“The only way to LEARN Mathematics is to DO Mathematics.”

MATHS POLICY

2021

Introduction

We are a Rights Respecting school.

Articles 28 and 29 focus on a child's right to an education and on the quality and content of education.

We follow a 'greater depth and mastery thinking approach' to Maths, where pupils who grasp concepts rapidly are challenged, through being offered rich and sophisticated problems before any acceleration into new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, through additional practice and application, before moving on.

Opportunities for Mathematical Thinking allow children to make chains of reasoning connected with the other areas of their mathematics. A focus on Representation and Structure ensures concepts are explored using concrete, pictorial and abstract representations, the children actively look for patterns as well as specialise and generalise whilst problem solving. Coherence is achieved through the planning of small connected steps to link every question and lesson within a topic. Teachers use both procedural and conceptual Variation within their lessons and there remains an emphasis on fluency with a relentless focus on number and times table facts.

Teaching Principles and inclusive education

1. Teachers believe in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations.
2. Whole class teaching is encouraged, although children who need a more personalised, focused learning are taught in smaller, focused groups to encourage individual accelerated progress.
3. The reasoning behind mathematical processes is emphasized. Teacher/pupil interaction explores how answers were obtained as well as why the method worked and what might be the most efficient strategy.
4. Correct Mathematical language is used from early years through to year 6.
    a. Conceptual variation and procedural variation are used extensively throughout teaching. This helps to present the mathematics in ways that promote deep, sustainable learning. a. Conceptual variation is where the concept is varied and there is intelligent practice. Positive variation is showing what the concept is, and negative variation is showing what the concept isn't. This clears away misconceptions at the very start. Within positive variation, both standard and non-standard representations are shown.
    b. Procedural variation is where different procedures and/or representations are used to bring about

understanding. For example, teachers may collect several solutions for a problem (some right, some wrong) before guiding the class towards the most efficient method. It also involves highlighting the essential features of a concept or idea through varying the non-essential features. Variation is not the same as variety – careful attention needs to be paid to what aspects are being varied (and what is not being varied) and for what purpose.

5. Multiplication (timetables fluency)

   Children will be taught the basics of multiplication from early years using concrete resources and looking at patterns through to year 1.

   Year 2 – year 6 will complete weekly times table tests where children will peer mark and be encouraged to apply timetables knowledge in a conceptual/ practical problem.

Presentation

All children, starting from early years will complete mathematical work in squared books.

All children will be encouraged to write 1dgt each square.

All year groups will use a practice page/ board work page where children can practise concepts and calculations independently.

All work to be completed in pencil. (Apart from corrections)

Books will evidence a variety of teaching and learning pedagogy

e.g. – practical application/ pictorial application/ written (abstract) methods.

Minimal use of worksheets will show progression from learning a skill to application within problem solving.

Marking and Assessment

- Practise page work does not need to be marked.
- All other work will be marked in books using a green biro pen.
- Green highlighter will indicate an extension activity to extend/ challenge children's learning. Where a child has evidenced that he/she has a solid understanding of a mathematical concept a challenge will be expected to be seen in books.
- Blue highlighter will be used to highlight where children need to consolidate/ correct/ misconceptions.
- Corrections will be completed in red pen.
- Post and pre- teaching to be labelled in books.
- Teachers will use formative assessment daily to ensure fluidity and differentiation to support progression.
- Years 3,4 and 5 will use NFER assessments and summative key stage assessments to help analyse and plan for gaps in learning and support in accelerated progression in maths.

Role of the Subject Leader

- Ensures teachers understand the requirements of the National Curriculum and supports them to plan lessons. Leads by example by setting high standards in their own teaching.

- Leads continuing professional development and learning (CPDL); facilitates joint professional development – especially Lesson Study; provides coaching and feedback for teachers to improve pupil learning.

- Leads the whole-school monitoring and evaluation of teaching and learning in mathematics by: observing teaching and learning in maths regularly; analysing assessment data in order to plan whole school improvement in mathematics; conducting work scrutiny to inform evaluation of progress; conducting pupil interviews.

- Takes responsibility for managing own professional development by participating in external training, independent private study, engagement in educational research and scholarly reading.

- Keeps parents informed about mathematics issues.

- Ensures that the school's senior leaders and governors are kept informed about the quality of teaching and learning in mathematics.

- Works in close partnership with the school's SENDCO to ensure the learning needs of all pupils in mathematics are met effectively.
- Keeps the school's policy for mathematics under regular review.

Calculation

All calculations should always follow the CPA approach within every year group to ensure solid concept and understanding.

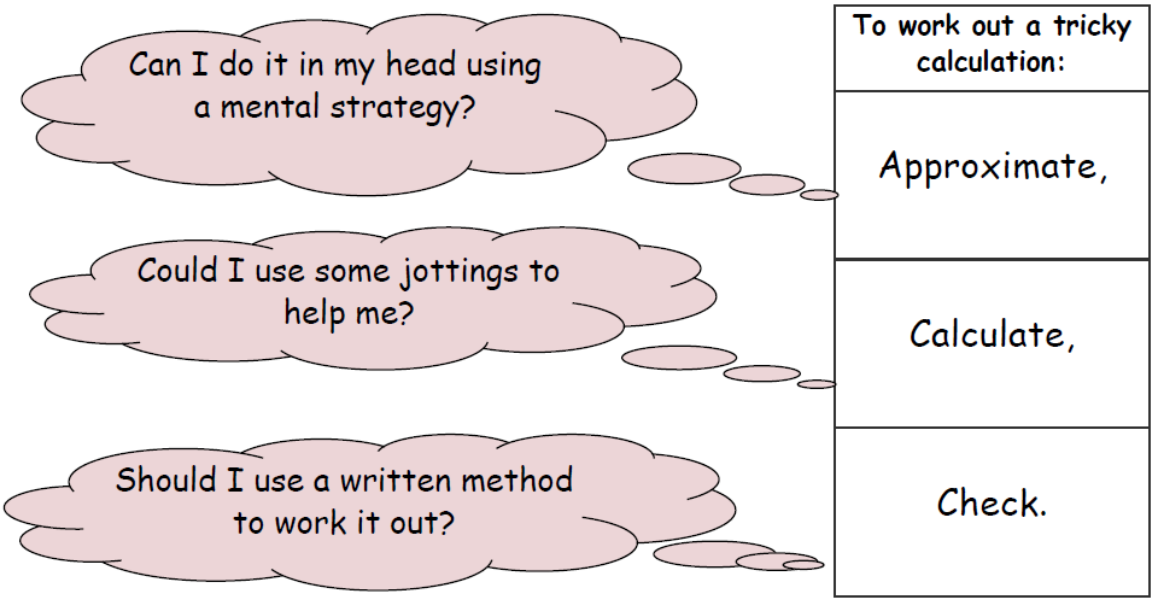
Our teachers will use their professional judgement to ensure children's calculation is secure and fundamentals understood.

Providing a context for calculation:

It is important that any type of calculation is given a real life context or problem solving approach to help build children's understanding of the purpose of calculation, and to help them recognise when to use certain operations and methods when faced with problems. This must be a priority within calculation lessons.

Choosing a calculation method:

Children need to be taught and encouraged to use the following processes in deciding what approach they will take to a calculation, to ensure they select the most appropriate method for the numbers involved:

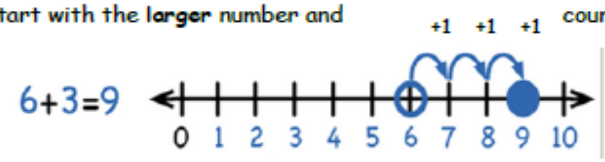


Progression in calculation Yrs 1-6

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.



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

Children should:

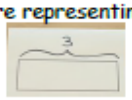
- **Have access to a wide range of counting manipulatives (equipment), everyday objects, number tracks and number lines (including blank number lines), Ten Frame, Base 10 and missing number (teachers and children) to show numbers in different contexts.**
- Read and write the addition (+) and equals (=) 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 + ☐ = 19 5 + 3 + 1 = ☐ ☐ + ☐ = 6

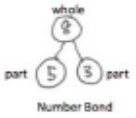
This builds on from prior learning of adding by combining two sets of objects into one group (5 cubes and 3 cubes) in Early Years.

Bar Model to support understanding:

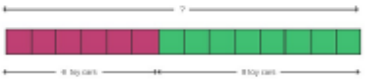
Modelling with counters/

Drawing using squares with 1 square representing 1 object





Ben has 6 toy cars. Stacey has 8 toy cars. How many toy cars do they have altogether?



6 + 8 = 14 They have 14 toy cars altogether.

Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line*

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
- Understand the place value of 2-digit numbers by partitioning into tens and ones.
- Given a number, say **one more or one less**.

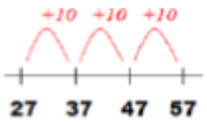
Addition

Year 2 Add with 2-digit numbers

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

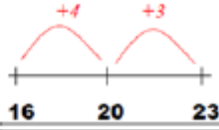
Add 2-digit numbers and tens:

27 + 30



Add 2-digit numbers and units:

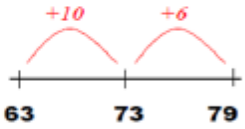
16 + 7



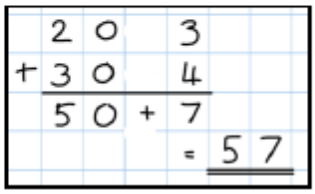
Use empty number lines, concrete equipment, hundred squares etc. to build confidence and fluency in mental addition skills.

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

63 + 16



23 + 34:



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

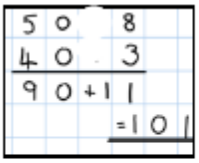
Partition and recombine

46 + 27 = 60 + 13 = 73

Use Dienes to support understanding.

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:



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 should physically make and carry out the calculation with Dienes , HTU boards, arrow cards or place value counters, then compare their practical version to the written form, to help them to build an understanding

Bar Model to support understanding of problem solving:

Helen has 14 bread-sticks. Her friend has 17. How many do they have altogether?

Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones /units, partition, addition, column, tens boundary*

Key skills for addition at Y2:

- Add a 2-digit number and ones bridging the tens. (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.

To support understanding, pupils should physically make and carry out the calculation with Dienes , HTO boards, place value arrow cards or place value counters, then compare their practical version to the written form, to help them to build an understanding of it.

Introduce the **expanded column addition**

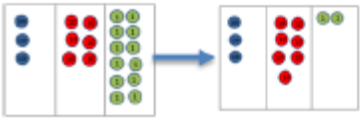
200 + 40 + 7
100 + 20 + 5
300 + 60 +12 = 372

Add the **ones (units)** first, in preparation for the compact method.

360 + 157

	300	60	0
+	100	50	7
	400	110	7

= 517



Compact method:

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

Add **ones** first.

Move to the compact **column addition** method, with 'carrying':

```
 236
+ 73
-----
 309
  1
```

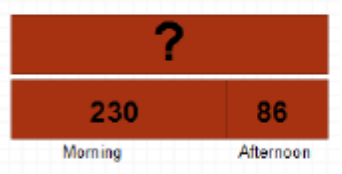
'Carry' numbers **underneath** the bottom line.

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**', but we say '**three add seven**' because it is already in the tens column.

Bar Model to support understanding of problem solving:

A man sold 230 balloons at a carnival in the morning. He sold another 86 balloons in the evening . How many balloons did he sell in all?



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:

- Count, 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 practise a wide range of mental addition strategies, ie. number bonds, adding the nearest multiple of 10, 100, 1000 and adjusting, using near doubles, partitioning and recombining.

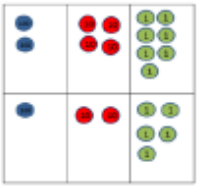
Addition

Year 4 Add numbers with up to 4 digits

Continue to use practical apparatus for those who still need the visual

Experience using Dienes, arrow cards and place value counters.

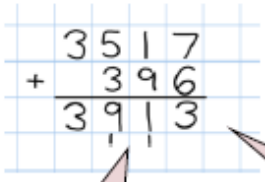
Move from expanded addition to the compact column method, **adding units first**, and 'carrying' numbers **underneath** the calculation. Also include money and measures contexts.



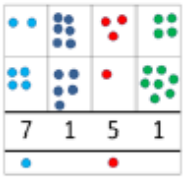
200 + 40 + 7
100 + 20 + 5
300 + 60 +12 = 372

247
+125
12
60
300
372

e.g. 3517 + 396 = 3913



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.



2634
+4517
7151

Add **ones** first.

'Carry' numbers **underneath** the bottom line.

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

Use and apply this method to money and measurement values.

Bar Model to support understanding of problem solving:

Alison jogs 6,860 metres and Calvin jogs 5,470 metres. How far do they jog altogether?

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 practise a wide range of mental addition strategies, ie. 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.

Addition

Year 5 **Add numbers with more than 4 digits including 2 decimal places.** Continue to use practical apparatus for those who still need the visual experience using Dienes, Numicon, arrow cards and place value counters. Include money, measures and decimals with different numbers of decimal places.

2458 + 596

Place Value Counters
2458 + 596

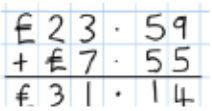
Combine the 1s.
Exchange ten 1s
for a 10 counter.

Combine the 10s.
Exchange ten 10s
for a 100 counter.

Combine the 100s.
Exchange ten 100s
for a 1000 counter

Read final answer
Three thousand and fifty - four.

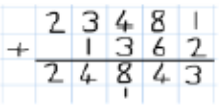
The decimal point should be aligned in the same way as the other place value columns, and must remain in the same column in the answer row.



Numbers should exceed 4 digits.

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

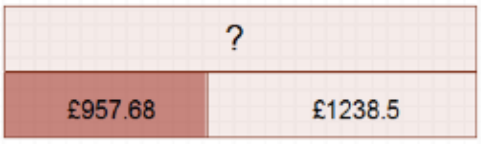
Say '6 tenths add 7 tenths' to reinforce place value.



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

Bar Model to support understanding of problem: solving:

MacDonalds sold £9957.68 worth of hamburgers and £1238.5 worth of chicken nuggets. How much money did they take altogether?



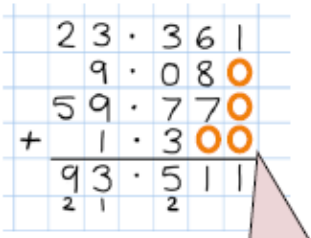
Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, partition, plus, addition, column, tens boundary, hundreds boundary, increase, 'carry', expanded, compact, vertical, thousands, hundreds, digits, inverse & **decimal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

Key skills for addition at Y5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies ie. add the nearest multiple of 10, 100, 1000 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

Addition

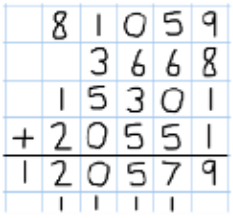
Year 6 Add several numbers of increasing complexity (up to 3 decimal places)



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

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

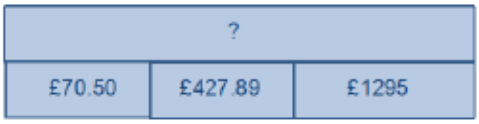
- Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.



Adding several numbers with more than 4 digits.

Bar Model to support understanding of problem: solving:

Jack went on holiday. His flight cost £70.50, the hotel £1295 and spending money £427.89. How much did Jack spend on his holiday?



Key vocabulary: *add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, ones, 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 practising 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

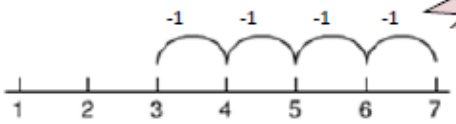
Subtraction

Year 1 Subtract from numbers up to 20

Children consolidate understanding of subtraction **practically**, showing subtraction on bead strings, using cubes, number lines, Base ten and small world objects in familiar contexts, and are introduced to more formal recording using number lines as below:

Read, write and interpret number sentences with - and =

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



$7 - 4 = 3$

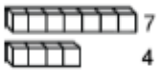
Finding the difference between.

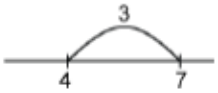
Model subtraction using hundred squares and numbered number lines/tracks, base ten and

Mental subtraction

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

This will be introduced **practically** with the language **'find the difference between'** and **'how many more to make ___?'** (Complementary addition)



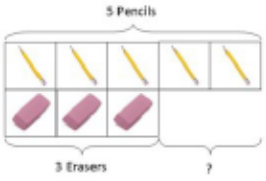


The difference between 7 and 4 is 3.

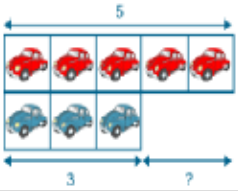
'Seven is 3 more than four'

'I am 2 years older than my sister'

Bar Model to support understanding:



Rasheed had 5 red cars and 3 blue. How many more red cars does he have?



Key vocabulary: *equal to, take, take away, less, minus, subtract, leaves, difference 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 (ie bead string, objects, cubes) and pictures, and missing number problems,
- Read and write numbers from 0 to 20 in numerals and words.

Subtraction

Year 2 Subtract with 2-digit numbers

Subtract numbers using concrete objects, pictorial representations.

23 – 5 = 18 

16 – 7 = 

Use Ten Frame and Dienes blocks for subtraction calculations too.

Subtract on a number line by <u>counting back</u>,

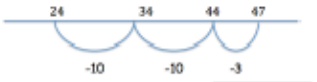
aiming to develop mental subtraction skills.

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

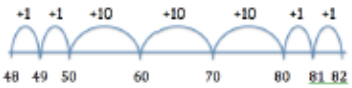
Subtracting by counting back :

Counting under the line, subtracting the units/ ones then the tens.



47-23 = 24

Subtracting by finding the difference using a number line:

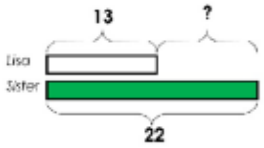


82 – 48 = 34

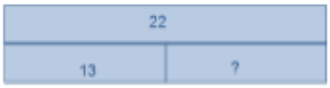
When numbers are far apart children to use the most efficient method of counting back. Resources: Dienes, Ten Frame, number line, multilink, small world objects, money, hundred squares, bead strings.

<u>Bar Model to support understanding of problem solving:</u>

Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.



Developing Part, Part, Whole.



<u>Key vocabulary</u>: *equal to, take, take away, less, minus, subtract, leaves, difference 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, ones

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.

Subtraction

Year 3 Subtracting with 2 and 3-digit numbers.

Introduce **partitioned column subtraction** method.

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

89 - 35 = 54

80	9
- 30	5
50	4

When learning to 'exchange', explore 'partitioning in different ways' so that pupils understand that when you exchange, the **VALUE** is the same ie **72** = 70+2 = 60+12 = 50+22 etc. Emphasise that the **value hasn't changed**, we

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

72 - 47

60 ¹2
- 40 7
20 5 =

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.

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

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.

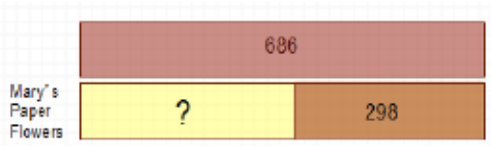
Subtracting money: partition into e.g. £1 + 30p + 8p

238 - 146 = 92

100
200 ¹30 + 8
- 100 40 + 6
0 + 90 + 2

Bar Model to support understanding of problem solving:

Mary made 686 paper flowers. She sold some of them. If 298 were left over, how many flowers did she sell?



686 — 298

Mary sold 384 flowers.

Key vocabulary: *equal to, take, take away, less, minus, subtract, leaves, difference 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
- 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.

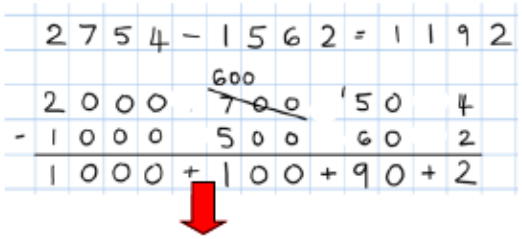
Approximate, Calculate, Check .

Equipment: See year 2.

Subtraction

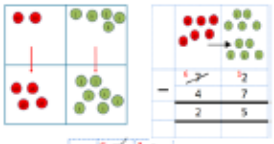
Year 4 Subtract with up to 4-digit numbers

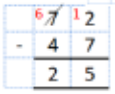
Partitioned column subtraction with 'exchanging' (decomposition):



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

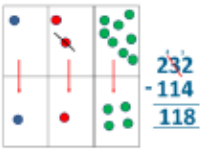
Subtracting money: partition into £1 + 30 + 5 for example.

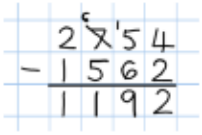




Compact column subtraction

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.





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

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

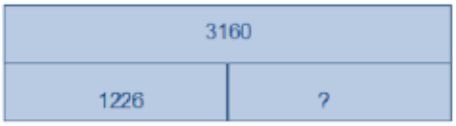
Mental strategies

A variety of mental strategies **must** be taught and practised, including counting on to find the difference where numbers are closer together, or where it is easier to count on. **Continue to use apparatus for children who require it.**

Approximate, Calculate, Check .

Bar Model to support understanding of problem solving:

There are 3,160 books in a shop. 1,226 are in English and the rest are in French. How many books are there?



Key vocabulary: *equal to, take, take away, less, minus, subtract, leaves, difference 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:

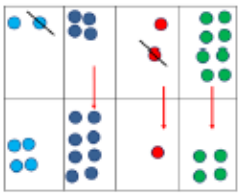
- Subtract by counting on where numbers are close together or they are near to multiples of 10, 100 etc.
- Children select the most appropriate and efficient methods for given subtraction calculations.
- Estimate and use inverse operations to check answers.
- Solve addition and subtraction 2-step problems, 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.

Subtraction

Year 5 Subtract with at least 4-digit numbers and 2 decimal places.

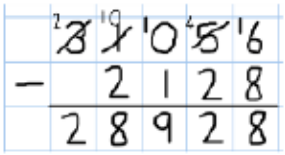
including money, measures, decimals.

Compact column subtraction
(with 'exchanging').



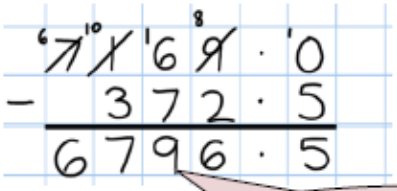
6232
- 4814
1418

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.

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



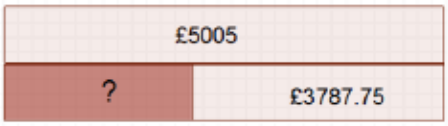
Add a place holder in any empty decimal places to aid understanding of what to subtract in that column.

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

Approximate, Calculate, Check .

Bar Model to support understanding of prob-

A holiday to Lapland costs £5005 for a family of four. The Smiths have only saved £3787.75. How much money do they still



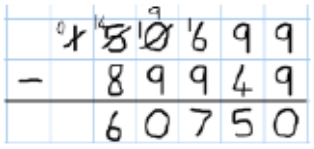
Key vocabulary: *equal to, take, take away, less, minus, subtract, leaves, difference between, how many more, how many fewer / less than, most, least, count back , how many left, how much less is_? difference, count on, strategy, partition, tens, units exchange, decrease, hundreds, value, digit, inverse,*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

Key skills for subtraction at Y5:

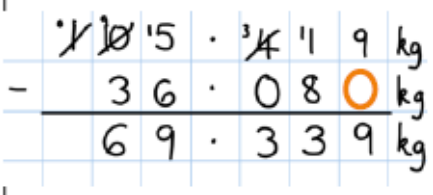
- Subtract numbers mentally with increasingly large numbers .
- Use rounding and estimation to check answers to calculations and determine, in a range of contexts, levels of accuracy .
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- 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 zero.
- Round any number up to 1 million to the nearest 10, 100, 1000, 10,000 and 100,000.

Subtraction

Year 6 Subtracting with increasingly large and more complex numbers and decimal values.



Using the compact column method to subtract more complex integers



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.

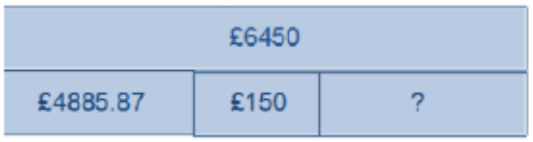
	12	.	3	16
4	7	.	2	9
2	5	.	0	7

Approximate, Calculate, Check .

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.

Bar Model to support understanding of problem solving:

Chloe wants to buy a new car for £6450. She has £4885.87 in her savings account. Her Dad gives her £150 for her birthday. How much more money does she need to save?



Key vocabulary: *equal to, take, take away, less, minus, subtract, leaves, difference 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

Year 1 Multiply with concrete objects, arrays and pictorial representations.

2 + 2 + 2 + 2 + 2 = 10

2 x 5 =10

2 multiplied by 5

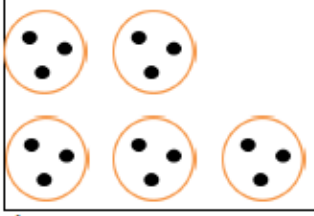
5 pairs

2 hops of 5

There are 3 lily pads. 2 frogs on each lily pad is 6 altogether.

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

3+3+3+3+3 = 15



Each teddy has 2 legs. How many legs will 3 teddies have?

2 + 2 + 2 = 6

- 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.

Equipment to use: Counters, small world objects, Base Ten, counting stick, pegs and peg board and money.

Bar Model to support understanding:

There are **2** baskets of apples. Each basket has **6** apples. How many apples are there altogether?

2 x 6 = 12

Whole 12	
Part 6	Part 6

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

Key skills for multiplication at Y1:

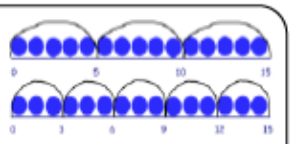
- Count in multiples of 2, 5 and 10, forwards and backwards.
- Solve one-step problems involving multiplication, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Make connections between arrays, number patterns, and counting in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

Multiplication

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

Use repeated addition on a number line:

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



Use arrays:

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

3 x 5 = 15

5 x 3 = 15

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

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

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

Use (concrete) practical apparatus:

5 x 3 = 5 + 5 + 5

5 frogs on 3 lily pads

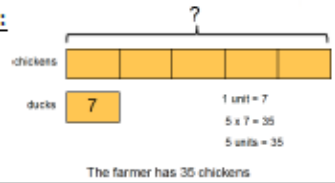
5 x 3 = 15

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.

Bar Model to support understanding of problem solving:

A farmer has 7 ducks. He has 5 times as many chickens as ducks. How many chickens does the farmer have?



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.

Equipment:
Small world objects, number lines, bead strings, money, counters, ten frame.

Multiplication

Year 3 Multiply 2-digits by a single digit number

3 X 18 = 54

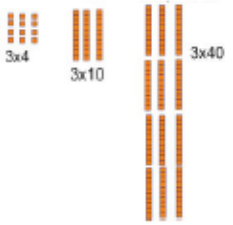
3 X 10

3 X 8

X	10	8
3	●●●	▪▪▪▪▪▪▪▪
	30	+ 24

x	3
10	●●●
8	▪▪▪▪▪▪▪▪
	30 + 24

x	3
10	3 0
8	2 4
	5 4



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

```
  1 4
x 3
  1 2   (3 x 4)
+ 3 0   (3x 10)
  4 2
```

Children will need to :

Have a good knowledge of tables-they need to be able to recall and work out multiplication facts for 2, 3, 4, 5, 8 and 10 .

In year 3 and 4 stick to the ladder method. It is important that you use the dienes to help model this and allow the children to do with dienes.

Language to use.:

Multiple 3 and 4 (write at the side to show what multiplication you have carried out.

Underneath that answer do 3multpiled by10. There are 3 10s. Write this answer underneath the previous (writing the calculation to the side).

Then add the two answers together.

They will need to be able to add single digits together.

Approximate,
Calculate,
Check .

Bar Model to support understanding of problem solving:

4 children go to the cinema. They each pay £15. How much do they spend altogether?

Whole unknown

?			
15	15	15	15

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, ladder method, multiple, product, tens, units, value*

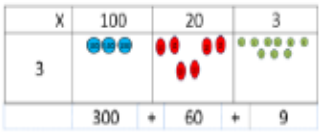
Key skills for multiplication:

- 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 □ = 18, □ x □ = 32

Multiplication

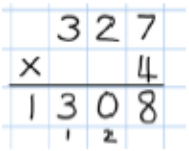
Year 4 Multiply 2 and 3-digits by a single digit,

using all multiplication tables up to **12 x 12**



×	3
300	900
20	60
3	9
	969

Develop children's understanding through providing a visual image to support their understanding.



323
× 3

9 (3 x 3)

60 (3 x 20)

+900 (3 x 300)

969

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**

See year 3. Carry out the same as year 3 but now moving to 3 digit multiplied by a 1 digit number.

As children become more confident you can start to take the written calculations from the side away.

When ready move onto short multiplication.

Approximate, Calculate, Check .

Bar Model to support understanding of problem solving:

A computer costs 5 times as much as a television. The television costs £429.

How much does the computer cost?

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, 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)

Multiplication

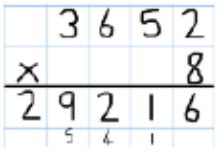
Year 5 Multiply up to 4-digits by 1 or 2 digits.

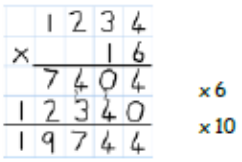
Introducing long multiplication

- 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.
- **Moving towards more complex numbers:**

- Explain that first we are multiplying the top number by 7 starting with the units. (any carrying needs to be done underneath the numbers).
- Now explain that we need to put a 0 underneath— explain that this is because we are multiplying the number by 20.. (2 tens) which is the same as multiplying 10 and 2.
- Now add the 2 numbers together to give you the answer.
- This will need lots of modelling to show the children.

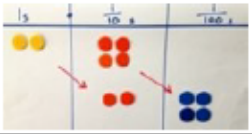
```
  56
X 27
 392   x7
1120   x20
1512
```





Moving towards more complex numbers:

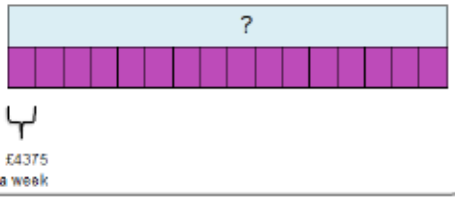
If I know 4 x 6 then 0.4 x 6 is ten times smaller



Approximate, Calculate, Check .

Bar Model to support understanding of problem solving:

The cost to run a sports centre is £4375 a week. How much would it cost to run for 16 weeks?



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

Year 6 Short and long multiplication as in Y5, and multiply decimals with up to 2d.p by a single digit.

		3	4	2	8
	X			5	6
	2	0	5	6	8
		2	1	4	
1	7	1	4	0	0
1	9	1	9	6	8
	2	1	4		

Line up the decimal points in the question and the answer.

	3	·	1	9
x				8
2	5	·	5	2
	1		7	

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

Approximate, Calculate, Check .

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**.

Bar Model to support understanding of problem solving:

If 5 friends went on holiday and each paid £579.75 what was the total cost of the holiday?

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 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.

Equipment: Dienes, money and measures to represent calculations.

Division

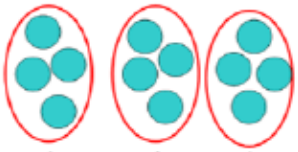
Year 1 Group and share small quantities

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

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

Grouping:

Sharing:



4 4 4

12 ÷ 3 = 4

12 shared between 3 is 4

6 ÷ 2 = 3

6 ÷ 3 = 2

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 (concrete) practical apparatus, arrays and picture representations—small world objects, counters, base 10, number lines, bead strings, counting stick, money.

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.

Bar Model to support understanding of problem solving:

Dana has 12 sweets. She gives half of them to her sister and keeps half for herself. How many sweets does each girl get?

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

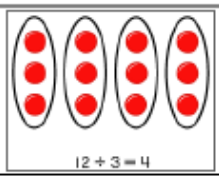
Key number skills needed for division at Y1:

- 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.
- Begin to understand halving using concrete objects and pictorial representations.

Division

Year 2 **Division using the ÷ and = sign move more towards grouping.** Use objects, arrays, diagrams and pictorial representations, and grouping on a number line.

Arrays:



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.

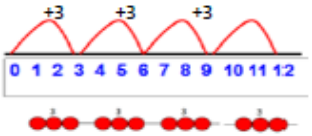
Know and understand grouping:

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

Grouping

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

Grouping using a number line and introducing remainders:

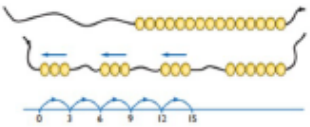


Group from zero in equal jumps of the divisor to find out 'how many groups of _ in _ ?'. Pupils could and using a bead string or practical apparatus to work out problems like 'A CD costs £3. How many CDs can I buy with £12?' **This is an important method to develop understanding of division as grouping.**

12 ÷ 3 = 4

15 ÷ 3 = 5 groups of 3

(grouping)

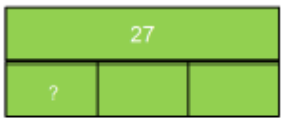


Pose **12 ÷ 3** as **'How many groups of 3 are in 12?'**

Bar Model to support understanding of problem solving:

There were 27 desks to clean. 3 boys shared the work equally. How many desks did each boy clean?

Each boy cleaned 9 desks.



Desks

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.

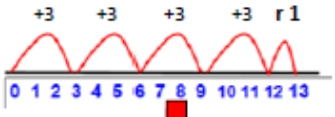
Equipment: As year 1.

Division

Year 3 Divide 2-digit numbers by a single digit

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.

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

	T	U
	2	3
3	6	9

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.

Remind children of correct place value, that 69 is equal to 6 tens and 9 ones, 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**.*

They could first be asked to use a number line to work this out, highlighting the need for a quicker, more efficient 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 final answer, but with remainders occurring within the calculation to be carried to the next digit.

	H	T	U
	1	4	2
3	4	12	6

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.

Step 3 Only taught when pupils can calculate 'remainders'.

Bar Model to support understanding of problem solving:

Pam puts the same number of apples in each of the 4 bags. She ended up with 52 apples in the bags. How many apples did she put in each bag?

52			
?	?	?	?

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*

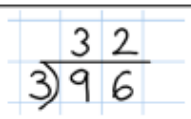
Key number skills needed for division at Y3:

- 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.

Equipment: Dienes, counters and counting objects.

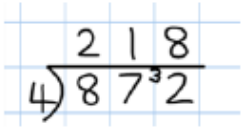
Division

Year 4 Divide up to 3-digit numbers by a single digit (without remainders initially) Continue to develop short division:

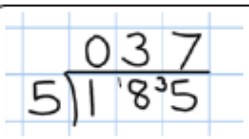


Short division should only be taught once children have secured the skill of calculating 'remainders'.

STEP 1: Pupils must be secure with the process of short division for dividing 2-digit numbers by a single digit (**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).



STEP 2: Pupils move onto 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.



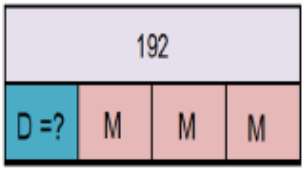
When the answer for the **first column** is zero (1 ÷ 5, as in example), children could initially write a zero above to acknowledge its place, and must always 'carry' the number (1) over to the next digit as a remainder.

Include money and measure contexts when confident.

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.

Bar Model to support understanding of problem solving:

Desmond and Melissa collect cards. They have 192 cards in all. Melissa has three times as many cards as Desmond. How many cards does Desmond have?



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.

Video clip: **Pupil demonstrating 3-digit short demonstration without remainders**

Equipment: Number lines and dienes.

Division

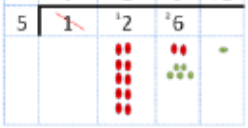
Year 5 Divide up to 4 digits by a single digit, including those with remainders.

Short division, including remainder answers:

```
   0 6 6 3 r 5
8 ) 5 3 5 0 2 9
```

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.

	H	T	U	
	0	2	5	r1
5	1	12	26	



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 <u>how</u> to express it**, ie. as a fraction, a decimal, or as a rounded number or value , depending upon the context of the

If children are confident and accu-

Try this equation; 848 ÷ 16	
Approximation 800 ÷ 16 =	50

```
      0  5  3
   ┌──────────
16 │ 8  4  8
   - 8  0
      ──────
         4  8
       - 4  8
         ─────
            0
```

Start with the largest place holder in this case it will be the hundreds column.

8 ÷ 16 not possible So put a 0 above the hundreds column

Carry the 8s digit over to the Tens column!

84 ÷ 16 =

16 x 5 = 80

84 - 80 = 4

48 ÷ 16 = 3

No remainders

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.

Include money and measure contexts.

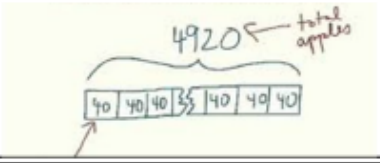
Approximate, Calculate, Check.

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

1dp)

<u>Bar Model to support understanding of problem solving:</u>

Frank has 4920 apples. He needs to put them into baskets of 40. How many baskets does he need?



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)*

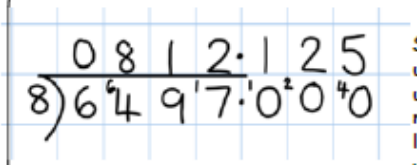
Key number skills needed for division at Y5:

- 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 r2 = 24$^{2}/_{4}$ = 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.

Division

Year 6 Divide at least 4 digits by both single-digit and 2-digit numbers (including decimal numbers and quantities)

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



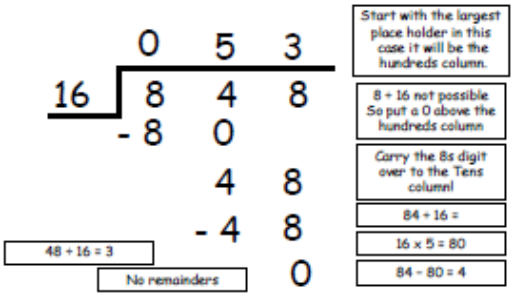
Short division with remainders: Pupils should continue to use this method, but with numbers to at least 4 digits, and understand how to express remainders as fractions, decimals, whole number remainders, or rounded numbers. Real life problem solving contexts need to be the starting point, where pupils 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 long division **for dividing by 2 digits.**

Try this equation; 848 ÷ 16	
Approximation 800 ÷ 16 =	**50**

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



Start with the largest place holder in this case it will be the hundreds column.

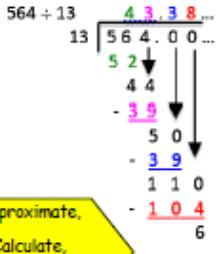
8 ÷ 16 not possible So put a 0 above the hundreds column

Carry the 8s digit over to the Tens column!

84 ÷ 16 =

16 x 5 = 80

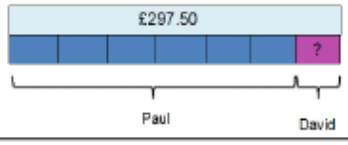
84 - 80 = 4



Approximate, Calculate, Check .

Bar Model to support understanding of problem solving:

Paul and David hire a car together at a cost of £297.50. Paul pays 6 times more than David. How much does David pay?



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.

Remote Learning:

In addition to their in-school work with Key Worker and eligible pupils, teachers will continue to support children that are unable to attend.

• Teachers should plan lessons that are relevant to the curriculum focus for that year group and endeavour to replicate this through use of our online resources tools, Whiterose Maths, EDShed and TTRS.

. • Teachers should ensure that children know the expectation regarding completion of work an evidencing work.

- Class dojo will be used to communicate with pupils and parents regarding remote learning work and children will upload Maths work to their individual portfolio. Work will be differentiated and challenging for all pupils.
- Teachers will complete one live lesson per week of isolation/ absence with a session for 'dropins' available to students who need extra support.
- All lessons will be sequenced with relevant video materials and questions used from our Whiterose Maths online programme.
- All work will be marked and feedback given with question prompts to challenge.