for multiplying by a single digit

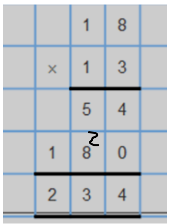
x	300	20	7
4	1200	80	28



Pupils could be asked to work out a given calculation using the grid, and then compare it to 'your' column method. What are the similarities and differences? Unpick the steps and show how it reduces the steps.

Introduce long multiplication for multiplying by 2 digits

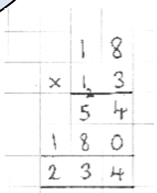


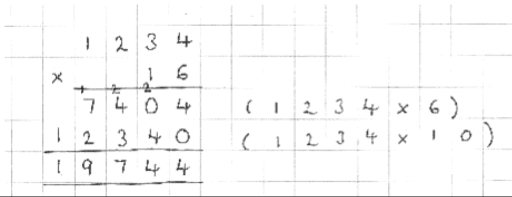


18 x 3 on the 1st row (8 x 3 = 24, carrying the 2 for twenty, then 1 x 3).
18 x 10 on the 2nd row. Put a zero in units first, then say 8 x 1, and 1 x 1

The grid could be used to introduce long multiplication, as the relationship can be seen in the answers in each row.

Moving towards more complex numbers:





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

Key skills for multiplication at Y5:

Identify multiples and factors, using knowledge of **multiplication tables to 12x12.**

Solve problems where larger numbers are decomposed into their factors

Multiply and divide integers and decimals by 10, 100 and 1000

Recognise and use square and cube numbers and their notation

Solve problems involving combinations of operations, choosing and using calculations and methods appropriately

Multiplication

Short and long multiplication as in Y5, and multiply decimals with up to 2d.p by a single digit.

Line up the decimal points in the question and the answer

$$\begin{array}{rrrrr} & 3 & \cdot & 1 & 9 \\ \times & & & & 8 \\ \hline 2 & 5 & \cdot & 5 & 2 \\ & {\scriptstyle 1} & & {\scriptstyle 7} & \end{array}$$

This works well for multiplying money (£.p) and other measures.

Position of subscript is flexible.

(Children are also shown multiplication without a decimal point and adjust answers according to place value)

Children will be able to:

- Use rounding and place value to make approximations before calculating and use these to check answers against.
- Use short multiplication (see Y5) to multiply numbers with more than 4-digits by a single digit; to multiply money and measures and to multiply decimals with up to 2d.p. by a single digit.
- Use long multiplication (see Y5) to multiply numbers with at least 4 digits by a 2-digit number.

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

Key skills for multiplication at Y6:

- Recall multiplication facts for all times tables up to **12 x 12 (as Y4 and Y5).**
- Multiply multi-digit numbers, up to 4-digit x 2-digit using long multiplication.
- Perform mental calculations with mixed operations and large numbers.
- Solve multi-step problems in a range of contexts, choosing appropriate combinations of operations and methods.
- Estimate answers using round and approximation and determine levels of accuracy.
- Round any integer to a required degree of accuracy.

Division

Group and share small quantities

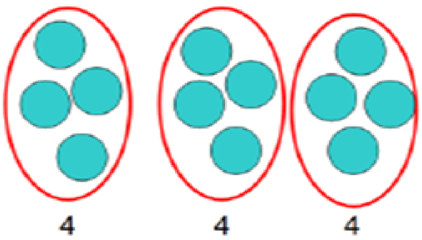
Using objects, diagrams and pictorial representations to solve problems involving both grouping and sharing

Division

How many groups of 4 can be made with 12 stars? = 3

Grouping:

Sharing:



12 shared between 3 is 4

Example division problem in a familiar context:

There are 6 pupils on this table and there are 18 pieces of fruit to share between us. If we share them equally, how many will we each get?

Can they work it out and give a division statement… ?
"18 shared between 6 people gives you 3 each"

Pupils should:

- Use lots of practical apparatus, arrays and picture representations
- Be taught to understand the difference between 'grouping' objects (How many groups of 2 can you make?) and 'sharing' (Share these sweets between 2 people)
- Be able to count in multiples of 2s, 5s and 10s.
- Find half of a group of objects by sharing into 2 equal groups.

Key Vocabulary: **share, share equally, one each, two each…, group, groups of, lots of, array**

Key number skills needed for division at Y1:

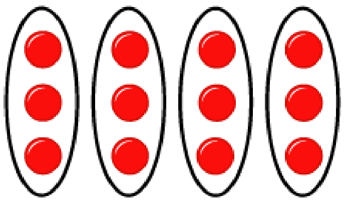
- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations arrays with the support of the teacher
- Through grouping and sharing small quantities, pupils begin to understand, division, and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

Division

Group and share, using the ÷ and = sign

Use objects, arrays, diagrams and pictorial representations, and grouping on a number line.

Arrays:



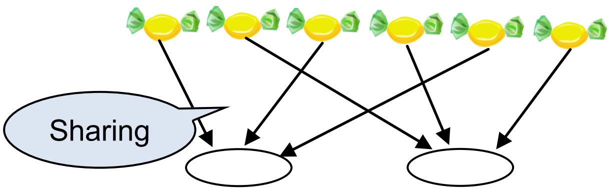
$12 \div 3 = 4$

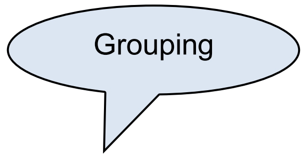
This represents 12 ÷ 3, posed as how many groups of 3 are in 12?

Pupils should also show that the same array can represent 12 ÷ 4 = 3 if grouped horizontally.

Know and understand sharing and grouping:

6 sweets shared between 2 people, how many do they each get?



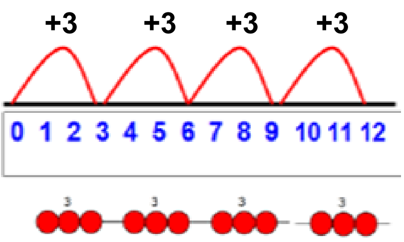


There are 6 sweets, how many people can have 2 sweets each?

Children should be taught to recognise whether problems require sharing or grouping.

Grouping using a number line:

Group from zero in equal jumps of the divisor to find out 'how many groups of _ in _?'. Pupils could and using a bead string or practical apparatus to work out problems like 'A CD costs £3. How many CDs can I buy with £12?' This is an important method to develop understanding of division as grouping.



Pose 12 ÷ 3 as 'How many groups of 3 are in 12?'

$12 \div 3 = 4$

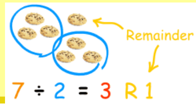
Key Vocabulary: **share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over**

Key number skills needed for division at Y2:

Count in steps of 2, 3, and 5 from 0

- Recall and use multiplication and division facts for the **2, 5 and 10** multiplication tables, including recognising odd and even numbers.
- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the x, ÷ and = signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot.
- Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.

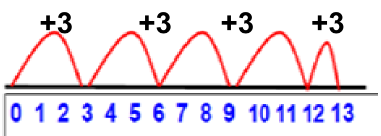
Divide 2-digit numbers by a single digit (where there is no remainder in the final answer)



Division

Grouping on a number line:

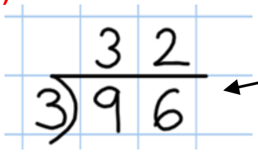
13 ÷ 3 = 4 r 1



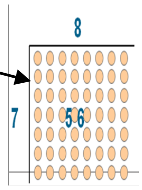
STEP 1: Children continue to work out unknown division facts by grouping on a number line from zero. They are also now taught the concept of **remainders,** as in the example. This should be introduced practically and with arrays, as well as being translated to a number line. Children should work towards calculating some basic division facts with remainders mentally for the 2s, 3s, 4s, 5s, 8s and 10s, ready for 'carrying' remainders across within the short division method.

Real life contexts need to be used routinely to help pupils gain a full understanding, and the ability to recognise the place of division and how to apply it to problems.

Short division: Limit numbers to NO remainders in the answer OR carried (each digit must be a multiple of the divisor).



STEP 2: Once children are secure with division as grouping and demonstrate this using number lines, arrays etc., **short division** for larger 2-digit numbers should be introduced, initially with carefully selected examples requiring no calculating of remainders at all. Start by introducing the layout of short division by comparing it to an array.

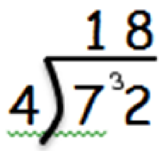


Remind children of correct place value, that 96 is equal to 90 and 6, but in short division, pose:

- How many 3's in 9? = 3, and record it above the **9 tens.**
- How many 3's in 6? = 2, and record it above the **6 units**.

Short division: Limit numbers to NO remainders in the final answer, but with remainders occurring within the

Step 3 Only taught when pupils can calculate 'remainders;



STEP 3: Once children demonstrate a full understanding of remainders, and also the short division method taught, they can be taught how to use the method when remainders occur within the calculation (e.g. 96†4), and be taught to 'carry' the remainder onto the next digit. **If needed, children should use the number line to work out individual division facts that occur which they are not yet able to recall mentally.**

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

Key number skills needed for division at Y3:

- Recall and use multiplication and division facts for the 2, 3, 4, 5, 8 and 10 multiplication tables (through doubling, connect the 2, 4 and 8s).
- 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.
- Solve problems, in contexts, and including missing number problems, involving multiplication and division.
- Pupils develop efficient mental methods, for example, using multiplication and division facts (e.g. using 3 × 2 = 6, 6 ÷ 3 = 2 and 2 = 6 ÷ 3) to derive related facts (30 × 2 = 60, so 60 ÷ 3 = 20 and 20 = 60 ÷ 3).
- Pupils develop reliable written methods for division, starting with calculations of 2-digit numbers by 1-digit numbers and progressing to the formal written method of short division.

Divide up to 3-digit numbers by a single digit (without remainders initially)

Division

Short division should only be taught once children have secured the skill of calculating ‘remainders’.

Continue to develop short division:

$$\begin{array}{r} 1\;8 \\ 4\overline{)7\,^{3}2} \end{array}$$

STEP 1: **Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (these those that do not result in a final remainder—see steps in Y3), but must understand how to calculate remainders, using this to ‘carry’ remainders within the calculation process (see example).**

$$\begin{array}{r} 2\;1\;8 \\ 4\overline{)8\;7\,^{3}2} \end{array}$$

STEP 2: **Pupils move into dividing numbers with up to 3-digits by a single digit, however problems and calculations provided should not result in a final answer with remainder at this stage. Children who exceed this expectation may progress to Y5 level.**

$$\begin{array}{r} 0\;3\;7 \\ 5\overline{)1\;8\,^{3}5} \end{array}$$

When the answer for the first column is zero (1 ÷ 5, as in example), children could initially write a zero above to acknowledge its place, and must always ‘carry’ the number (1) over to the next digit as a remainder.

Real life contexts need to be used routinely to help pupils gain a full understanding, and the ability to recognise the place of division and how to apply it to problems.

Include money and measure contexts when confident

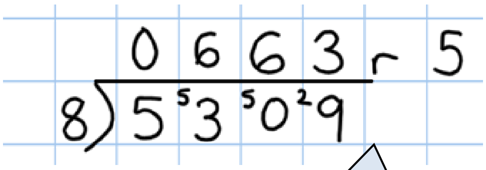
Key Vocabulary: **share, share equally, one each, two each…, group, equal groups of, lots of, array, divide, divided by, divided into, division, grouping, number line, left, left over, inverse, short division, ‘carry’, remainder, multiple, divisible by, factor**

- **Key number skills needed for division at Y4:**
- **Recall multiplication and division facts for all numbers up to 12 x 12.**
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying and dividing by 10 and 100 and 1.
- Pupils practise to become fluent in the formal written method of short division with exact answers when dividing by a one-digit number
- Pupils practise mental methods and extend this to three-digit numbers to derive facts, for example 200 × 3 = 600 so 600 ÷ 3 = 200
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as three cakes shared equally between 10 children.

Divide up to 4 digits by a single digit, including those with remainders.

Division

Short division, including remainder answers:



Short division with remainders: Now that pupils are introduced to examples that give rise to remainder answers, division needs to have a real life problem solving context, where pupils consider the meaning of the remainder and how to express it, i.e. As a fraction, a decimal, or as a rounded number or value, depending upon the context of the problem.

The answer to 5309 ÷ 8 could be expressed as 663 and five eighths, 663 r 5, as a decimal, or rounded as appropriate to the problem involved.

See Y6 for how to continue the short division to give a decimal answer for children who are confident.

Include money and measure contexts.

If children are confident and accurate:

- Introduce long division for pupils who are ready to divide any number by a 2 digit number (e.g. 2678 ÷ 19). This is a Year 6 expectation

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, inverse, quotient, prime number, prime factors, composite number (non-prime)**

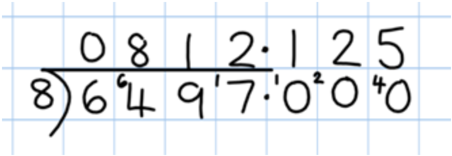
Key number skills needed for division at Y5:

- Recall multiplication and division facts for all numbers up to 12 x 12 (as in Y4).
- Multiply and divide numbers mentally, drawing upon known facts.
- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two number.
- Solve problems involving multiplication and division where larger numbers are decomposed into their factors.
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000.
- Use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers.
- Work out whether a number up to 100 is prime, and recall prime numbers to 19.
- 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
- Use multiplication and division as inverses.
- 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 ÷ 4 = 24 r 2 = $24\frac{1}{2}$ = 24.5 ≈ 25).
- Solve problems involving combinations of all four operations, including understanding of the equals sign, and including division for scaling by different fractions and problems involving simple rates.

Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

Division

Short division, for dividing by a single digit: e.g. 6497 ÷ 8:



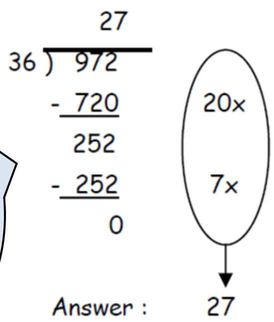
Short division with remainders: Pupils should continue to use this method, but with numbers to at least 4 digits, and understand how to express remainders as fractions, decimals, whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where pupils have to consider the most appropriate way to express the remainder.

Calculating a decimal remainder: In this example, rather than expressing the remainder as **r 1**, a decimal point is added after the units because there is still a remainder, and the one remainder is carried onto zeros after the decimal point (to show there was no decimal value in the original number). Keep dividing to an appropriate degree of accuracy for the problem being solved.

Introduce formal long division methods.

Some children might find chunking helpful to understand division.

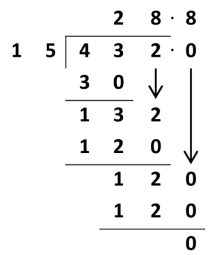
Must be aligned in place value for subtracting



- Find out 'How many 36s are in 972?' by subtracting 'chunks' of 36, until zero is reached (or until there is a remainder).

Where remainders occur, pupils should express them as fractions, decimals or use rounding, depending upon the problem

432 ÷ 15 becomes



Answer: 28·8

As children become more confident and fully understand the process, introduce formal written division

Key Vocabulary: As previously, & common factor

Key number skills needed for division at Y6:

- Recall and use multiplication and division facts for all numbers to 12 x 12 for more complex calculations
- 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. Use short division where appropriate.
- Perform mental calculations, including with mixed operations and large numbers.
- Identify common factors, common multiples and prime numbers.
- Solve problems involving all 4 operations.
- Use estimation to check answers to calculations and determine accuracy, in the context of a problem.
- Use written division methods in cases where the answer has up to two decimal places.
- Solve problems which require answers to be rounded to specified degrees of accuracy.

Ravenbank
SCHOOL

Pepper Street, Lymm Cheshire WA13 0JT
Tel: 01925 753926 Fax: 01925 757473
Email: Ravenbank_Primary@warrington.gov.uk