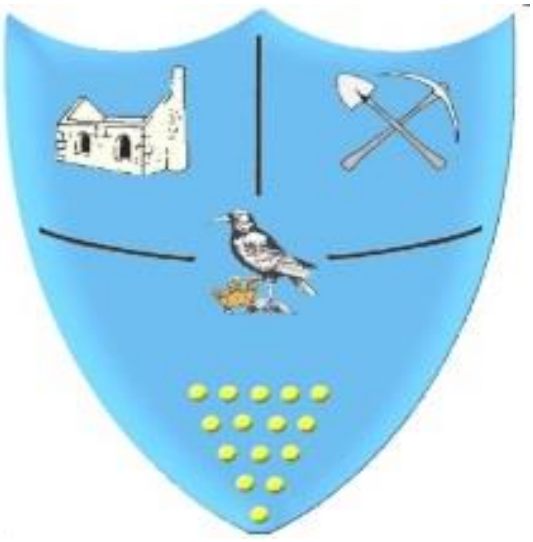


Roskear Primary and Nursery School

Calculation policy

Introduction

This calculation policy has been written in-line with the programmes of study taken from the revised National Curriculum for Mathematics (2014) and EYFS Curriculum Guidance Framework. It provides guidance on appropriate calculation methods and progression. The content is set out in year groups under the following headings: addition, subtraction, multiplication, division and fractions.

Children will use mental methods as their first port of call when appropriate, but for calculations that they cannot do in their heads, they will need to use an efficient written method accurately and with confidence.

This mathematics calculation policy is a guide for all staff at Roskear Primary and Nursery school. It is designed to be used alongside any teaching resources that teachers wish to use and does not recommend one scheme over another, rather a variety of resources and an approach - The Mastery Approach. All staff have access to Maths No Problem (a linear curriculum), which provides a host of lesson plans, activities and ideas. It is a mathematics scheme in its own right but it is recommended that it is not adhered to in a strict manner. The school has also bought into Target Your Maths. NRich on line resources are excellent ways to support the learning of mathematics and should be used to tailor lessons to suit the needs of the pupils. All teachers have been given the scheme of work from Trinity Teaching School Alliance - White Rose Maths Hub based in Halifax. Staff are encouraged to base their planning around their recommended modules. These modules use the Singapore Maths Methods and are affiliated to the workings of the New Mathematics Curriculum that is now running throughout the school. It is a sequential programme of study that is underpinned by promoting fluency in number. It emphasises that all pupils must have a thorough grounding in the four basic rules of number before progressing on to the next level. This philosophy is evident in the White Rose scheme and is being adopted by staff at Roskear School. This complete understanding gives pupils more confidence in dealing with number activities and in turn, leads to mastery of the four operations.

At the centre of the mastery approach to the teaching of mathematics is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems. Similarly with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete and pictorial representations. In- turn meeting the three aims of the National Curriculum (Fluency, Problem solving and Reasoning)

The principle of the concrete – pictorial- abstract (CPA) approach is that children have a true understanding of a mathematical concept, they need to master all three phases. Reinforcement is achieved by going back and forth between these representations. For example if a child is working in the 'abstract,' 'proving' something in the concrete or pictorial. For the purposes of the pupils we refer to CPA as 'show it,' 'draw it' and 'explain it.'

Aims of the policy

To ensure consistency and progression in our approach to calculation.

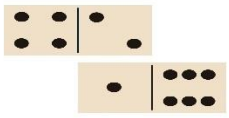
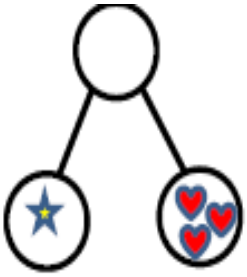
Make teachers aware of the strategies that pupils are formally taught in each year group that will support them to preform mental and written calculations.

Supporting teachers in identifying appropriate pictorial representations and concrete materials.

To ensure that children develop an efficient, reliable, formal written method of calculation for all operations.

To ensure that children can use these methods accurately with confidence and understanding.

The policy only details the strategies; teachers must plan opportunities for pupils to apply these; for example, when solving problems, or where possible, opportunities somewhere else in the curriculum.

EYFS1- Addition	
NC Statutory Requirements **Birth -11 months** – notice changes in number of objects / images , sounds in groups of and up to 3 **8 – 20 months** - has some understanding that things exist even when out of sight **16-26 months** – Begins to organise and categorise objects -sorting **22 – 36 months** – knows that a group of things changes in quantity when something is added or taken away 30 – 50 months- separates a group of 3 or 4 objects in different ways beginning to recognise that the total is still the same **40-60 months** -finds the total number of items in two groups by counting all of them In practical activities and discussions begins to use the vocabulary involved in addition and subtraction	
Concrete	Counting- numbers in the environment inside and outside   
Pictorial	Combining groups of objects to find the total   Then adding on to a set, one by one 
Abstract	Informal number line/number sentences As above, alongside a calculation 

Teaching Points:

- Put all objects together and count
- Find totals of 2 groups using objects in hoops
- Then total of 2 groups using objects and numerals in hoops
- Then …total of 2 groups using objects and hoops and recording as a number sentence
- Then without hoops, with objects and record as a number sentence
- Fluency with counting requires counting from any numbers
- Use fingers (but avoid counting from one each time)
- Use numicon.

EYFS1- Subtraction

NC Statutory Requirements

Birth – 11 months notice changes in number of objects/ images , sounds in groups of and up to 3

8 – 20 months - has some understanding that things exist even when out of sight

16-26 month Begins to organise and categorise objects -sorting

22 – 36 months knows that a group of things changes in quantity when something is added or taken away

30 – 50 separates a group of 3 or 4 objects in different ways beginning to recognise that the total is still the same

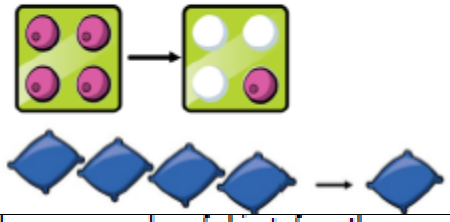
40-60 Understands subtraction as taking away objects from a group and counting on how many are left.

In practical activities and discussions begins to use the vocabulary involved in addition and subtraction

Concrete

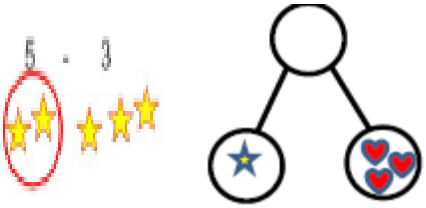
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).

4 – 3 = 1



Pictorial

Take away a number of objects from the group, count what's left



Abstract

Introduce – and = symbols

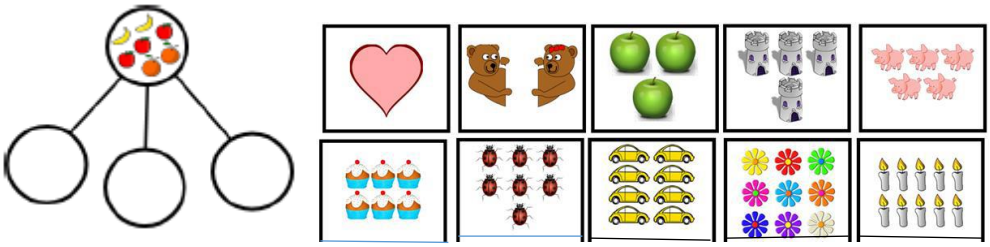
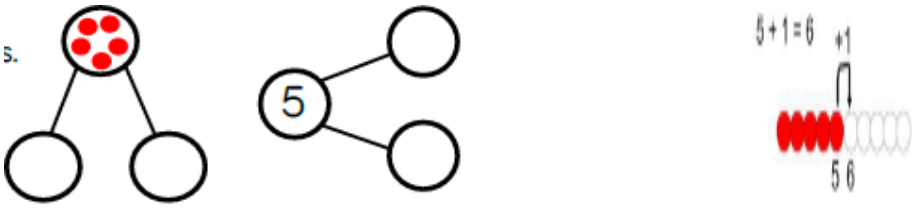
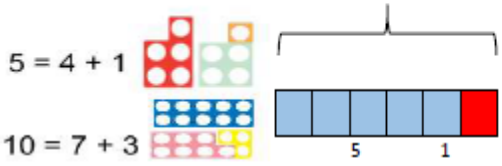
Include vocabulary: 'difference'

Relate to number line and introduce a bar model.

5 – 3 = ?

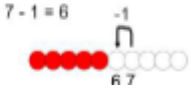
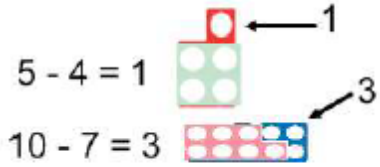
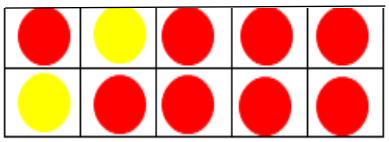
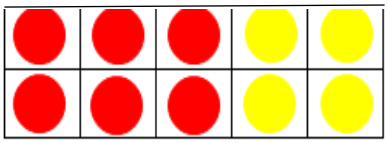
Teaching Points

- Then.. start with group of objects and record the numeral. Take some away, record and count what's left (record)
- '6 take away 3 is 3' OR '3 less than 6 is 3'. Emphasise JUMPING along number line
- Then.. look at number line: what do we need to do?
- Use bar model to support visualisation
- Counting and reading numbers to 20
- Doubling using objects and numbers
- Halving using objects and numbers
- Sharing using objects Adding and subtracting two single digit numbers referring to a number line

EYFS2 - Addition	
NC Statutory Requirements **ELG**- Children count reliably with numbers from one to 20; place them in order; say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. Count on from first group to add two groups of objects.	
Concrete	Using hoops and a variety of objects. 
Pictorial	Add one onto a number 
Abstract	At this point a bar model image can be introduced as another method of showing the calculation pictorially. 10 = ? + ? 9 = ? + ? 8 = ? + ? Etc  5 + 1 =?

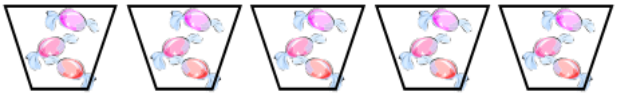
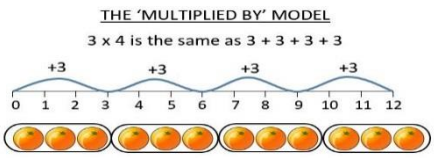
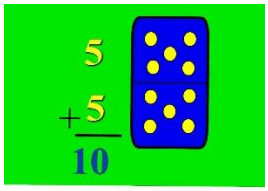
Teaching Points

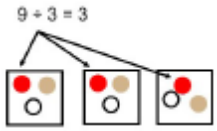
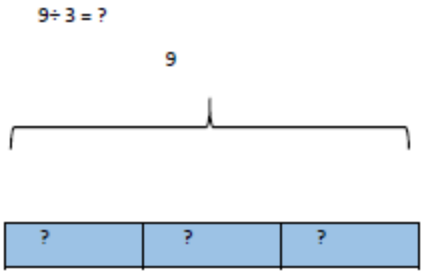
- Write all the ways to make2,3,4,5,6,7,8,9 NOT just 10
- Using a bead bar is an effective way of showing how different numbers are split up.
- Model the checking process as this is built upon throughout the strategies and policy.
- Ensure that children are being taught to count the jumps.
- Hold the biggest number in your head and count on.

EYFS2 - Subtraction	
NC Statutory Requirements **ELG**- Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.	
Concrete	What's the difference between 10 and 6?  
Pictorial	Take away one from a number  Using the bar model helps move from the concrete to the abstract 
Abstract	Inverse use of number bonds   

Teaching Points

- Model with numicon
- In order to calculate effectively children must know all the number bonds up to ten. This will enable them to jump back on the number line rather than count.
- Using a bead bar is also an effective way to show how to split smaller numbers up.
- Using the bar model will help pupils to understand the inverse concept.
- When counting the remaining amount, and when checking that the correct number have been taken away, model efficient counting in twos where necessary or arrayed numbers of ten for example.
- Model the checking process as this is built upon throughout the strategies and policy.
- When solving missing number problems, ensure that there is a variety of layout where there is a modelling of 'balancing calculations.
- Counting on (up) along the top of the number line.
- Counting back along the top of the number line

EYFS2 - Multiplication	
NC Statutory Requirements **ELG**- Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.	
Concrete	Doubling a number is the same as adding the same number again  Showing repeated addition and recording (2+2+2+2=8)
Pictorial	 
Abstract	 
Teaching Points Encourage pupils to explain what they see. Organise arrays with objects and use vocabulary such as groups, lots of and more.	

EYFS2 - Division	
NC Statutory Requirements **ELG**- Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.	
Concrete	  Practically halving objects – both halves being exactly the same size - Start with play dough and things you can cut and then progress to practical objects. Eg: Pizza – cut in half to make two pieces – then add toppings , eg: 2 tomatoes - half of 2 is 1
Pictorial	 Is that fair?
Abstract	
Teaching Points • Use counters of different colours • When sharing you know how many groups you will have; you are working out how many are in each group. • Don't over teach 'sharing'- Focus more on grouping • Appropriate use of bar models can be introduced for more fluent pupils.	

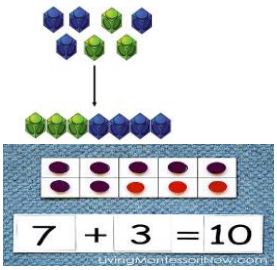
Year 1 Addition

NC Statutory Requirements

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9

Concrete

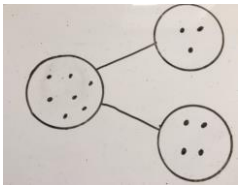
Combining two parts of a whole



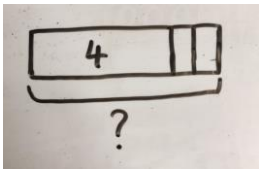
Counting on using number lines using cubes or Numicon

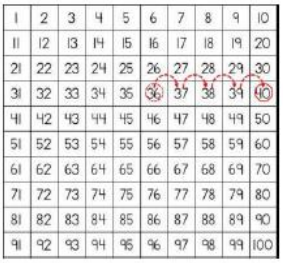
Pictorial

Children to represent the cubes using dots or crosses.
They could put each part on a part whole model.



A bar model which encourages the children to count on, rather than count all.





Abstract

4 + 3 = 7

What is 2 more than 4?
What is the sum of 2 and 4?
What is the total of 4 and 2?

Teaching Points

- Counting forward /up in jumps on top of the line
- Model the checking process
- Ensure children are counting the jumps
- Working up from number bonds 5,6,7,10,20 memorise
- Realise the effect of adding zero

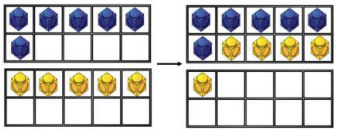
Year 1 Subtraction

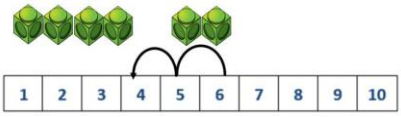
NC Statutory Requirements

- read, write and interpret mathematical statements involving addition (+), subtraction (–) and equals (=) signs
- represent and use number bonds and related subtraction facts within 20
- add and subtract one-digit and two-digit numbers to 20, including zero
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? – 9

Concrete

Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used)

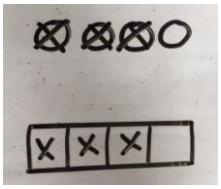


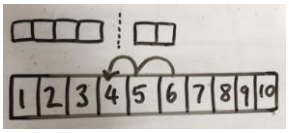


Counting back using number lines.
6-2=4

Pictorial

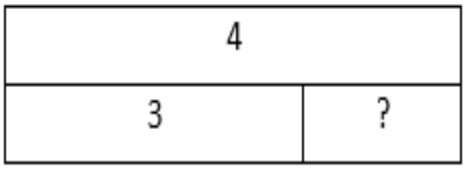
Draw and cross out the correct amount

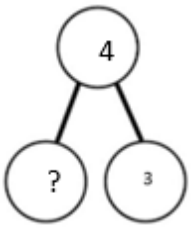




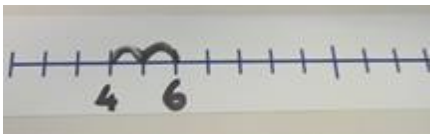
Abstract

4+3= 7 Pupils begin to use notation including missing number



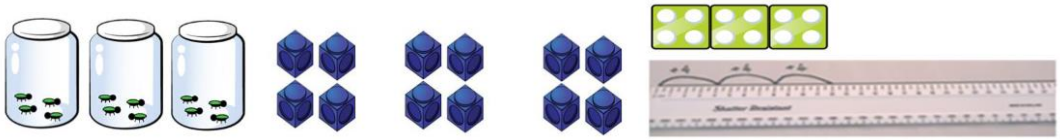
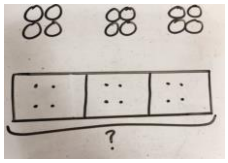
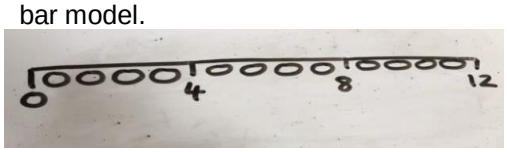
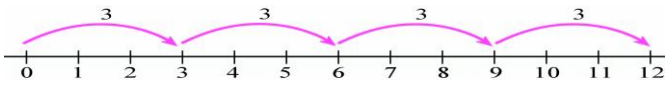


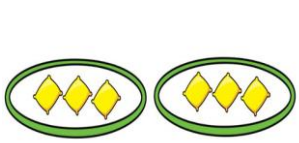
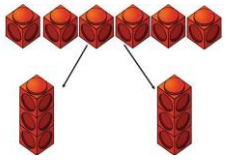
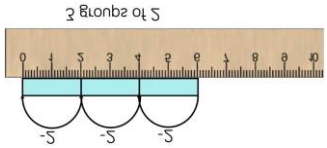
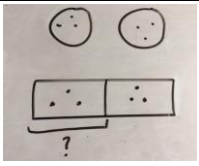
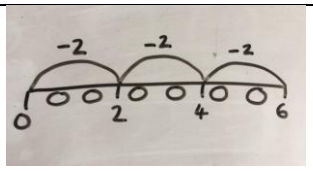
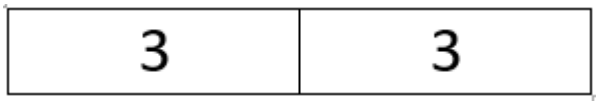
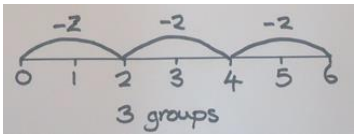
Counting backwards

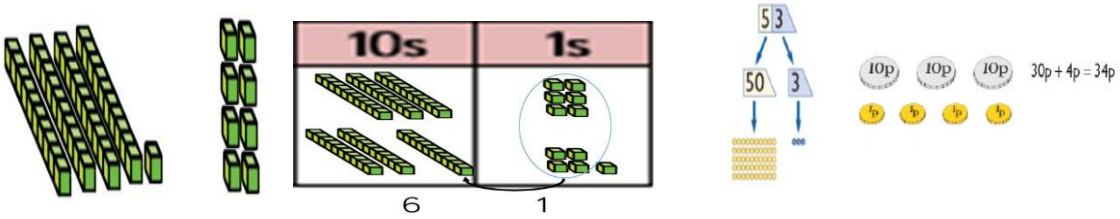
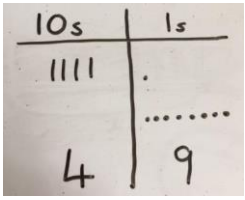
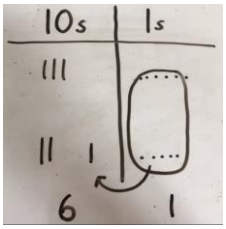
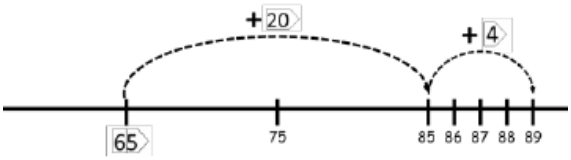
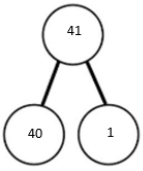
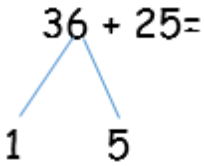
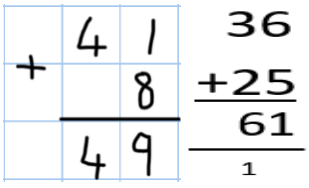


Teaching Points

- When counting the remaining amount, check the correct number have been taken away.
- Model efficient counting in twos where necessary
- Model the checking process
- When solving missing numbers , ensure a variety of layout where there is modelling of 'balancing of calculations
- Realise effect of subtracting zero
- Count forward of top of number line; under for counting backwards.
- Appropriate use of discrete, continuous, comparable bar models to support understanding

Year 1 Multiplication	
NC Statutory Requirements • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	
Concrete	 Repeated grouping/repeated addition 3 × 4 4 + 4 + 4 There are 3 equal groups, with 4 in each group.
Pictorial	 Children to represent the practical resources in a picture and use a bar model. 
Abstract	4 + 4 + 4 = 12 Marked number line showing three jumps of four. 3 × 4 = 12 
Teaching Points • Use accessible language when using word problems • Ensure pupils use contextual links • Use concepts of arrays; links with doubling and repeated addition • Tables progression- counting in 2,5 and 10 • Use a number line with clearly marked divisions before moving onto a partially marked number line.	

Year 1 Division	
NC Statutory Requirements • solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher	
Concrete	Sharing using a range of objects. 6 ÷ 2    Repeated subtraction using Cuisenaire rods under a ruler. 6 ÷ 2 
Pictorial	 Present sharing pictorially  Use a number line to present repeated subtraction pictorally
Abstract	6 ÷ 2 = 3  Children should also be encouraged to use their 2 times tables facts.  Abstract number line to represent the equal groups that have been subtracted.
Teaching Points • Children physically groups items and count. • Encourage questions such as how many groups? How many are in each group? • Model forming arrays to be organised systematically to aid counting when this develops into multiples • Counting in 2,5's and 10's.. • Use a number line with clearly marked divisions before using a partially marked number line.	

Year 2 Addition	
NC Statutory Requirements • solve problems with addition using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods • recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100 • add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones , a two-digit number and tens , two two-digit numbers , adding three one-digit numbers • show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems	
Concrete	TO + O using base 10. Continue to develop understanding of partitioning and place value. 41 + 8  TO + TO using base 10 Continue to develop understanding of partitioning and place value. 36 + 25=61
Pictorial	Children to represent the base 10 e.g. lines for tens and dot/crosses for ones.    Children to represent the base 10 in a place value chart.
Abstract	41+8=  1 + 8 = 9 40 + 9 = 49  30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61  Formal
Teaching Point • Counting forward in ones then tens. Suggesting 'number bonds' and related facts to make jumps • Headings for columns are labelled • Appropriateness of number at each stage e.g no carrying required	

Year 2 Subtraction

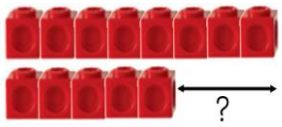
NC Statutory Requirements

- solve problems with subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures; applying their increasing knowledge of mental and written methods
- recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100
- add and subtract numbers using concrete objects, pictorial representations, and mentally, including: a two-digit number and ones , a two-digit number and tens , two two-digit numbers , adding three one-digit numbers
- show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems

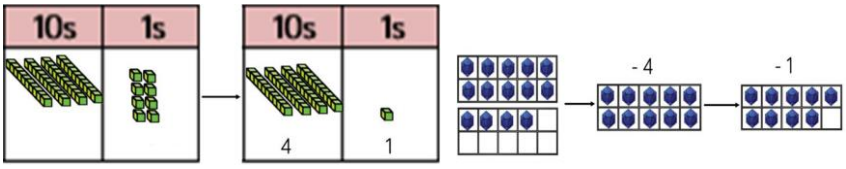
Concrete

Finding the difference (using cubes, Numicon or other objects can also be used).

Calculate the difference between 8 and 5.



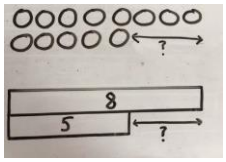
Making 10 using ten frames. 14 – 5



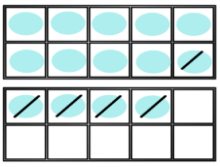
Column method using base 10. 48-7=41

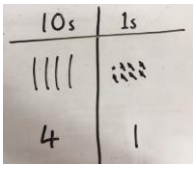
Pictorial

Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.



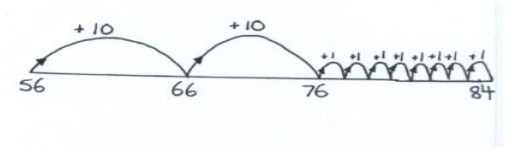
Children to represent the base 10 pictorially



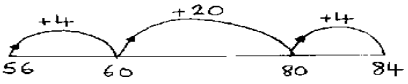


Children to present the ten frame pictorially and discuss what they did to make 10

Counting up from the smaller to the larger number (complementary addition) To be taught to support mental calculation and when the numbers are close together. 84-56=56 + 4 + 20 + 4 =84



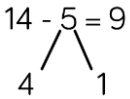
or



Abstract

- Find the difference between 8 and 5.
- 8 – 5, the difference is
- Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.

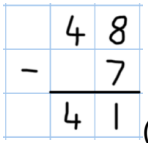
Children to show how they can make 10 by partitioning the subtrahend.



(informal)

14 – 4 = 10

10 – 1 = 9



(formal)

Teaching Points

- Include missing numbers in different forms such as shapes or letters to build on commutative facts: 70+30=100 100-^=30 30 +?=100
- Comparison bar models
- Variation- 47-6=, 57-6=, 67-6=,77-6=
- Progress to number line without divisions
- To ensure clarity of the strategy subtract only the ones initially.

Year 2 Multiplication

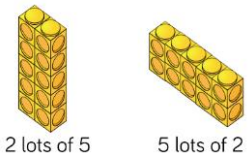
NC Statutory Requirements

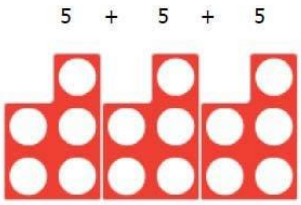
- recall and use multiplication facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers
- calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
- show that 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.

Concrete

Use arrays to illustrate commutativity counters and other objects can also be used.

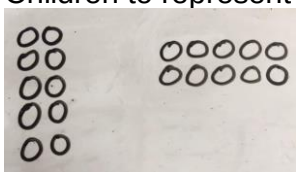
2 × 5 = 5 × 2

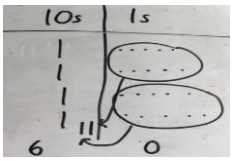


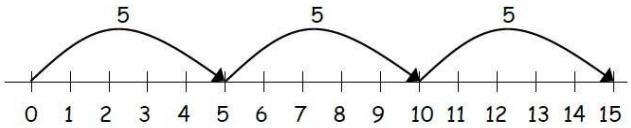


Pictorial

Children to represent the arrays pictorially. Represent concrete pictorally







Abstract

Children to be able to use an array to write a range of calculations e.g.

10 = 2 × 5

5 × 2 = 10

2 + 2 + 2 + 2 + 2 = 10

10 = 5 + 5

Children to be encouraged to show the steps they have taken.

4 x 15

10 5

10 x 4 = 40

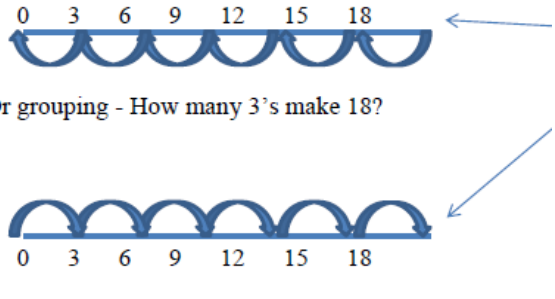
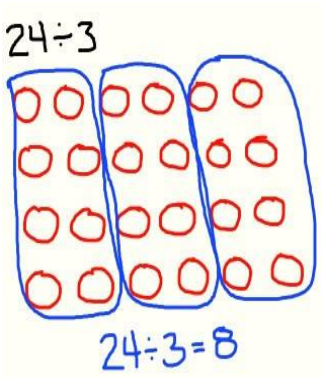
5 x 4 = 20

40 + 20 = 60

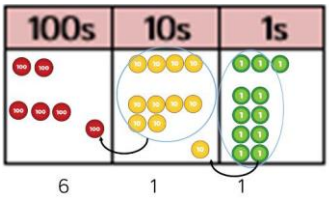
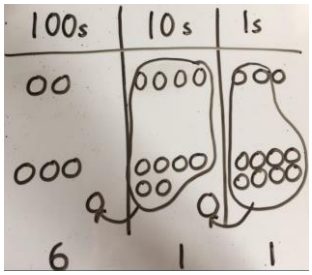
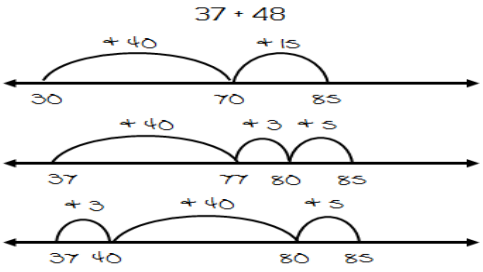
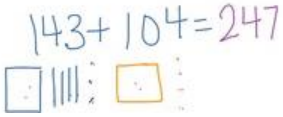
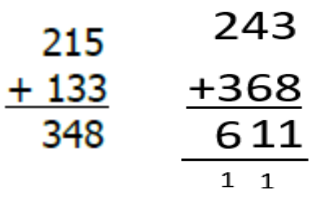
Teaching Points

- Build on partitioning skills to partition then multiply to strengthen links with place value
- Note appropriateness of the number. Where they stay in the 'teens' to strengthen ability to multiply by 10

<table>
<tr><th colspan="2">Year 2 Division</th></tr>
<tr><td colspan="2">NC Statutory Requirements
recall and use multiplication and division facts for the 2,3, 5 and 10 multiplication tables, including recognising odd and even numbers
calculate mathematical statements for division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs
show that multiplication of two numbers can be done in any order (commutative) and division of one number by another is not
solve problems involving division, using materials, arrays, repeated addition, mental methods, and division facts, including problems in contexts.</td></tr>
<tr><td>Concrete</td><td>Link division to multiplication.
Explore sharing and grouping
  </td></tr>
<tr><td>Pictorial</td><td>Pupils continue to explore division as sharing and grouping:

18 ÷ 3 can be modelled as sharing – 18 shared between 3 or modelling jumping back in threes to share in ‘chunks’ of 3:
 
  </td></tr>
<tr><td>Abstract</td><td>Write all the number sentences that can be created e.g 6x3=18, 3x6=18, 18/3=6, 18/6=3

Complete written divisions and show the remainder using r
  </td></tr>
<tr><td colspan="2">Teaching Points
Appropriateness of the number; begin with the numbers that do not have a remainder and build upon multiplication facts, then, change the divisor or amount and ask ‘How many are left over?’</td></tr>
</table>

Year 3 Addition	
NC Statutory Requirements • add and subtract numbers mentally, including: a three-digit number and ones ; a three-digit number and tens ; a three-digit number and hundreds • add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction • estimate the answer to a calculation and use inverse operations to check answers • solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.	
Concrete	Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred. Base ten  
Pictorial	Children to represent the counters in a place value chart, circling when they make an exchange.   
Abstract	
Teaching Points • Numbers initially crossing tens boundary within a three digit number, moving to crossing tens and hundreds in numbers up to 1000. • Pupils begin to use number lines without given divisions. • Starting with number at left hand side of number line. Jumping along the top of the line. • Teaching point in example links to recognising number bonds and how smaller jumps, rather than jumping eight will help reinforce mental strategies. • Variation: missing numbers	

Year 3 Subtraction

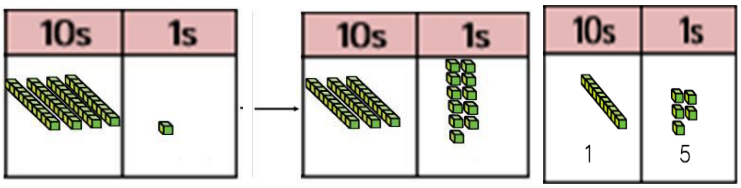
NC Statutory Requirements

- add and subtract numbers mentally, including: a three-digit number and ones ; a three-digit number and tens ; a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction

Concrete

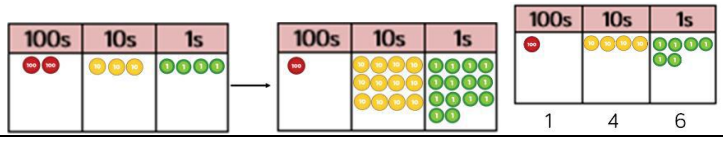
Column method using base 10 and having to exchange.

41 – 26



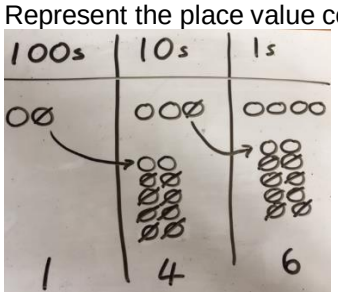
Column method using place value counters.

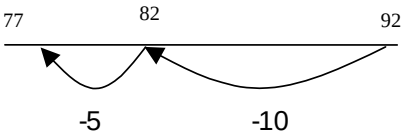
234 – 88



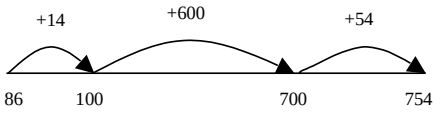
Pictorial

Represent the place value counters pictorially; remembering to show what has been exchanged.





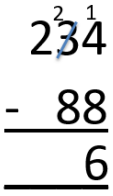
Use known facts to solve 92-15=77

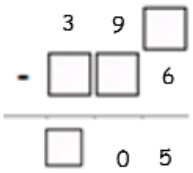


Complementary addition to solve 754 – 86 = 668

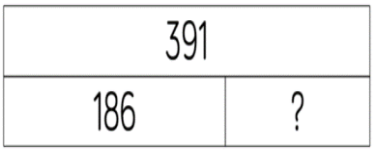
Abstract

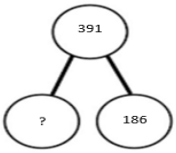
Formal column method. Children must understand what has happened when they have crossed out digits.





Raj spent £391, Timmy spent £186.
How much more did Raj spend?





Calculate the difference between 391 and 18

Teaching Points

- Ensure a discrete teaching of mental strategies building upon informal written strategies of number lines and partitioning numbers to subtract tens from tens and units from units modelling and promoting the use of jottings.
- Note appropriateness of number here where 'exchanging' isn't required.
- Practical resources to help promote abstract 'exchange' through concrete understanding of place value practically. Modelling practical alongside formal written initially.
- Model subtracting from least significant figure (ones).
- Remember to use the inverse operation to check
- Pupils should start column subtraction without any exchange of 10,100 etc. Always use column headings to secure place value.Whilst partitioning at this point will help some pupils, staff must be aware that it can lead to future confusion when exchanging 10s and is best avoided.

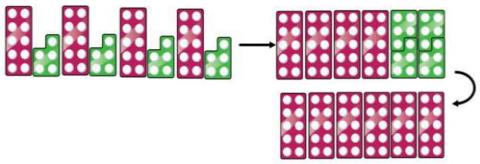
Year 3 Multiplication

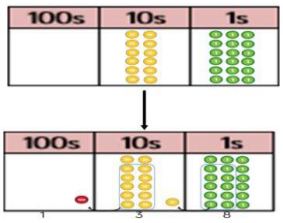
NC Statutory Requirements

- recall and use multiplication and division facts for the 2,3, 4, 5,6 and 8 and 9 multiplication tables
- 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, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects

Concrete

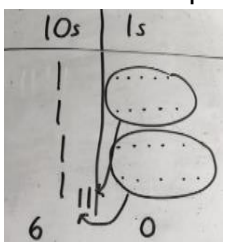
Partition to multiply using Numicon, base 10 or Cuisenaire rods. Formal column method with place value 6x23= counters 4x15

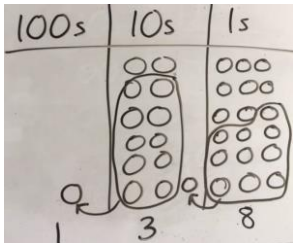




Pictorial

Children to represent the counters/base 10, pictorially e.g. the image below.





Abstract

Mai had to swim 23 lengths, 6 times a week.
How many lengths did she swim in one week?
With the counters,

23	23	23	23	23	23

?

H	T	O
	2	3
x		6
	1	8
1	2	0
1	3	8

$$\begin{array}{r} 23 \\ \times\ \ 6 \\ \hline 138 \\ {\scriptstyle 1\ \ 1} \end{array}$$

Find the product of 6 and 23

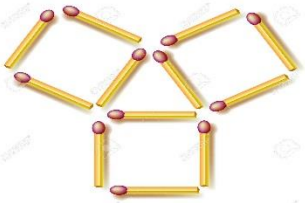
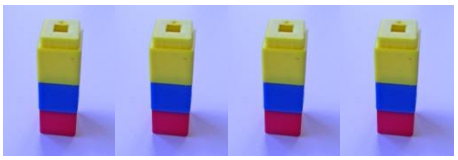
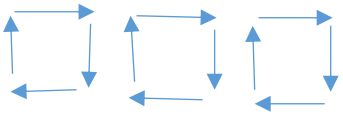
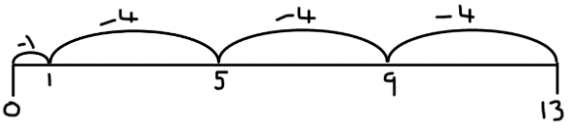
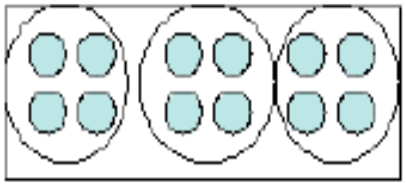
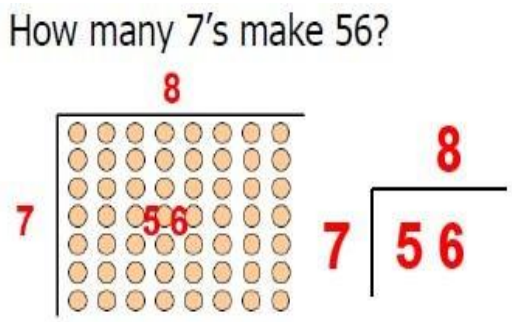
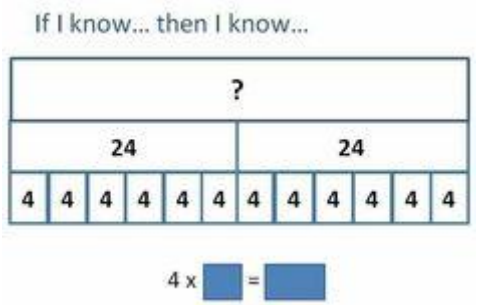
Partioning 23x6=

20x6=120
3x6=18
120+18=138

Teaching Points

Through doubling children make connections with 2,4, and 8 times tables
9x8=, 9x80=, 9x800=,90x8=, 900x8=, ?= 900x8= , 72= ?x8

Expanded method is used in year 3 in preparation for the formal short multiplication method
The number exchanged goes under the line

Year 3 Division	
NC Statutory Requirements • recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables • write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods • solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects	
Concrete	12 ÷ 4 Use of lollipop sticks to form squares- whole squares are made because we are dividing by 4.   There are 3 whole squares
Pictorial	12 ÷ 4=3 Children should be encouraged to use their times table facts; they could also represent groups on a number line. There are 3 whole squares,   
Abstract	  (Formal)
Teaching Points • The digits in the numbers used, initially, those that are being taught and reinforced through expected multiplication times tables knowledge.	

Year 4 Addition

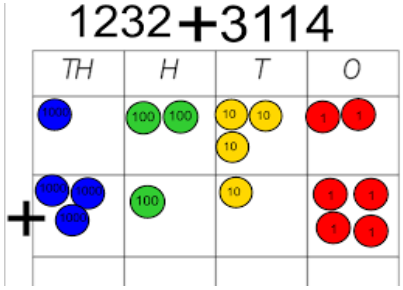
NC Statutory Requirements

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Concrete

2343+1220=3563

Pictorial



Abstract

Th	H	T	O
4	6	2	7
3	9	1	4
8	5	4	1
1		1	

Teaching Practice

- Building on strategy from Year 3 moving to using numbers which, when added, remain within the 10,000 boundary.
- Formal written strategy modelled with:
- Th H T U labelled in columns.
- One digit per square.
- Calculate from 'ones' (least significant figure).
- The exchanged number goes under the line

Year 4 Subtraction

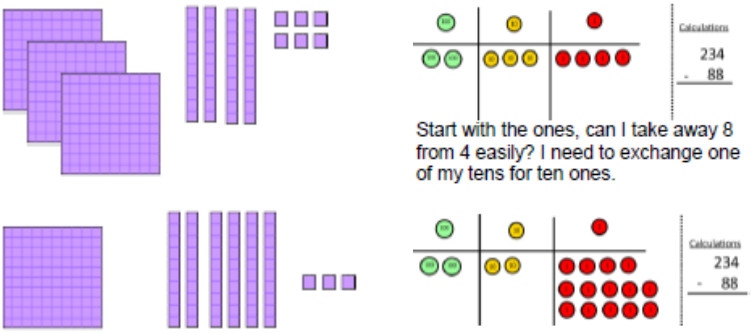
NC Statutory Requirements

- add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- estimate and use inverse operations to check answers to a calculation
- solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why

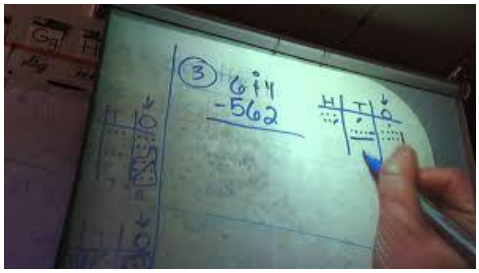
Concrete

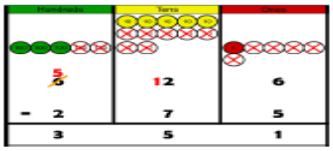
Progressively move towards 4-digit
3- and 4-digit where again, only one exchange is needed initially.

346-153=193

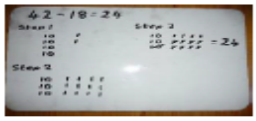


Pictorial





Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make.



When confident, children can find their own way to record the exchange/regrouping.

Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup.

Abstract

Progressing to subtraction of numbers to two decimal places in context (such as money £ including € and $ as appropriate)

£213.83 - £183.51

H	T	U • t	h
½	¹1	3 • 8	3
1	8	3 • 5	1
0	3	0 • 3	2

Estimating answers:

Rounding this calculation to nearest ten:
£210 - £180 = £30
1

Teaching Point

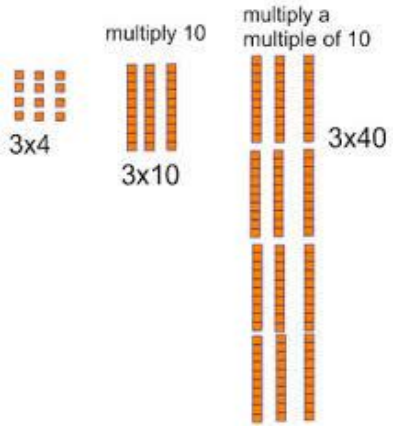
- Don't use number line for HTU – HTU (only exception is something like 1,000 – 279) which would involve too many exchanges.
- Note that when modelling practically, and until secure, only one exchange per calculation is required.

Year 4 Multiplication

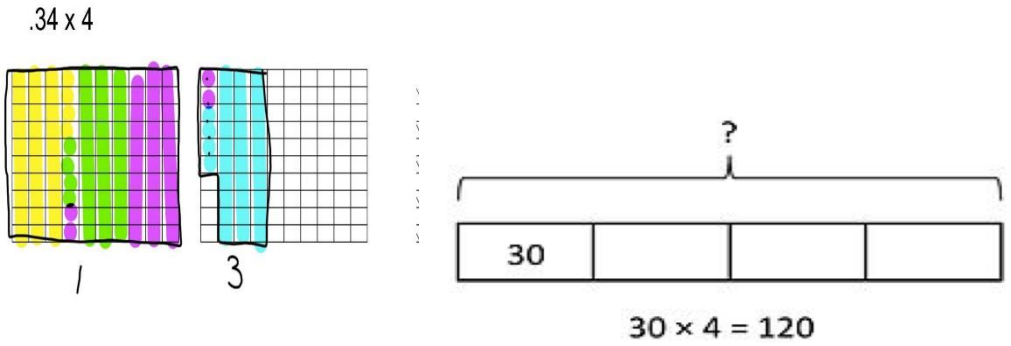
NC Statutory Requirements

- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Concrete



Pictorial



Abstract

Partitioning works well as a mental method, but children often make mistakes when using it as a written method. Pupils should be taught strategies such as:

'13 x 6 is the same as 10 x 6 and 3 x 6 (60 + 18) = 78'

Th	H	T	O
	3	2	6
x			3
		1	8
		6	0
	9	0	0
	9	7	8

Th	H	T	O
	3	2	6
x			3
	9	7	8
		1	

Teaching Points

- Progress onto missing numbers in the calculation.
- Expanded method is used to support the progression of the formal short multiplication.
- The exchanged digit goes under the line.

Year 4 Division

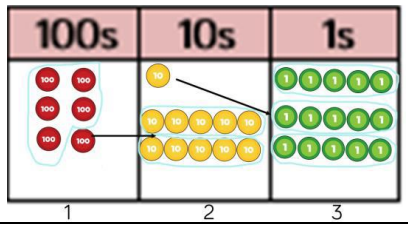
NC Statutory Requirements

- recall multiplication and division facts for multiplication tables up to 12 × 12
- use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- recognise and use factor pairs and commutativity in mental calculations
- multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

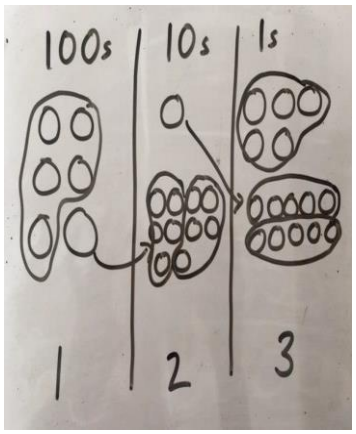
Concrete

Short division using place value counters to group.

615 ÷ 5



Pictorial



8 ÷ 2 is the same as

8 x 1 (or 8) = 4

2 2

SCALING is linked with SHARING:

'1/2 as big'

Blue is 2 x as big as red.

Abstract

$$5\overline{)615}\quad 123$$

Informal: Partitioning

600 ÷ 5= 120

10 ÷ 5= 2

5 ÷ 5= 1

120+2+1= 123

Teaching Points

- Initially use divisors that pupils are secure with e.g 2,3,5
- To secure the procedure and concept use numbers that divide equally.
- When pupils are secure introduce 'carrying over'
- Progressing on to missing numbers

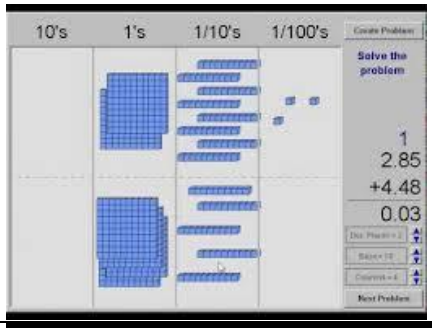
Year 5 Addition

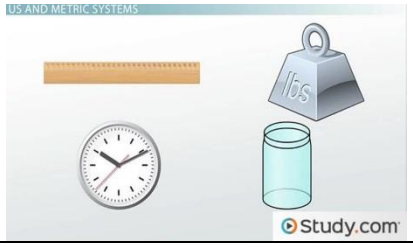
NC Statutory Requirements

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

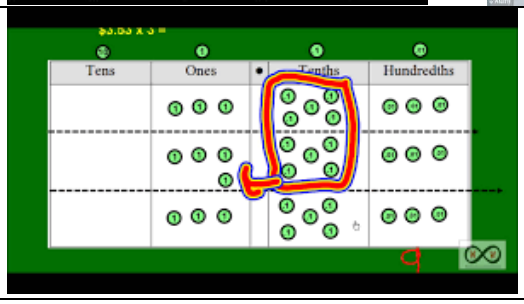
Concrete

2.83+9.50=





Pictorial



Abstract

Building on Y4 strategy and number choices moving to numbers, when added within 1 million.

	TTh	Th	H	T	O
	4	3	2	0	1
	2	2	1	2	4
+	3	1	3	2	1
	9	6	6	4	6

Progressing to addition of numbers to two decimal places in context (such as money £ including € and $ as appropriate) £132.52 + £213.83

					1/10	1/100
	H	T	U	•	t	H
	1	3	2	•	5	2
+	2	1	3	•	8	3
	3	4	6	•	3	5
			1			

Estimating answers:

Rounding this calculation to nearest ten:

£130 + £210 = £340

Teaching Points

- Note appropriateness of number above where there is only one 'carry' initially to ensure clarity and understanding of the layout and process. Building on Y4 strategy and number choices moving to numbers, when added within 1 million.
- Model when writing the answer, and when writing numbers such as that shown, the use of commas: 96,646
- Use of rounding to check the relevance of numbers in answer.
- When calculating using numbers involving decimals, a clear step to success must be the writing in of the decimal point in the answer area **first** to help when carrying past this boundary.
- Progress to missing numbers.
- Use inverse to check answers

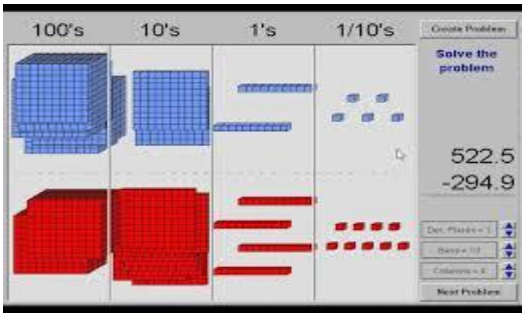
Year 5 Subtraction

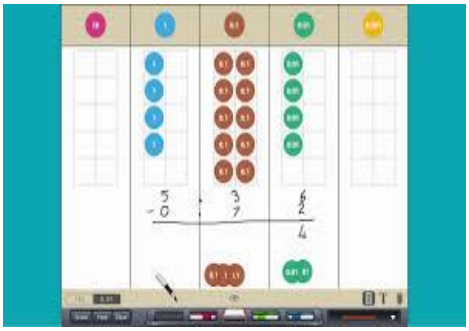
NC Statutory Requirements

- add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)
- add and subtract numbers mentally with increasingly large numbers
- use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.

Concrete

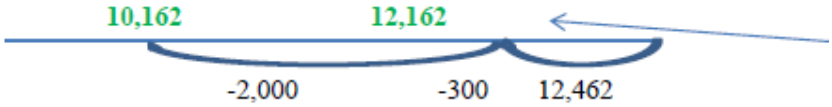
Strategies build on those of Year 4 and involve starting numbers of up to 100,000 and progressing to 1,000,000.





Pictorial

Mental Strategies:
When modelling and teaching mental strategies, refer to picturing the use of a number line and either counting back or on: Δ = 12,462 – 2,300



Abstract

Formal Written:

Th	H	T	U
7	~~8~~ 9	~~9~~ 10	16
2	5	9	8
5	3	0	8

Estimating answers:

E: 7900 – 2600 = 5300

Teaching Points

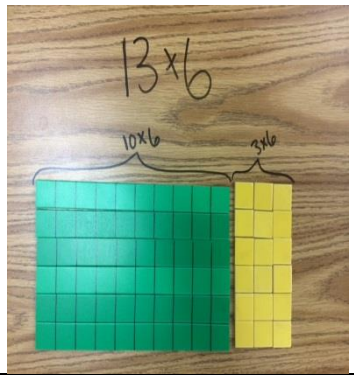
- Progressively, and before moving to larger numbers, begin to explore written strategies where '2 exchanges' are needed:
- Ensure exchanging is recapped in depth, using PV counters to consolidate conceptual understanding.

Year 5 Multiplication

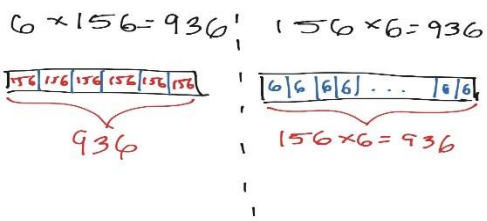
- **NC Statutory Requirements**
- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- 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
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Concrete

×	1	2	3	4	5	6	7	8	9	10
1	1	2	3	4	5	6	7	8	9	10
2	2	4	6	8	10	12	14	16	18	20
3	3	6	9	12	15	18	21	24	27	30
4	4	8	12	16	20	24	28	32	36	40
5	5	10	15	20	25	30	35	40	45	50
6	6	12	18	24	30	36	42	48	54	60
7	7	14	21	28	35	42	49	56	63	70
8	8	16	24	32	40	48	56	64	72	80
9	9	18	27	36	45	54	63	72	81	90
10	10	20	30	40	50	60	70	80	90	100



Pictorial



Abstract

HT1

242

X 7

1694

2 1

```
   1 2 4
 x   2 6
 -------
   7 4 4
 1   2
 2 4 8 0
 -------
 3 2 2 4
 -------
 1 1
```

Answer: 3224

Formal

147 x 6

100x 6=600
40x6= 240
7x6 =42
=842

Informal

Teaching Points

- Double 3 x table gives you 6 x table, 12 x table.
- Double 2 x table gives you 4 x table, 8 x table
- Double 5 x table gives you 10 x table

Year 5 Division

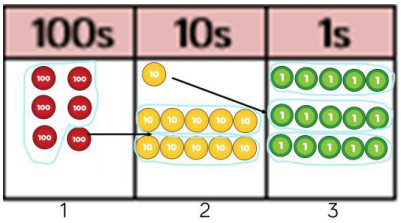
NC Statutory Requirements

- identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- know and use the vocabulary of prime numbers, prime factors and composite (nonprime) numbers
- establish whether a number up to 100 is prime and recall prime numbers up to 19
- multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- multiply and divide numbers mentally drawing upon known facts
- 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
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign
- solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates.

Concrete

Short division using place value counters to group.

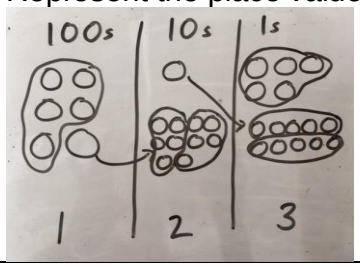
615 ÷ 5



1. Make 615 with place value counters.
2. How many groups of 5 hundreds can you make with 6 hundred counters?
3. Exchange 1 hundred for 10 tens.
4. How many groups of 5 tens can you make with 11 ten counters?
5. Exchange 1 ten for 10 ones.
6. How many groups of 5 ones can you make with 15 ones?

Pictorial

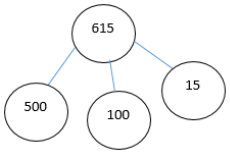
Represent the place value counters pictorially.



Abstract

Using the part whole model below, how can you divide 615 by 5 without using short division?

$$5\overline{)615} = 123$$



I have £615 and share it equally between 5 bank accounts. How much will be in each account?

615 pupils need to be put into 5 groups. How many will be in each group?

615 ÷ 5 =

? = 615 ÷ 5

Short division

98 ÷ 7 becomes

$$7\overline{)98} = 14$$

Answer: 14

432 ÷ 5 becomes

$$5\overline{)432} = 86 \text{ r } 2$$

Answer: 86 remainder 2

496 ÷ 11 becomes

$$11\overline{)496} = 45\frac{1}{11}$$

Answer: $45\frac{1}{11}$

Teaching Points

- Interpret the remainders within the context of the question.

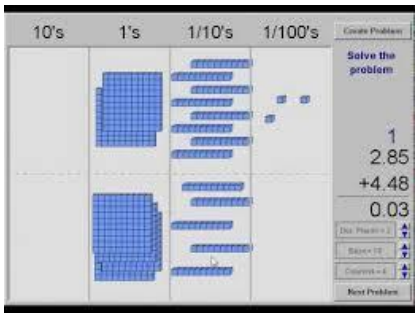
Year 6 Addition

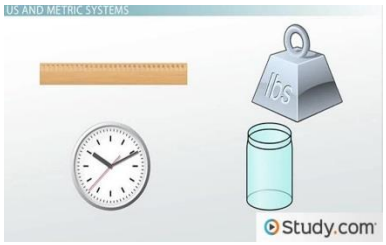
NC Statutory Requirements

- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Concrete

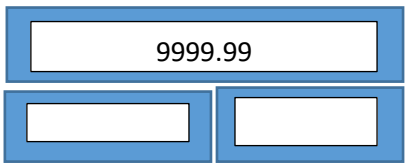
2.83+9.50=

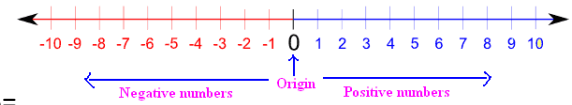




Pictorial

Th	H	T	U	.	$\frac{1}{10}$	$\frac{1}{100}$
○○	○○	○○	○○		○○	○○
○○	○○	○○	○○		○○	○○
○○	○○	○○	○○		○○	○○
○○	○○	○○	○○		○○	○○
○	○	○	○		○	○





-3+5=

Abstract

Building on Y5 strategy and number choices moving to numbers, when added within **10 million**.

Children secure strategies for addition when adding more than two numbers including numbers to three decimal places.

$$\begin{array}{r} 1\ 2\ 0\ 5\ 3\ 7 \\ 2\ 3\ 4\ 2\ 7\ 1 \\ +\ 3\ 2\ 3\ 2\ 2\ 1 \\ \hline 6\ 7\ 8\ 0\ 2\ 9 \\ \hline \end{array}$$

$$\begin{array}{r} 0 \bullet 5\ 5\ 7 \\ 1 \bullet 2\ 1\ 1 \\ +\ 0 \bullet 2\ 0\ 2 \\ \hline 1 \bullet 9\ 7\ 0 \\ \hline \end{array}$$

Calculating decimal numbers to three decimal places:

Teaching Points

- Note appropriateness of numbers: initially, when dealing with this size of numbers, not requiring numerous 'carrying' to ensure clarity and understanding of application of strategy.
- Model when writing the answer, and when writing numbers such as that shown, the use of commas: 678,029 and modelling reading the numbers within the separated groups of numbers.
- Reinforce and reiterate the value of each digit when talking about the number.
- Note in the example, the use of '0' as a place value holder here and as a digit within the decimal number itself: to reiterate the understanding of its importance and 'value'.

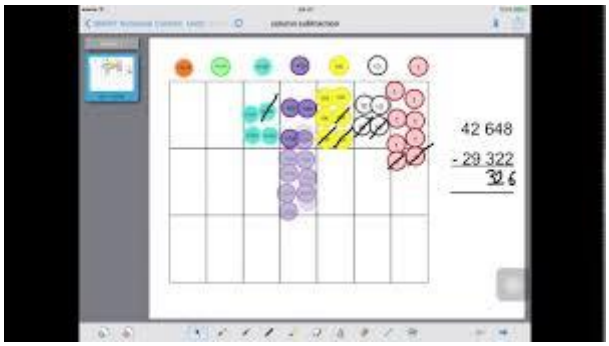
Year 6 Subtraction

NC Statutory Requirements

- perform mental calculations, including with mixed operations and large numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why

Concrete

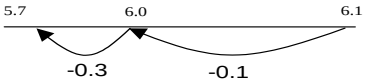
Place value counters

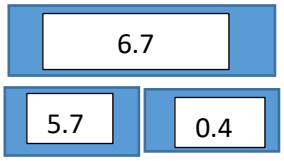


Pictorial

Pupils apply written subtraction skills to numbers up to and including three decimal places (3dp). These are presented in contextual situations such as units of measure

6.1 – 0.4 = 5.7





Abstract

Strategies build on those of Year 5 and involve starting numbers of up to 1,000,000 and progressing to 10,000,000.

Pupils apply their learning of subtraction strategies and combine these with other areas of learning to solve problems such as:

632,465 + **(745,676 – 325,534)** = progressing to

8,675,509 **–** (9,645,253 **–** 2,867,675) =

Calculations and ranges of numbers are applied through worded problems including units of measure.

Teaching Points

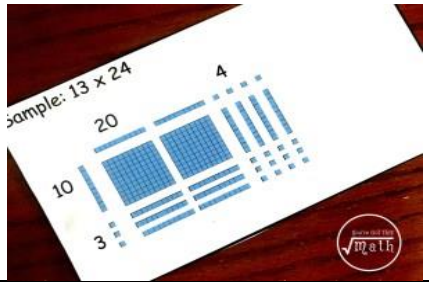
- Model the use of brackets in multi-step problems identifying brackets as the initial step needed and combining this with an additional written strategy.
- Pupils encouraged to apply learning of subtraction strategies including estimation; choosing the most efficient methods and then checking answers.

Year 6 Multiplication

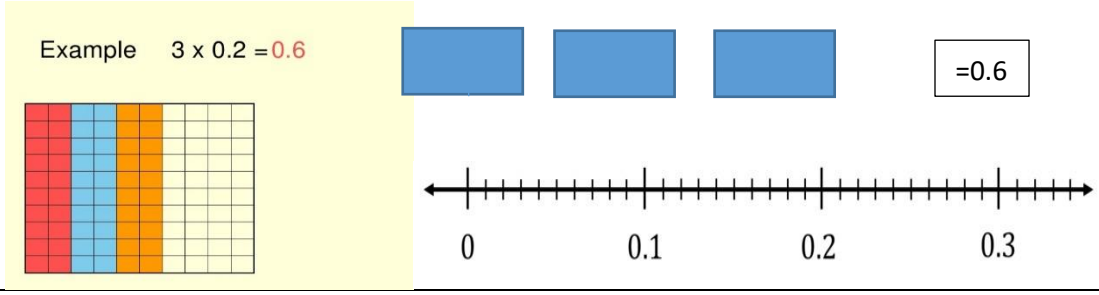
NC Statutory Requirements

- multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
- 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
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations

Concrete



Pictorial



Abstract

Formal

Pupils progress towards multiplying Th H T U x T U and H T U . t h x T using formal written method of long multiplication:

2 3 1 4 x 2 3 =

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

Progress to multiplication of decimals, in the context of money is recommended to ensure a concrete understanding of the concept and value of digits: **£36.21 x 17**

	3	6	•	2	1
x	1	7			
2	5	3	•	4	7
3	6	2	•	1	0
6	1	5	•	5	7

Informal (Building on year 5 partitioning strategy pupils can use factor pairs to mentally solve long multiplication)

Factor Pairs

17x12=204

(17x3)x2x2

51x2=102x2=204

Partitioning: 113 x 23	
20 x 113 10x113=1130 10x113=1130 =2260	3 x 113 3x100=300 3 x 10=30 3 x 3=9 =339
2260+339=2599	

Teaching Points

- Build from the 'teens' to 20s and reinforce efficiency where the number could apply x10 and doubling knowledge
- Be aware of how calculation maybe in different order. Progress onto missing numbers in the calculation.

Year 6 Division

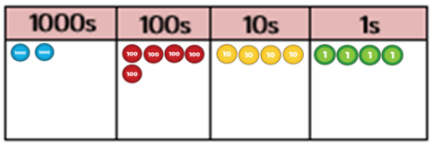
NC Statutory Requirements

- 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
- divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context
- perform mental calculations, including with mixed operations and large numbers
- identify common factors, common multiples and prime numbers
- use their knowledge of the order of operations to carry out calculations involving the four operations

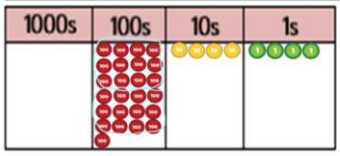
Concrete

Long division using place value counters

2544 ÷ 12

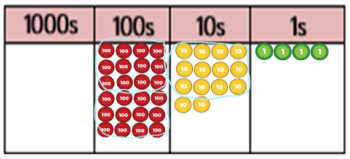


We can't group 2 thousands into groups of 12 so will exchange them.



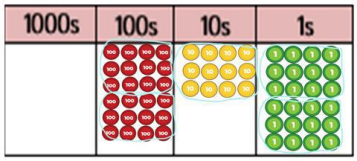
We can group 24 hundreds into groups of 12 which leaves with 1 hundred.

$$\begin{array}{r} 02 \\ 12\overline{)2544} \\ 24 \\ \hline 1 \end{array}$$



After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.

$$\begin{array}{r} 021 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 2 \end{array}$$

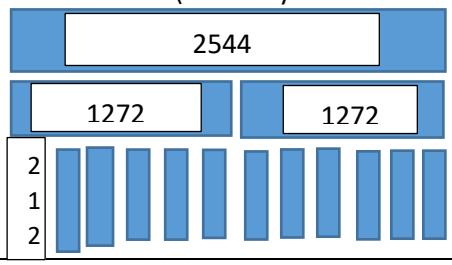


After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder.

$$\begin{array}{r} 0212 \\ 12\overline{)2544} \\ 24 \\ \hline 14 \\ 12 \\ \hline 24 \\ 24 \\ \hline 0 \end{array}$$

Pictorial

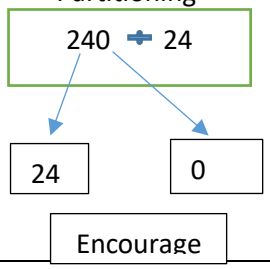
2544 – 12=212 (divide by factors of the divisor)



Divide by 2

Divide by 6

Partitioning



Encourage

Abstract

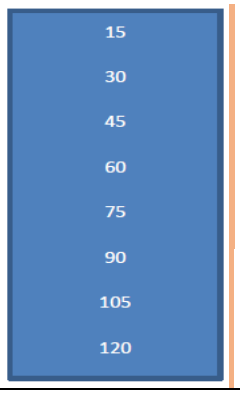
Formal: Long Divsion

Pupils use long division to calculate:

432 ÷ 15 =

This answer can be shown as a quotient (rather than an integer remainder): 28 12/15 = 28 4/5

Progressing to long division to find a decimal remainder:



$$\begin{array}{r} 2\ 8.\ 8 \\ 15\overline{)4\ 3\ 1^{13}2\cdot\ 120} \end{array}$$

Teaching Points

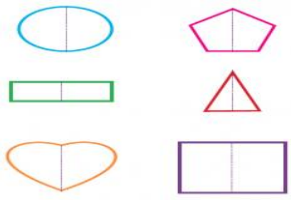
- Ensure secure understanding of place holder and place value.

Year 1 - Fractions

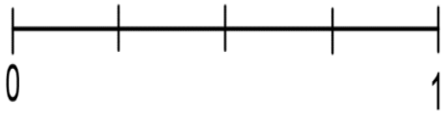
Pupils should be taught to:

- Recognise, find and name a half as one of two equal parts of an object, shape or quantity.
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Concrete



Pictorial



Show half and quarter on a number line or bar model

Abstract

Tim gets half of 12 coins. How many coins does he get?

How many halves can I get from the two whole apples?

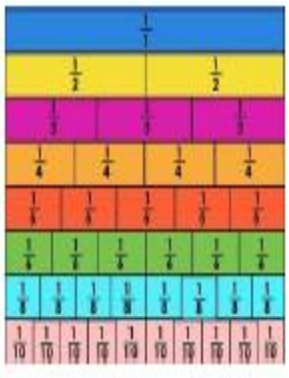
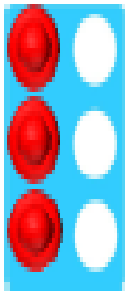
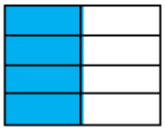
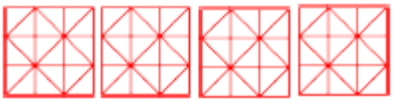
- How many ways can I share these pizzas between four people?

Teaching Points:

Year 2 - Fractions

Pupils should be taught to:

- Recognise, find, name and write fractions $\frac{1}{3}$, $\frac{1}{4}$, $\frac{2}{4}$ and $\frac{3}{4}$ of a length, shape, set of objects or quantity
- Write simple fractions for example, $\frac{1}{2}$ of 6 = 3 and recognise the equivalence of $\frac{2}{4}$ and $\frac{1}{2}$.

Concrete Numicon Cubes Fraction wall	 $\frac{4}{4}$ of this tower is blue. How else can we describe this?  
Pictorial	Write a simple fraction sentence for the space shaded below.  • Can you shade this diagram in different ways to show $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{6}$ and $\frac{1}{9}$ 
Abstract	$\frac{1}{2}$ of 6 = ☐ $\frac{1}{\square}$ of 12 = 3 $\frac{2}{4}$ of ☐ = 4

Teaching Points:

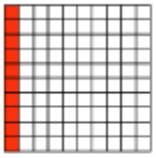
Year 3- Fractions

Pupils should be taught to:

- Count up and down in tenths; recognise that tenths arise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10
- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators
- Recognise and use fractions as numbers: unit fractions and non-unit fractions with small denominators
- Recognise and show, using diagrams, equivalent fractions with small denominators

Concrete

- Shade the 100 square in, to show different amount of tenths.
  How many ways can you do this?



Base ten

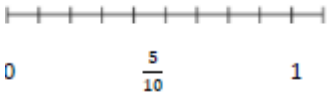
Pictorial

- Shade the diagram to continue the pattern.

Complete the fractions to describe the set of objects.

Bar model

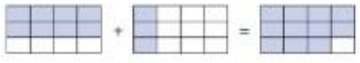
Here is a number line from 0 - 1. Can you fill in the missing fractions on the number line?



Number line

Add and subtract fractions with the same denominator within one whole :

Eg: 8/12 + 3/12 = 11/12



Abstract

- Finish the sequences:

$\frac{1}{10}, \frac{2}{10}, \frac{3}{10}, \_\_, \_\_, \_\_$

On a number line o to 1, label:
$0.7, \frac{3}{10}, \frac{1}{10}, 0.9, \frac{10}{10}$

Teaching Points:

Teaching point – add numerator - ensure children recognise what a whole looks like.

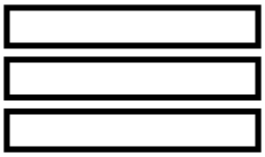
Year 4 - Fractions

Pupils should be taught to:

- Recognise and show, using diagrams, families of common equivalent fractions
- Count up and down in hundredths; recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten.
- Add and subtract fractions with the same denominator

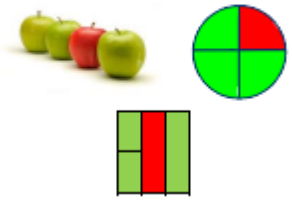
Concrete

- Fold the strips of paper into halves, quarters and eighths.

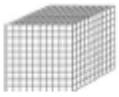


Shade in one half and find the equivalent fractions for quarters and eighths.

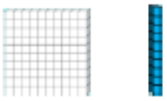
Look at the three pictures. What's the same and what's different?



If this block is worth 1 whole



Work out the value of:

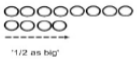


Pictorial

8 ÷ 2 is the same as

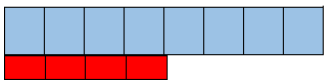
8 x 1/2 (or 8/2) = 4

SCALING is linked with SHARING:



'1/2 as big'

Blue is 2 x as big as red.

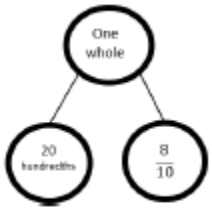


Calculate:

- Stick the bar models in your book and draw a number line for each.

Colour in the equivalent fractions.

True or false? Explain why.



Create your own part whole models.

Abstract

- Find three ways to complete each calculation.

Fill in the box:

$\frac{5}{8} + \square = \frac{7}{8}$

$\frac{5}{6} - \square = \frac{1}{6}$

$\frac{\square}{\square} + \frac{\square}{\square} = \frac{8}{9}$

$\frac{\square}{\square} - \frac{\square}{\square} = \frac{8}{9}$

- How many ways can you complete the calculation?

$\frac{2}{7} + \frac{\square}{7} = \frac{7}{7} - \frac{\square}{7}$

Teaching Points:

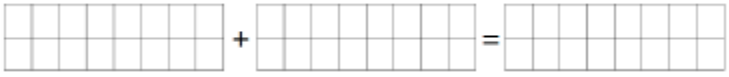
Year 5 - Fractions

Pupils should be taught to:

- Compare and order fractions whose denominators are all multiples of the same number
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Add and subtract fractions with the same denominator and denominators that are multiples of the same number
- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements as a mixed number

Concrete

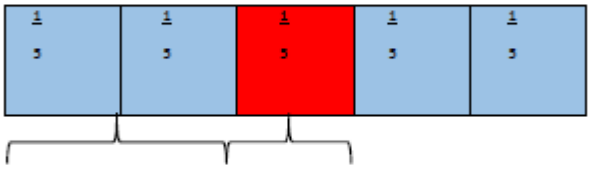
$\frac{5}{8} + \frac{3}{16} = \frac{13}{16}$

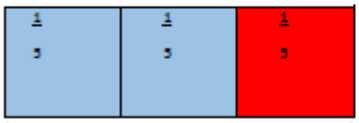


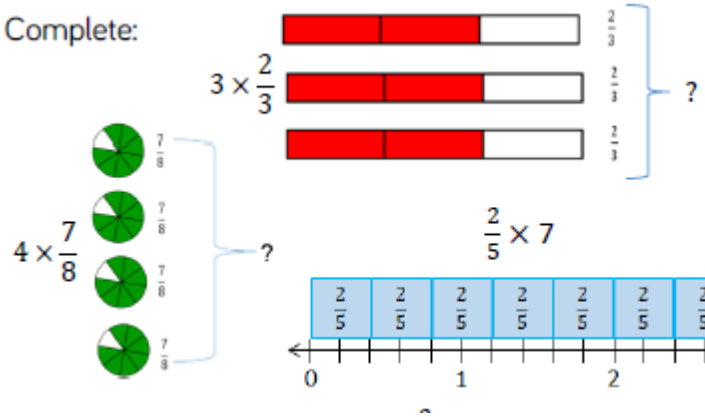
Pictorial

$\frac{2}{5} + \frac{1}{5} =$

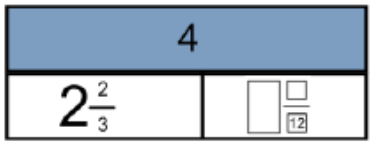
should be taught using fraction pieces, strips of paper, diagrams or bar modelling.

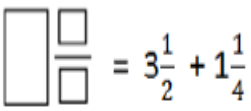






Abstract





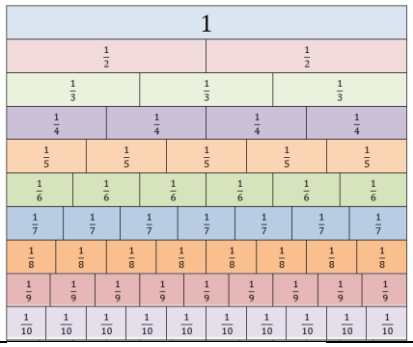
Teaching Points:

Year 6 - Fractions

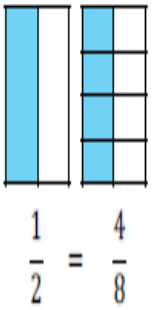
Pupils should be taught to:

- Use common factors to simplify fractions; use common multiples to express fractions in the same denominator
- Compare and order fractions, including fractions > 1
- Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions; divide fractions by whole number; multiply fractions

Concrete

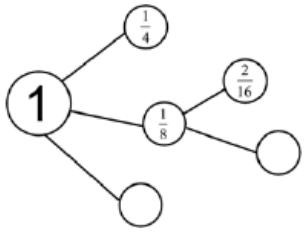


Take two pieces of paper the same size.
Fold on piece into two equal pieces.
Fold the other into eight equal pieces.
What equivalent fractions can you find?

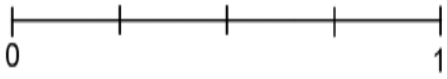


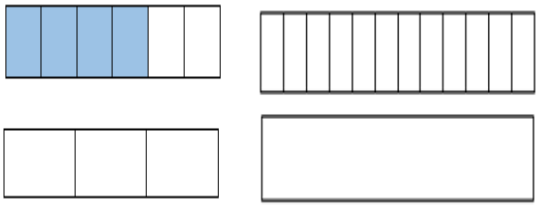
$\frac{1}{2} = \frac{4}{8}$

Pictorial



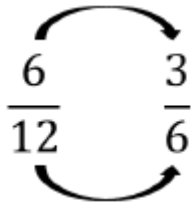
On the number line place $\frac{2}{8}, \frac{4}{8}, \frac{1}{8}, \frac{4}{4}, \frac{7}{8}, \frac{3}{16}$





$2 \div \frac{2}{3}$

Abstract



Convert so that both fractions have the same denominator

$\frac{3}{5} + \frac{4}{7}$ (both denominators go into 35)

Teaching Points:

FS2-Maths Vocabulary

Adding and subtracting

add, more, and
make, sum, total
altogether
score
double
one more, two more, ten more...
how many more to make... ?
how many more is... than...?
take (away), leave
how many are left/left over?
how many have gone?
one less, two less... ten less...
how many fewer is... than...?
difference between
is the same as

Solving problems

Reasoning about numbers or shapes
pattern
puzzle
answer
right, wrong
what could we try next?
how did you work it out?
count, sort
group, set
match
same, different
list

Problems involving 'real life' or money

compare
double
half, halve
pair
count out, share out
left, left over
money
coin
penny, pence, pound
price
cost
buy
sell
spend, spent
pay
change
dear, costs more
cheap, costs less, cheaper
costs the same as
how much...? how many...?
total

Year 1 Maths Vocabulary

words new to Year 1 are in red

Addition and subtraction

+, add, more, plus
make, sum, total
altogether
score
double, near double
one more, two more... ten more
how many more to make...?
how many more is... than...?

method
jotting
answer
right, correct, wrong
what could we try next?
how did you work it out?
number sentence
sign, operation, symbol, equation
how much more is...?

-, subtract, take (away), minus leave
how many are left/left over?
how many are gone?
one less, two less, ten less...
how many fewer is... than...?
how much less is...?
difference between
half, halve
=, equals, sign, is the same as

Solving problems- Making decisions and reasoning

pattern
puzzle
answer
right, wrong
what could we try next?
how did you work it out?
count out, share out, left, left over
number sentence
sign, operation

Year 2 Maths Vocabulary

Words new to Year 2 are in red

Addition and subtraction

+, add, addition, more, plus
make, sum, total
altogether
score
double, near double
one more, two more... ten more... one hundred more
how many more to make...?
how many more is... than...?
how much more is...?

-, subtract, take away, minus
leave, how many are left/left over?
one less, two less... ten less... one hundred less
how many less is... than...?
difference between
half, halve
=, equals, sign, is the same as
tens boundary

Multiplication and division

lots of, groups of
x, times, multiply, multiplied by
multiple of
once, twice, three times,
four times, five times... ten times...
times as (big, long, wide and so on)
repeated addition
array
row, column
double, halve
share, share equally
one each, two each, three each...
group in pairs, threes... tens
equal groups of
÷, divide, divided by, divided into, left, left over

Year 3 Maths Vocabulary

Words new to Year 3 are in red

Addition and subtraction

+, add, addition, more, plus
make, sum, total
altogether
score
double, near double
one more, two more... ten more... one hundred more
how many more to make ...?
how many more is... than ...?
how much more is...?

-, subtract, take (away), minus
leave, how many are left/left over?
one less, two less... ten less... one hundred less
how many fewer is... than ...?
how much less is...?
difference between
half, halve
=, equals, sign, is the same as
tens boundary, hundreds boundary

Multiplication and division

lots of, groups of
x, times, multiplication, multiply, multiplied by
multiple of, product
once, twice, three times,
four times, five times... ten times...
times as (big, long, wide and so on)
repeated addition
array
row, column
double, halve
share, share equally
one each, two each, three each...
group in pairs, threes... tens
equal groups of
÷, divide, division, divided by, divided into
left, left over, remainder

Solving problems-Making decisions and reasoning

pattern, puzzle
calculate, calculation
mental calculation
method, strategy
jotting
answer
right, correct, wrong
what could we try next?
how did you work it out?
number sentence
sign, operation, symbol, equation

Year 4 Maths Vocabulary

Words new to Year 4 are in red

Addition and subtraction

add, addition, more, plus, increase
sum, total, altogether
score
double, near double
how many more to make...?
subtract, subtraction, take away, minus, decrease
leave, how many are left/left over?
difference between
half, halve
how many more/fewer is... than...?
how much more/less is...?
is the same as, equals, sign
tens boundary, hundreds boundary
inverse

Multiplication and division

lots of, groups of
times, multiplication, multiply, multiplied by
multiple of, product
once, twice, three times
four times, five times... ten times
times as (big, long, wide, and so on)
repeated addition
array
row, column
double, halve
share, share equally
one each, two each, three each...
group in pairs, threes... tens
equal groups of
divide, division, divided by, divided into, divisible by
remainder
factor, quotient
inverse

Solving problems

pattern, puzzle
calculate, calculation
mental calculation
method
jotting
answer
right, correct, wrong
what could we try next?
how did you work it out?
number sentence
sign, operation, symbol, equation

Year 5 Maths Vocabulary

Words new to Year 5 are in red

Addition and subtraction
add, addition, more, plus, increase
sum, total, altogether
score
double, near double
how many more to make...?
subtract, subtraction, take (away), minus, decrease
leave, how many are left/left over?
difference between
half, halve
how many more/ fewer is... than...?
how much more/less is...?
equals, sign, is the same as
tens boundary, hundreds boundary
units boundary, tenths boundary
inverse

Multiplication and division
lots of, groups of
times, multiply, multiplication, multiplied by
multiple of, product
once, twice, three times
four times, five times... ten times
times as (big, long, wide, and so on)
repeated addition
array
row, column
double, halve
share, share equally
one each, two each, three each...
group in pairs, threes... tens
equal groups of
divide, divided by, divided into, divisible by
remainder
factor, quotient, divisible by
inverse

Solving problems
pattern, puzzle
calculate, calculation
mental calculation
method, strategy
jotting
answer
right, correct, wrong
what could we try next?
how did you work it out?
number sentence
sign, operation, symbol, equation

Year 6 Maths Vocabulary

Words new to Year 6 are in red

Addition and subtraction

add, addition, more, plus, increase
sum, total, altogether
score
double, near double

Positive
Negative
Order of operations (BIDMAS)

how many more to make...?
subtract, subtraction, take (away), minus, decrease
leave, how many are left/left over?
difference between
half, halve
how many more/fewer is... than...?
how much more/less is...?
is the same as, equals, sign
tens boundary, hundreds boundary
units boundary, tenths boundary
inverse

Multiplication and division

lots of, groups of
times, multiplication, multiply, multiplied by
multiple of, product
once, twice, three times
four times, five times... ten times
times as (big, long, wide, and so on)
repeated addition
array, row, column
double, halve
share, share equally
one each, two each, three each...
group in pairs, threes... tens
equal groups of
divide, division, divided by, divisor, divided into
remainder
factor, quotient, divisible by
inverse
Numerator
Denominator
Prime number
Factors
Multiples
Highest common factor
Lowest common factor
Lowest common multiple
Highest common multiple
Ratio
Proportion

Solving problems

pattern, puzzle
calculate, calculation
mental calculation
method, strategy
jotting
answer
right, correct, wrong
what could we try next?
how did you work it out?
number sentence
sign, operation, symbol, equation

I know this …so…..

Shape Space and Measure

Faces, vertices
Quadrilaterals
Circumference
Diameter
Imperial
Metric
Quadrants