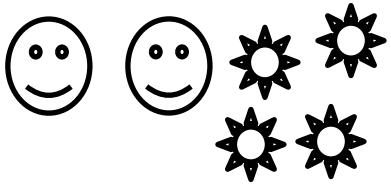
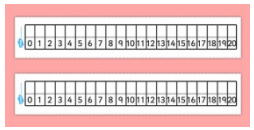
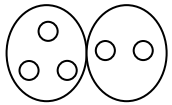
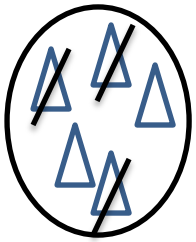
CALSHOT PRIMARY SCHOOL

Calculation Policy

'At Calshot we aim to provide the highest quality of learning and care for ALL children in a safe and enjoyable environment, nurturing personal values, in partnership with parents, carers and the wider community. We expect everyone in our school to strive to achieve their full potential.'

Calculation Policy for Foundation Stage: Calshot Primary School			
ADDITION	**SUBTRACTION**	**MULTIPLICATION**	**DIVISION**
Key Objectives • Subitise: instantaneously recognise a number of objects • Find the total number of items in two groups by counting all of them. • Using quantities and objects to add two single digit numbers and count on to find the answers. In practical activities begin to use the vocabulary involved in addition.	**Key Objectives** • Subitise: instantaneously recognise a number of objects • Begin to relate subtraction to taking away. • In practical activities begin to use the vocabulary involved in subtraction. • Using quantities and objects, subtract single digit numbers and count back to find the answer.	**Key Objectives** • Skip count repeated groups of the same size. • Solve problems including doubling.	**Key Objectives** • To share objects into equal groups and count how many there are in each group. • To solve problems using sharing and halving.
Oral and practical work Songs and rhymes Dice and number games Multisensory exploration of number and number in the environment. Use the vocabulary associated with addition in practical activities – add, more, make, sum, total, altogether, one more, two more, ten more, how many more to make…? How many more is…than…? Finding one more than, practically using objects, and one more than any given number, using a number track or number line.	**Oral and practical work** Songs and rhymes Use Computing programs e.g. Tizzy's Island, Topmarks, Early Years Package. Multisensory exploration of number and numbers in the environment. Use the vocabulary associated with subtraction in practical activities - Take away, leave, how may are left/ left over? How many are gone? One less, two less, ten less, how many fewer is…? Difference between, is the same as… Dice and number games, counting back beginning to use a number line.	**Oral and practical work** Use the vocabulary associated with multiplication (e.g. lots of, groups of) Skip counting in ones, twos and tens. Matching pairs, e.g. socks  Number songs and rhymGames Finding doubles in dominoes Counting objects in repeated sets (repeated addition)	**Oral and practical work** Practical activities, songs and rhymes. Use the vocabulary associated with division; halve, share, share equally, one each, two each, three each, equal groups of, left, left over. Sharing objects practically.  Make use of everyday situations; sharing out fruit at snack time etc.

Number track  Gathering collections of practical objects with 1-1 correspondence (matching a number of items to a number) Using Numicon to add numbers together and use Computing programs e.g. Tizzy's Island, Topmarks, Early Years Package. Number stories for combining sets e.g. 3 pigs in a field, 2 in a sty, how many altogether? Teacher models 3+ 2 = 5 5 = 3 + 2  Children recording calculations.	 Number stories using objects 5 – 3 =  How many are there? How many now? (After some have been removed) Finding one less practically using objects and finding one less than any given number. Finding the difference between numbers using Numicon.  Teacher modelling number sentences and children recording. 5 – 3 = 2 2 = 5 – 3	 Using Numicon to begin counting in repeated sets 	In the role play area – sharing objects in a practical way – e.g. sharing out cutlery and crockery items for setting a table.

Calculation Policy for Year 1: Calshot Primary School

ADDITION

Informal methods to support mental calculations

- Read, write and interpret mathematical statements, using symbols + - and =
- Represent and use number bonds and related addition facts within 20
- Add one digit and two digit numbers up to 20, including zero.
- Solve one- step problems using concrete objects and pictorial representations and missing number problems such as 10 = 7 + ☐
- Given a number, identify (and use the language) one more
- Use everyday objects to check calculations

Written calculations

- Begin to compare (what's the same/ different?) for commutative sums eg. 3 + 7 = 7+ 3
- Memorise and reason with number bonds to 10 and 20 in several forms
- Add using objects, Numicon, cubes and with number lines
- Ensure pre-calculation steps are understood including:

1. Counting objects (involving simple concrete problems)
2. Conservation of number (rearrangement does not change quantity)
3. Recognise place value in numbers beyond 20

SUBTRACTION

Informal methods to support mental calculations

- Subtract one digit and two digit numbers to 20, including zero
- Read, write and interpret mathematical statements using symbols (+, -, =) signs
- Represent and use number bonds and related subtraction facts within 20.
- Solve one-step problems using concrete objects and pictorial representations and missing number problems such as ☐ = - 9
- Memorise and reason with number bonds to 10 and 20
- Use everyday objects to check calculations

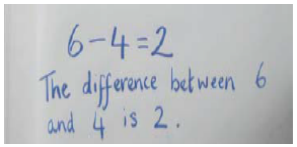
Written calculations

- Subtract one-digit and two- digit numbers to 20, including zero.

  7– 3 = ☐ 7 - ☐ = 4

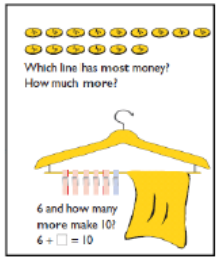
  ☐ - 3 = 4 17 – 13 = ☐ 17 - ☐ = 4
- Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
- Represent and use number bonds and related subtraction facts within 20.

4. Counting as reciting and enumerating (saying one number after another in the correct order)

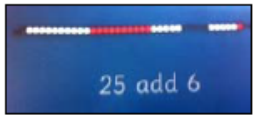


Fractions (if needed)
Not applicable

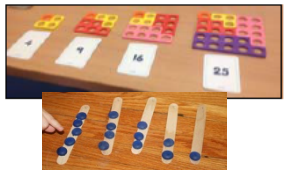
Concrete and pictorial representations, including:



Number tracks

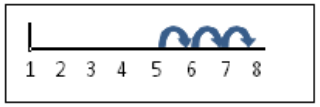


Bead strings



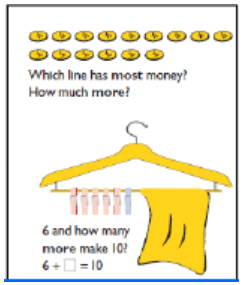
Real everyday objects

Number lines

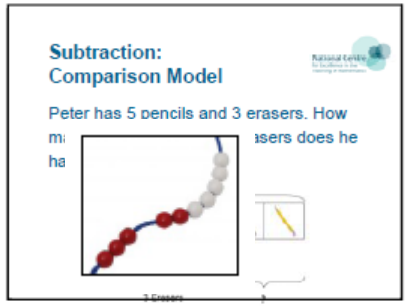


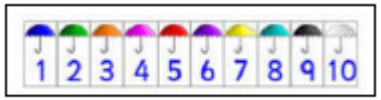
Fractions (if needed)
Not applicable

Concrete and pictorial representations, including:



Hands and children themselves





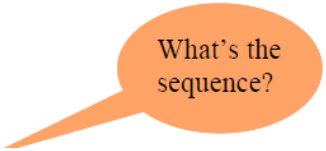
Bead strings, number tracks and lines

Calculation Policy for Year 1: Calshot Primary School

MULTIPLICATION	DIVISION

Informal methods to support mental calculations

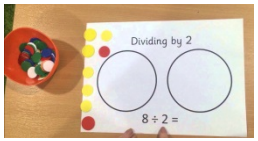
- Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.
- Count in multiples of twos, fives and tens with equipment, songs & rhythms, and including by rote.
- Skip counting in 2s e.g. counting socks, shoes, animal legs…
- Skip counting in 5s e.g. counting fingers, fingers in gloves, toes…
- Skip counting in 10s e.g. counting fingers, toes…
- Doubles up to 10
- Recognising odd and even numbers
- Write as a number pattern (e.g. 5, 10, 15…; 2, 4, 6…; 10, 20, 30…)



Informal methods to support mental calculations

The relationship between multiplication and division must be continually considered.

- 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.
- Children should be able to make connections between arrays, number patterns and counting in twos, fives and tens.
- Count on or back in 2s, 5s and 10s and look for patterns.

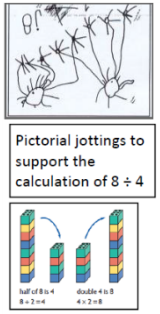


Written calculations

There is no statutory requirement for written multiplication in Year 1; however, it may be helpful to encourage children to begin to write it as a repeated addition sentence in preparation for Year 2.

E.g. 2 + 2 + 2 + 2 = 8.

It is important to use a range of models to develop understanding of multiplication. Children can then make connections between arrays, number patterns and counting in twos, fives and tens.



Pictorial jottings to support the calculation of 8 ÷ 4

Written calculations

Children should experiment with the concepts of sharing and grouping in a number of ways.

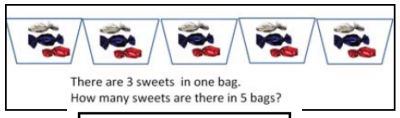
To begin with, they use their own recording, which will move towards fluent, symbolic notation in Year 2.

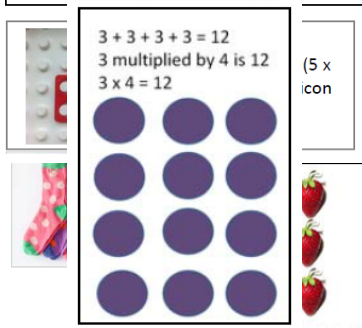
Understanding and recording should be continuously supported by the use of arrays as a default model, as well as other useful representations, (see below.)

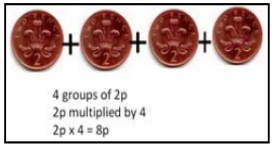
Fractions (if needed)

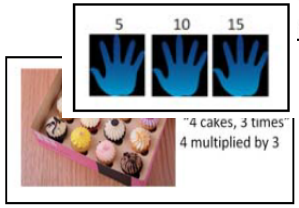
Not applicable

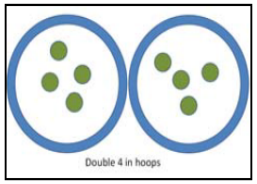
Concrete and pictorial representations, including:











Fractions (if needed)

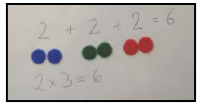
- Recognise, find and name a half as one of two equal parts of an object, shape or quantity.
- Recognise, find and name a quarter as one of four equal parts of an object, shape or quantity.

Concrete and pictorial representations, including:

Use a range of concrete and pictorial representations that will support children's recording and understanding of sharing as division and the link with multiplication.

Here, the cakes are placed in an array formation.

How can we share 6 cakes between 3 people?

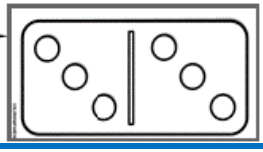


How many 2 tiles can we fit on the 6 tile?

Children should use manipulatives (such as Numicon and Base 10) and real-life objects to support their recording and understanding of grouping and the link with multiplication. Dominoes and dice reinforce concepts of doubling and halving.

Moving from concrete to pictorial, counters represent the cakes to reinforce the relationship between multiplication and division.

"Double 3 is 6. Half of 6 is 3."



ADDITION

Informal methods to support mental calculations

Add numbers using concrete objects, pictorial representations and mental methods including:

- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Adding three one-digit numbers

17 + 2 = 19 12 + 4 = 16
57 + 2 = 59 32 + 34 = 66

Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.

Written calculations

Children should understand the commutative law of addition (addition of two numbers can be done in any order)

12 + 30 = 30 + 12
□ + 25 = 25 + 41

Children will record addition by using:

- Number lines
- Inverse operations
- A number square
- Adding numbers in different order

65 = 60 + 5
65 = 50 + 15
65 = 40 + 25
65 = 30 + 35
65 = 20 + 45
65 = 10 + 55

Children will begin to record addition in columns to support place value and prepare for formal written methods with larger numbers.

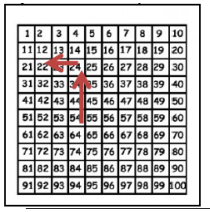
$$\begin{array}{r} 30+4 \\ 20+5 \\ \hline 50+9 \end{array}$$

SUBTRACTION

Informal methods to support mental calculations

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



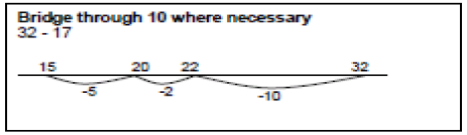
54—32 = 22

Recall and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100.

Written calculations

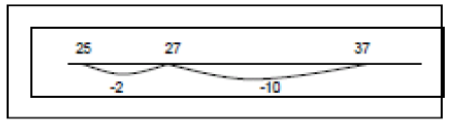
Children should understand that subtraction is not commutative (the numbers cannot be repositioned in the calculation)

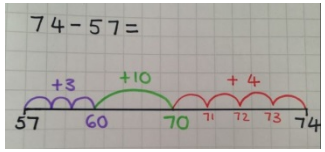
Jottings to support informal methods:



Written recording:

37 – 12 = 37 – 10 - 2
= 27 – 2
= 25

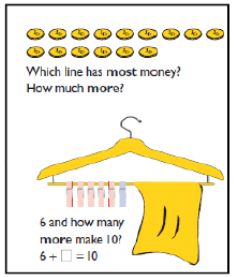


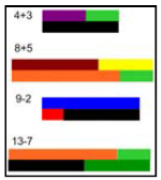


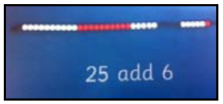
Fractions (if needed)

Counting in fractions up to 10, starting from any numbers and using the $\frac{1}{2}$ and 2/4 equivalence on the number line.

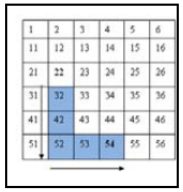
Concrete and pictorial representations, including:



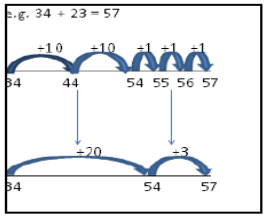




Bead strings



Real everyday objects



Number lines

Number tracks

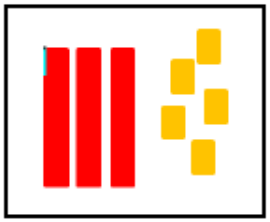
Fractions (if needed)

Children should count in fractions up to 10, starting from any number, for example; 1, 1 $\frac{1}{4}$, 1 $\frac{1}{2}$, 1 $\frac{3}{4}$, 2.

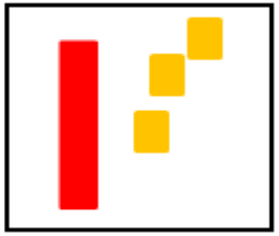
Concrete and pictorial representations, including:

Children can use straws or base 10 to represent and partition 2-digit numbers.
Children can subtract (without decomposition/moving tens) using partitioning and equipment, e.g.:

To calculate 35 – 22, remove 22:



Then record: 35 – 22 = 13



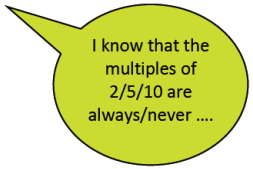
Use concrete and pictorial models to assist with counting, e.g. paper cups, beads strings, plates, shapes, Numicon, etc.

Calculation Policy for Year 2: Calshot Primary School

MULTIPLICATION

Informal methods to support mental calculations

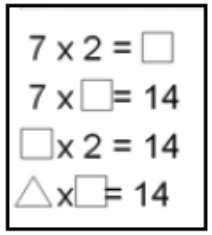
- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, connecting the 2, 5 and 10 multiplication tables to each other.
- Connect the 10 multiplication table to place value.
- Recognise odd and even numbers.
- Show that the multiplication of two numbers is commutative and can be done in any order.



- Use a variety of language to describe multiplication and division (e.g. lots of, groups of, repeated addition)
- Apply doubling of numbers up to ten to doubling larger numbers.

Written calculations

- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs.
- Begin to use multiplication tables and recall facts to perform written calculations.
- Use a range of materials and contexts…including concrete models, arrays, repeated addition and number lines



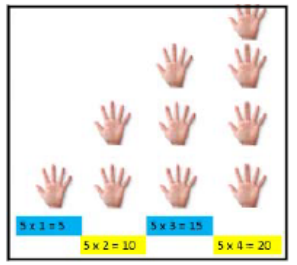
DIVISION

Informal methods to support mental calculations

The relationship between multiplication and division must be continually considered.

- Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers.

"5, one time", "5, two times" and so on.



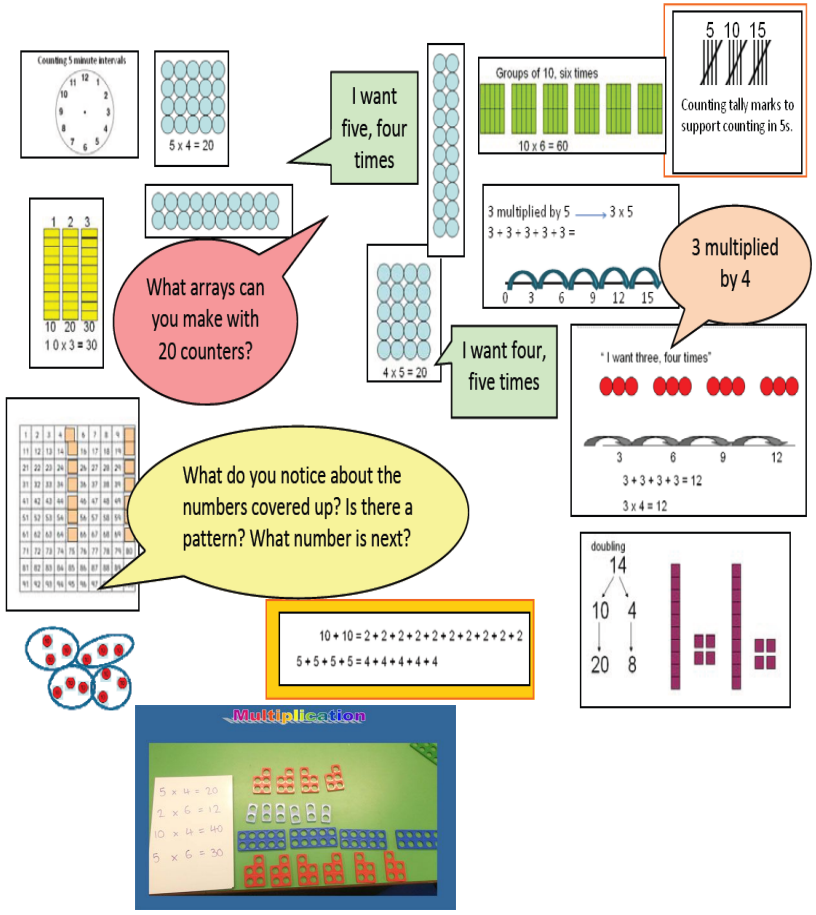
Written calculations

- Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (x), division (÷) and equals (=) signs.
- Show that multiplication of two numbers can be done in any order (commutative) and division by 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.

Fractions (if needed)

- Write simple fractions for example, ½ of 6 = 3 and recognise the equivalence of 2/4 and 1/2.
- Begin to relate multiplication and division models to fractions and measures.

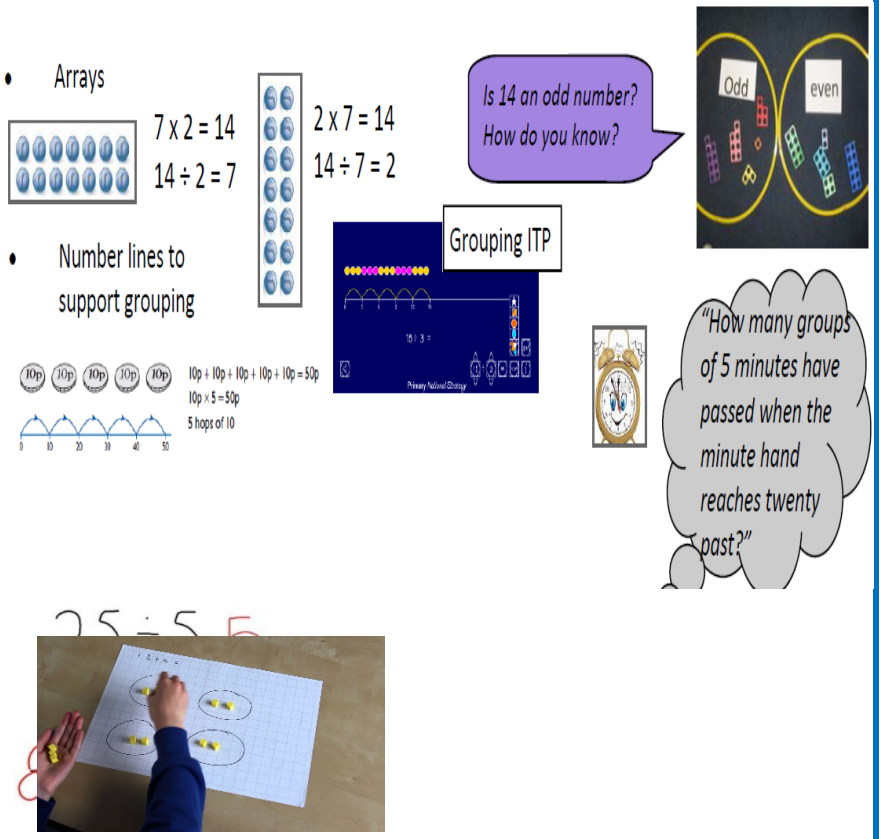
Concrete and pictorial representations, including:



Fractions (if needed)

- Recognise, fine, name and write fractions 1/3, 1/4, 3/4, 2/4 of a length, shape, set of objects or quantity.
- Write simple fractions, for example, ½ of 6 = 3 and recognise the equivalence of ½ and 2/4.

Concrete and pictorial representations, including:



Calculation Policy for Year 3: Calshot Primary School

ADDITION

Informal methods to support mental calculations

Add numbers mentally, including:

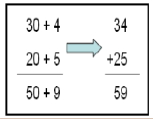
- A three-digit number and ones
- A three-digit number and tens
- A three-digit number and hundreds
- Partition all numbers and recombine, start with 10's and 1's then 100's 10's 1s + 10's 1's
- Use straws, base 10, place value counters, number lines

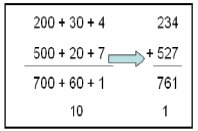
Common mental calculation strategies:
Partitioning and recombining
Doubles and near doubles
Use number pairs to 10 and 100
Adding near multiples of ten and adjusting
Using patterns of similar calculations
Using known number facts
Bridging though ten, hundred
Complementary addition

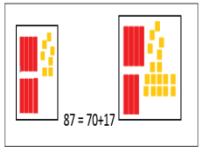
Written calculations

Add numbers with up to three digits, using formal written (columnar) methods.

Add two three digit numbers using concrete and abstract representations (e.g. straws, dienes, place value counters, empty number lines)







Revert to concrete representations if children find expanded/column methods difficult

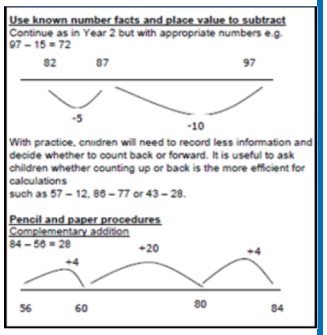
SUBTRACTION

Informal methods to support mental calculations

Subtract numbers mentally, including:

- A three-digit number and ones
- A three-digit number and tens
- A three-digit number and hundreds

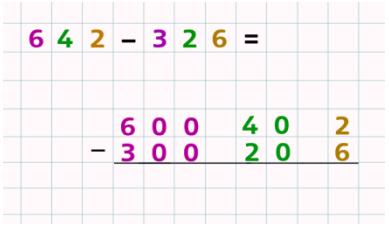
Use a number line, base 10, hundred squares, two-hundred squares and similar representations to support mental calculations.



Written calculations

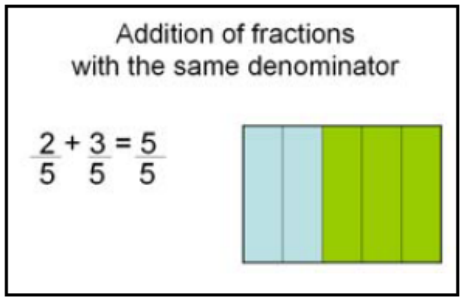
Add and subtract numbers with up to three digits, using formal written methods of columnar addition and subtraction.

Expanded Column Subtraction:



Fractions (if needed)

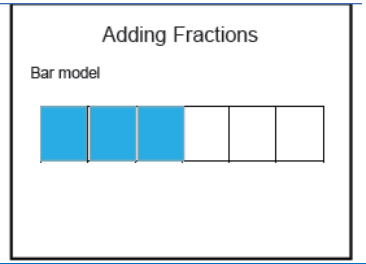
Addition of fractions with the same denominator within one whole.



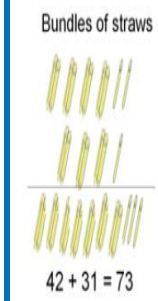
Fractions (if needed)

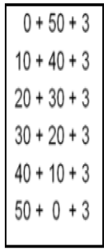
- Count up and down in tenths.
- Add and subtract fractions with the same denominator within one whole.

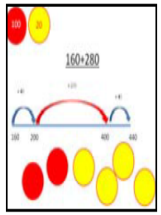
$\frac{1}{6} + \frac{1}{6} + \frac{1}{6} = \frac{3}{6} = \frac{1}{2}$

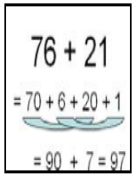


Concrete and pictorial representations, including:





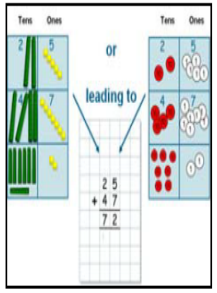




Partitioning and recombining

What is the same and what is different about all these methods?

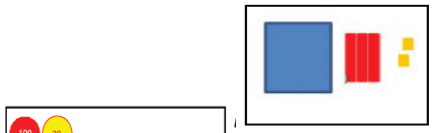
I can explain my method using representations



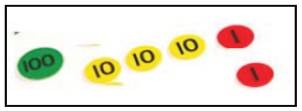
Base 10 and place value counters

Concrete and pictorial representations, including:

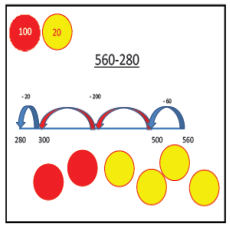
Partitioning and repartitioning to support the understanding of place-value.

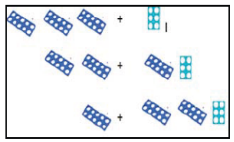


132 in base 10



132 in place value counters.





30 + 6
20 + 16
10 + 26

All of these representations still comprise the amount of 36.

Introduce transition from concrete place value representations, (e.g. base 10 or Numicon), to pictorial- such as place value counters or money.

Calculation Policy for Year 3: Calshot Primary School

MULTIPLICATION

Informal methods to support mental calculations

- Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables (and 2, 5 and 10 multiplication tables from Y2)
- Use doubling to connect 2, 4 and 8 multiplication tables
- Develop efficient mental methods using commutativity and associativity (multiplication can be carried out in any order)

The commutative law:
4 x 12 = 12 x 4

- Derive related multiplication and division facts
- Calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental methods
- Partitioning: multiply the tens first and then multiply the ones, e.g. 57 x 6 = (50 x 6) + (7 x 6) = 300 + 42 = 342
- Children can apply these skills to solve spoken word problems too
- Be able to solve missing number statements e.g. 72 ÷ □ = 8

Ensure opportunities to learn multiplication tables through use of visual models, images and also rote learning.

Multiplication and division facts:
8 x 4 = 32, 4 x 8 = 32, 32 ÷ 4 = 8, 32 ÷ 8 = 4

DIVISION

Informal methods to support mental calculations

The relationship between multiplication and division must be continually considered.

- Pupils should be taught to recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables.
- Pupils continue to practise their mental recall of multiplication tables…in order to improve fluency.
- Pupils develop efficient mental methods using associativity (e.g. 7 x 4 = 28 so 28 ÷ 7 = 4 and 7 = 28 ÷ 4) to derive related multiplication and division facts.

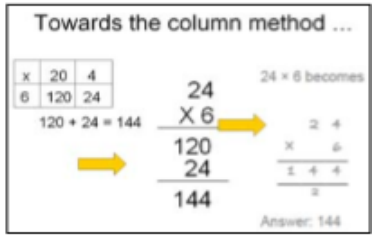
Written calculations

- Write and calculate mathematical statements for multiplication using the multiplication tables that they know, including for two-digit numbers times one digit numbers, progressing to formal written methods
- Solve problems, including missing number problems, involving multiplication, including positive integer scaling problems and correspondence problems (e.g. A ball costs £4, how much would 5 balls cost?)
- Estimate before calculating
- Ensure written methods build on/ relate to mental methods

Grid Multiplication:

x	20	4	
2	40	8	48

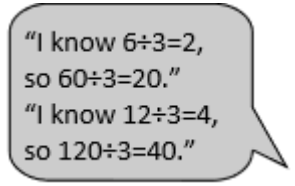
Expanded Column Multiplication:

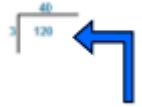


Written calculations

Pupils should be taught to:

- Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers multiplied by one digit numbers, using mental and progressing to formal written methods.
- Solve problems, including missing number problems, involving division





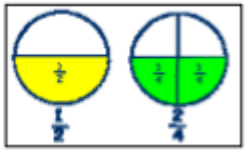
New written methods can be modelled alongside mental or informal methods to ensure understanding.

Fractions (if needed)

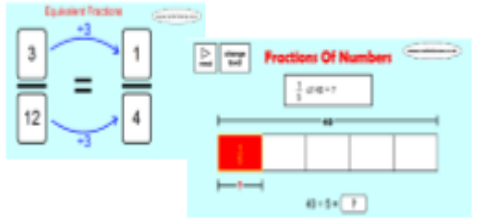
Fractions (if needed)

- Recognise that tenths rise from dividing an object into 10 equal parts and in dividing one-digit numbers or quantities by 10.

- Recognise and show, using diagrams, equivalent fractions with small denominators

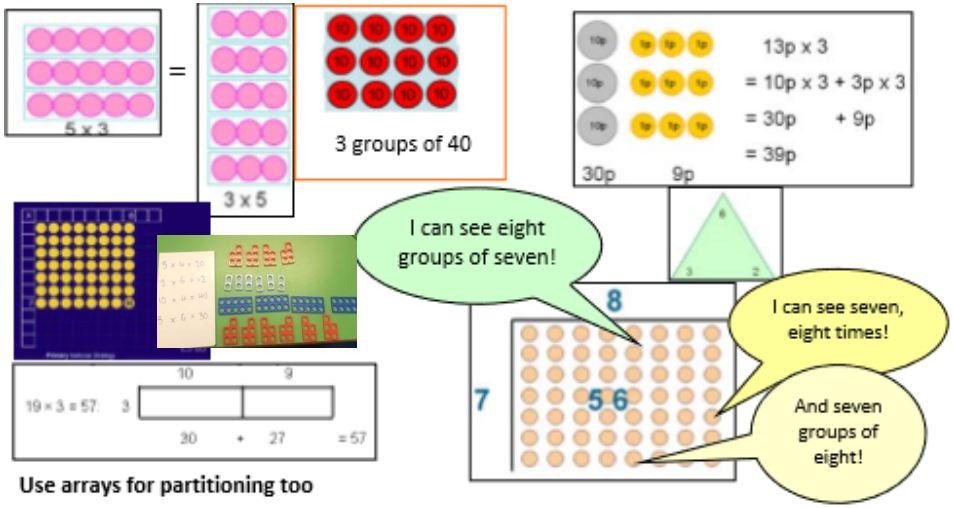


- Recognise and show, using diagrams, equivalent fractions with small denominators.



- Recognise, find and write fractions of a discrete set of objects: unit fractions and non-unit fractions with small denominators.

Concrete and pictorial representations, including:

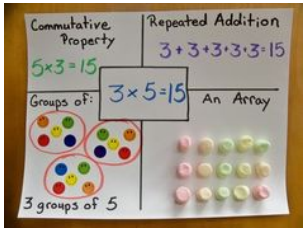


Use arrays for partitioning too

Grid Multiplication:

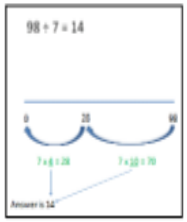
x	20	4
2	40	8

48

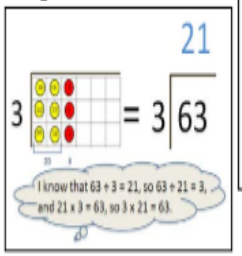


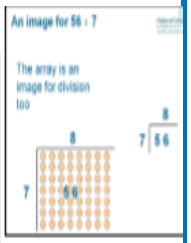
Concrete and pictorial representations, including:

Use a range of concrete and pictorial resources, including:



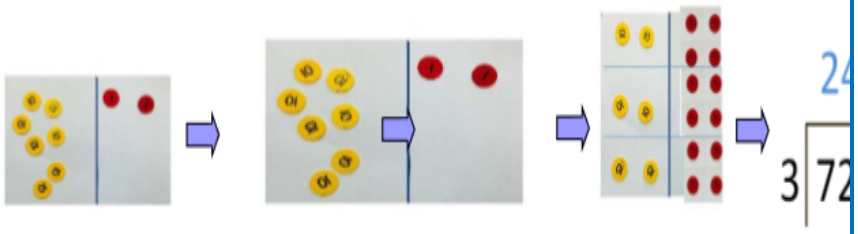
63 ÷ 3 equals three groups of 2 tens and a one.





How could I calculate 72÷3 ?

Informal exploration with manipulatives supports the progression to formal written methods—which is continued in Year 4.



Calculation Policy for Year 4: Calshot Primary School

ADDITION	SUBTRACTION
Informal methods to support mental calculations • Practise mental methods with increasingly large numbers.	**Informal methods to support mental calculations** Continue to practise mental methods with increasingly large numbers to aid fluency.

55 + 37 = 55+ 30 + 7
= 85 + 7
= 92

- Consolidate partitioning and re-partitioning
- Use compensation (see below) for adding too much/little and adjusting
- Use Numicon, base 10, place value counters, empty number lines etc.

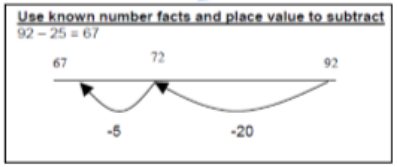
Common mental calculation strategies:
Partitioning and recombining
Doubles and near doubles
Use number pairs to 10 and 100
Adding near multiples of ten and adjusting
Using patterns of similar calculations
Using known number facts
Bridging though ten, hundred
Complementary addition

I know that 63 + 29 is the same as 63 + 30 - 1

Methods to support fluent calculation and encourage efficiency of method:

- Find a small difference by counting on, e.g. 5003 – 4996
- Subtract nearest multiple of ten and adjust.
- Partition larger numbers.

This could be done using an empty number line. Children should recall and use number facts to reduce the number of steps.



Whenever possible, children should be encouraged to visualise number lines and other basic, supporting representations to promote fluent work without jottings.

Written calculations

- Add numbers with up to four digits, using formal written (columnar) methods.
- Add three digit numbers using column addition and then move onto 4 digits.
- Include decimal addition for money.

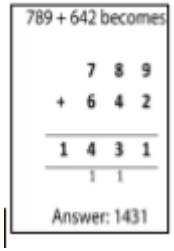
```
  4 5 7 8  +
  2 3 4 9
-----------
  6 9 2 7
-----------
    1 1
```

Written calculations

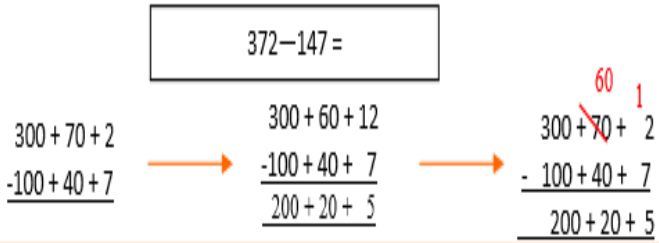
- Subtract numbers with up to 4 digit numbers using the formal written methods of columnar subtraction where appropriate.
- Build on formal, expanded column subtraction using exchange (moving/taking tens/ hundreds) wherever necessary.
- Continue to use representations and manipulatives to develop understanding of place value.

- Base 10 equipment and Numicon is used to support understanding for those that need it.

Revert to expanded methods if children find formal calculation method difficult



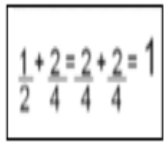
- Use of base 10 and Numicon equipment is used to support understanding for those that need it.



Apply understanding of subtraction with larger integers to that of decimals in context of money and measures. (See Year 5.)

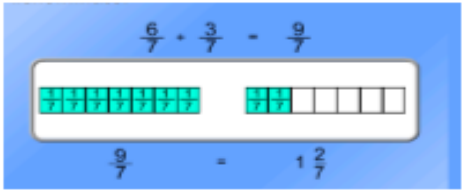
Fractions (if needed)

- Addition of fractions with the same denominator to become fluent through a variety of increasingly problems beyond one whole.
- Counting using simple fractions and decimals, both forwards and backwards.



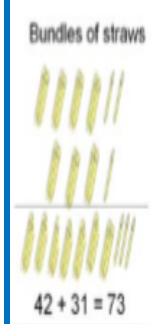
Fractions (if needed)

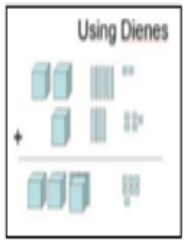
- Count up and down in hundredths.
- Add and subtract fractions with the same denominator.
- Solve simple measure and money problems involving fractions and decimals to two decimal places.

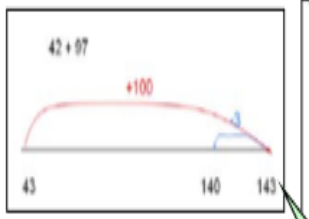


Concrete and pictorial representations, including:

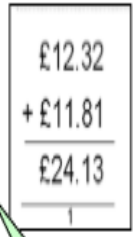
Use physical/pictorial representations alongside expanded and columnar methods.

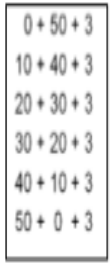




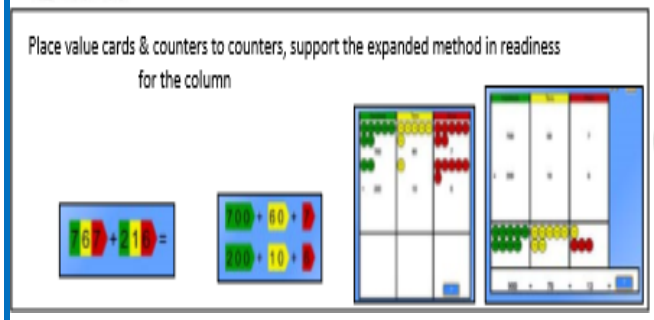


Compensating in mental addition



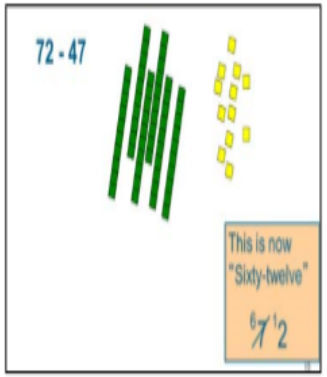


Re-partitioning

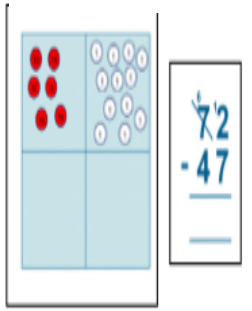


Ask what is the same and what is different about all these methods?

Concrete and pictorial representations, including:



Base 10 and place value counters used to model underlying place value concepts.



Compare and discuss the suitability of different strategies/methods in different contexts.

Pupils decide which operations and methods would be useful and why.

I would count on using a number line to calculate 5003-4896; because the numbers are close together.

Calculation Policy for Year 4: Calshot Primary School

MULTIPLICATION

Informal methods to support mental calculations

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Use place value, known and derived facts to multiply and divide mentally, including:
  - Multiplying by 0 and 1;
  - Multiplying together three numbers
- Recognise and use factor pairs and commutative property of multiplication (multiplication can be rearranged e.g. 4 x 7 = 7 x 4) in mental calculations
- Practise mental methods and extend this to three-digit numbers to derive facts

Using the **distributive** law:
39 x 7 = 30 x 7 + 9 x 7
Using the **associative** law:
(2 x 3) x 4 = 2 x (3 x 4)

Using facts and rules:
2 x 6 x 5 = 10 x 6 = 60

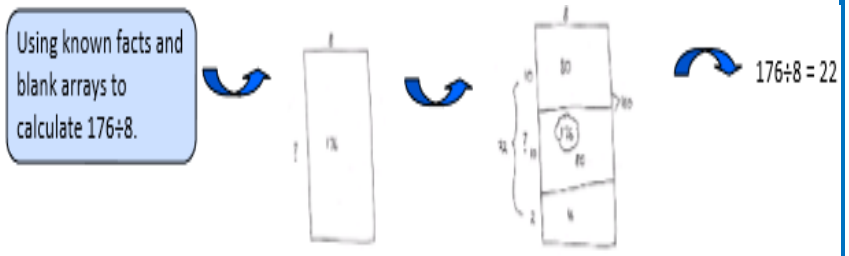
DIVISION

Informal methods to support mental calculations

The relationship between multiplication and division must be continually reinforced.

Pupils should be taught to:

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Use place value, known and derived facts to multiply and divide mentally, including:
  - Dividing by 1;
  - Multiplying together three numbers
- Recognise and use factor pairs and commutative property of multiplication in mental calculations
- Practise mental methods and extend this to three-digit numbers to derive facts ,(for example 600÷3 = 200 can be derived from 2 x3 =6)
- Begin to understand remainders in the context of a problem

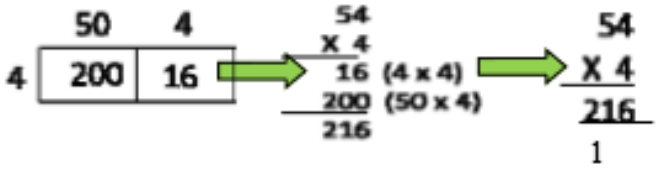


Written calculations

- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Estimate before calculating
- Ensure written methods build on/ relate to mental methods (e.g. grid method)
- Introduce alongside grid expanded column multiplication

Key skills to support:

- know or quickly recall multiplication facts up to 12 × 12
- understand the effect of multiplying numbers by 10, 100 or 1000
- multiply multiples of 10, for example, 20 × 40;
- approximate, e.g. recognise that 72 × 38 is approximately 70 × 40 = 2800 and use this information to check whether their answer appears sensible

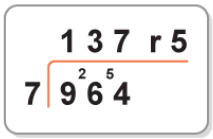


Revert to expanded methods if children find formal calculation method difficult

Written calculations

Pupils are introduced to:

- A formal written layout (short division) to divide 2- and 3-digit numbers by a one digit number
- Children begin to understand remainders in context of a problem



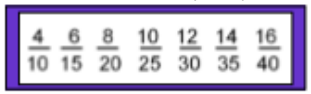
Fractions (if needed)

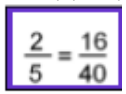
- Recognise and show, using diagrams, families of common equivalent fractions
- Understand the relation between non-unit fractions and multiplication and division of quantities, with particular emphasis on tenths and hundredths
- Make connections between fractions of a length, of a shape and as a representation of one whole or set of quantities

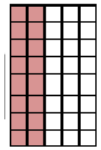
Fractions (if needed)

- Recognise and show, using diagrams, families of common equivalent fractions
- Recognise that hundredths arise when dividing an object by one hundred and dividing tenths by ten
- Solve problems involving increasingly harder fractions to calculate quantities and fractions to

- Use factors and multiples to recognise equivalent fraction and simplify where appropriate







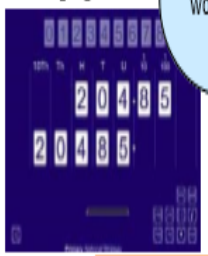
divide quantities, including non-unit fractions where the answer is a whole number

- Find the effect of dividing a one or two digit number by 10 or 100, identifying the value of the digits in the answer as ones, tenths and hundredths

Concrete and pictorial representations, including:

Ensure children can confidently multiply & divide by 10 and 100, that multiplying by 10 makes the number bigger and all digits move one place to the left, while dividing by 10 makes the number smaller and all the digits move one place to the right.

Moving digits ITP



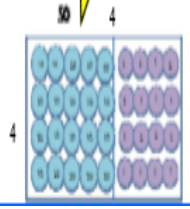
This digit is worth 200

245 X 6 = 1470

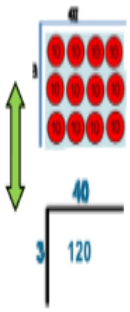
This digit is worth 30

2 3

I can use place value counters to model the grid method



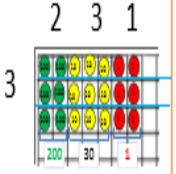
Use arrays made with place value counters to demonstrate the link between multiplication and division. This will support understanding of the grid method.



Children need to understand and apply the language of multiples and factors and use it in solving multiplication and division problems, for example, 'All factors of 36 are multiples of 2, true or false? Find me two factors of 48 that are also multiples of 3.'

Concrete and pictorial representations, including:

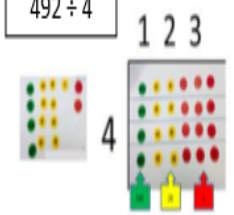
693 ÷ 3



Children can work in pairs: child A constructs the array (dividing manipulatives into 3 rows), child B checks it and records this in a formal, short division format.

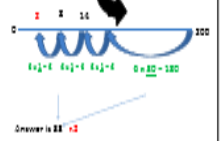
By working through larger number calculations with manipulatives, children gain experience of exchange (re-partitioning) within division algorithms.

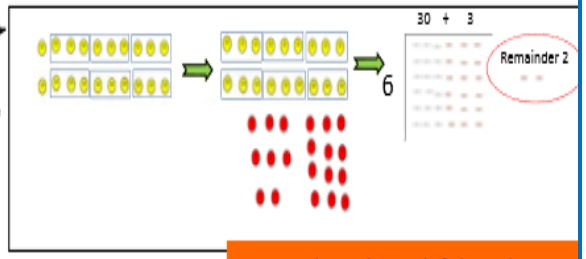
492 ÷ 4



By the end of Year 4, children need to have encountered remainders in a number of contexts. Pupils can be introduced to remainders using known facts: e.g. 13÷4; and then progress to larger numbers. (See below).

200 ÷ 6 = 33 r.2





Money can be used instead of place value counte

Calculation Policy for Year 5: Calshot Primary School

ADDITION

Informal methods to support mental calculations

- Add numbers mentally with increasingly large numbers, e.g. 12,462 + 2300 = 14,762
- Add 10, 100 and 1000 onto five-digit numbers
- Mentally add tenths and one-digit numbers and tenths
- Use rounding to check answers to calculations to determine, in the context of a problem, levels of accuracy.
- Add decimals, including a mix of whole numbers and decimals, numbers with different amounts of decimal places using complements/bonds to 1 (e.g. 0.83 + 0.17 = 1)

Common mental calculation strategies:
Partitioning and recombining
Doubles and near doubles
Use number pairs to 10 and 100
Adding near multiples of ten and adjusting
Using patterns of similar calculations
Using known number facts
Bridging though ten, hundred
Complementary addition

SUBTRACTION

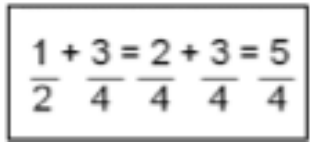
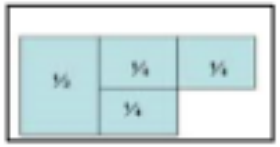
Informal methods to support mental calculations

- Subtract numbers mentally with increasingly large numbers. E.g. 12,462 – 2300 = 10,162.
- Use rounding to check answers to calculations to determine, in the context of a problem, levels of accuracy.
- Pupils practise subtracting decimals, including a mix of whole numbers and decimals, numbers with different amounts of decimal places using complements/bonds to 1 (for example, 1 – 0.17 = 0.83.)
- Pupils mentally subtract tenths and one-digit whole numbers and tenths.
- Pupils subtract using number lines to count on

Mental Strategies for Subtraction:

- Find differences by counting on
- Partitioning numbers in a variety of ways
- Applying known facts
- Bridging through multiples of 10
- Subtracting 9, 11 etc by compensating

	Children use, or visualise, representation of choice. Refer back to physical representations as required.
Written calculations • Add whole numbers with more than four digits, using formal written (columnar) methods. • Include decimal addition for money. £563.14 + £207.88 £771.02 1 1 1 **Revert to expanded methods if children find formal calculation method difficult**	**Written calculations** • Subtract whole numbers with more than four digits, using formal written methods (columnar subtraction.) • Pupils practise subtracting decimals. As in Year 4, compare physical and / or pictorial representations and expanded algorithms alongside columnar methods. Ask: *What is the same? What's different?* Compare and discuss the suitability of different methods, (mental or written), in context. Revert to expanded methods whenever difficulties arise £17.34—£12.16 *What is the same about these models? What's different?* 1000+700+20+14p - 1000+200+10+ 6p 500+10+ 8p 2 1734p - 1216p 518p £ 2 17.34 - 12.16 5.18 Relate place value of decimals with that of whole numbers using representations. See below.
Fractions (if needed)	**Fractions (if needed)**

• Add fractions with the same denominator and denominators that are multiples of the same number (to become fluent through a variety of increasingly complex problems and add fractions that exceed 1 as a mixed number.)  	• Subtract fractions with the same denominator and denominators that are multiples of the same number. (Include fractions exceeding 1 as a mixed number.) • Solve problems involving numbers up to three decimal places. • Pupils mentally subtract tenths and one-digit whole numbers and tenths.

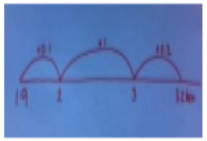
Concrete and pictorial representations, including:

Use physical/pictorial representations alongside columnar methods where needed.

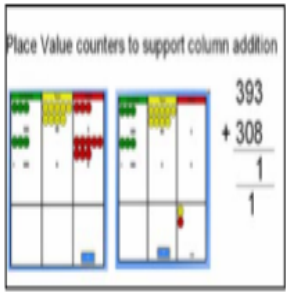
12 462 + 2300
= 12 462 + 2000 + 300
= 14 462 + 300
= 14 762

Partitioning and recombining

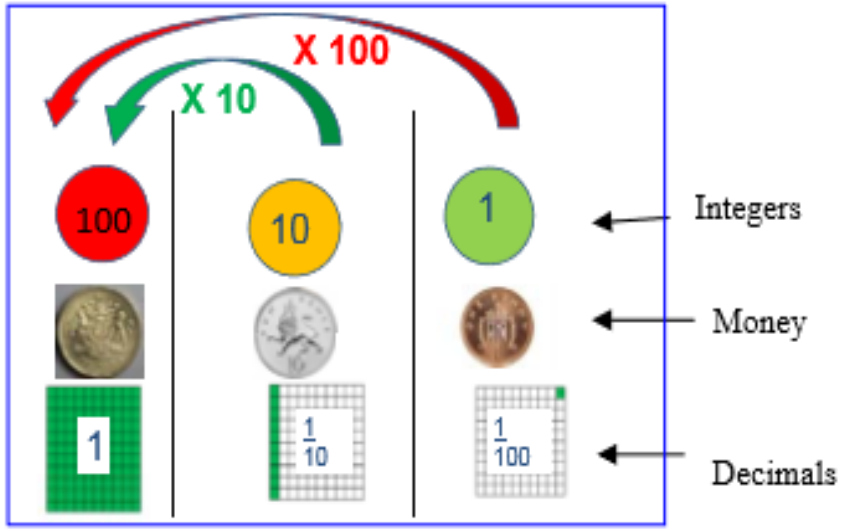
Ask what is the same and what is different about all these methods?



Jottings to support mental calculation



Concrete and pictorial representations, including:

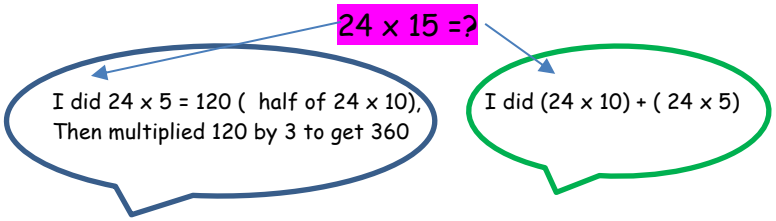


MULTIPLICATION

Informal methods to support mental calculations

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Multiply and divide mentally drawing upon known facts
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- Recognise and use square and cube numbers (& notation)
- Establish whether a number up to 100 is prime and recall prime numbers up to 19

Pupils should be taught throughout that percentages, decimals and fractions are different ways of expressing proportions.



Written calculations

- Multiply numbers up to four-digits by a one or two-digit number using a formal written method

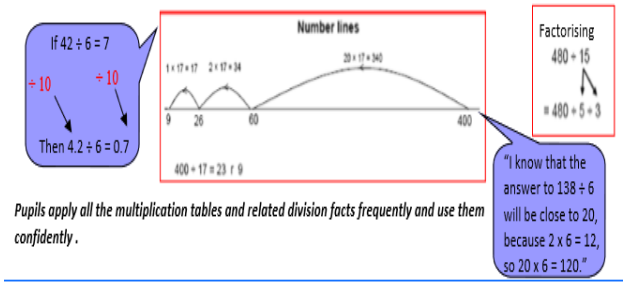
DIVISION

Informal methods to support mental calculations

The relationship between multiplication and division must be continually reinforced.

Pupils should be taught to:

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Multiply and divide whole numbers and those involving decimals by 10, 100 and 1000
- Use a range of divisibility rules (2,3,4,5,9 and 10)
- Divide numbers mentally drawing upon known facts
- Identify multiples and factors, including all factor pairs of a number and common factors of two numbers.

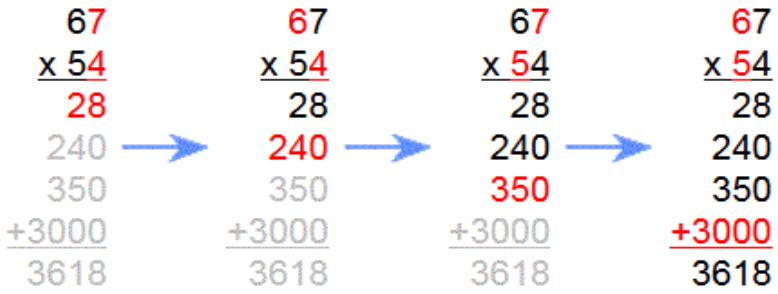


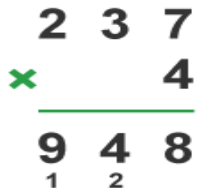
Pupils apply all the multiplication tables and related division facts frequently and use them confidently .

Written calculations

Pupils practise the use of the formal written methods of short division.

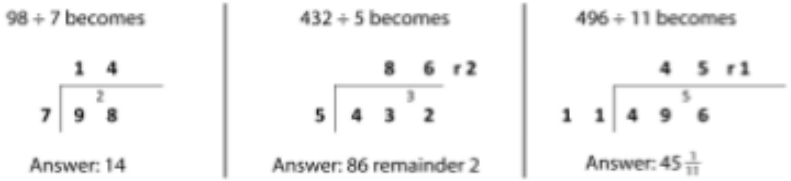
- Pupils introduced to expanded column multiplication followed by short column multiplication for multiplying by a one-digit number, then long column multiplication for two-digit numbers



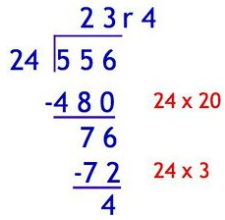


Compact methods for multiplication are efficient but often do not make the value of each digit explicit. When introducing multiplication of decimals, it is sensible to take children back to an expanded form such as the grid method where the value of each digit is clear, to ensure that children understand the process.

Revert to expanded methods if children find formal calculation method difficult



- Divide numbers up to four-digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context.
- Divide a three-digit number by a 2-digit number using long division (chunking by repeatedly subtracting).

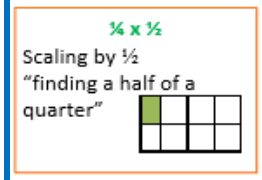


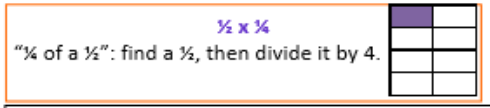
- Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding. (See representations below.)

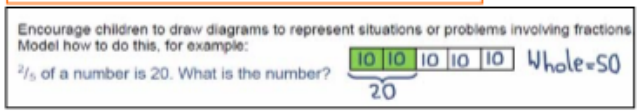
Revert to expanded methods if children find formal calculation method difficult

Fractions (if needed)

- Multiply proper fractions and mixed numbers by whole numbers, supported by materials and diagrams
- Identify, name and write equivalent fractions of a given fraction, represented visually, including tenths and hundredths
- Pupils connect multiplication by a fraction to using fractions as operators (fractions of) and to division, building on work from previous years. This relates to





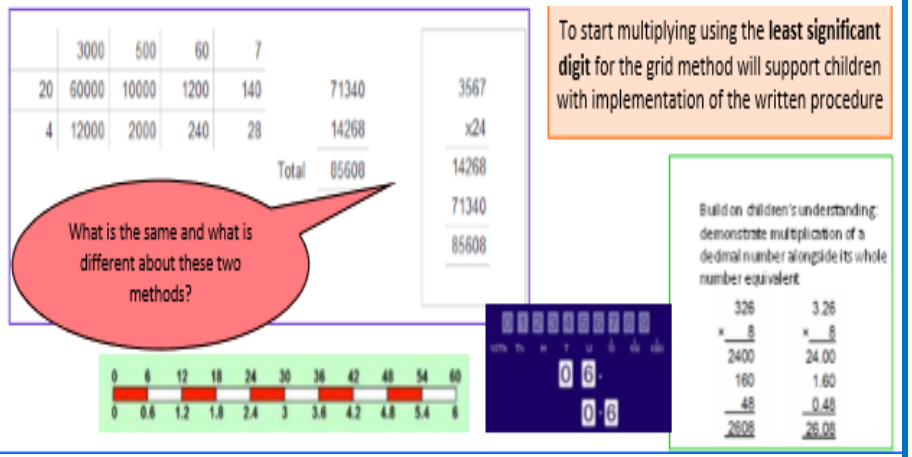


scaling by simple fractions, including fractions > 1.

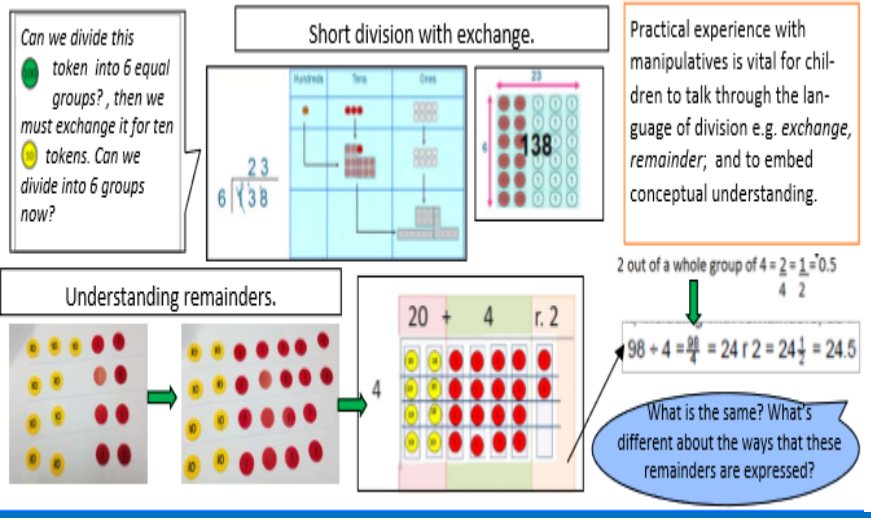
Fractions (if needed)

- Recognise mixed numbers and improper fractions and convert from one form to the other and write mathematical statements > 1 as a mixed number.
- Pupils connect equivalent fractions >1 that simplify to integers with division and other fractions >1 to division with remainders.
- Pupils connect multiplication by a fraction to using fractions as operators (fractions of) and to division.
- Pupils should make connections between percentages, fractions and decimals.

Concrete and pictorial representations, including:



Concrete and pictorial representations, including



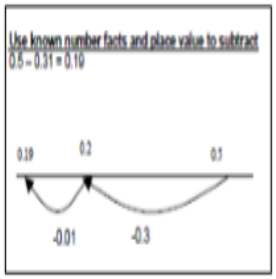
Calculation Policy for Year 6: Calshot Primary School	
ADDITION	**SUBTRACTION**
Informal methods to support mental calculations *Pupils should use knowledge of BODMAS to understand the order of operations when carrying out calculation involving more than one operation* • Perform mental calculations, including with mixed operations and large numbers (more complex calculations) • Children use representation of choice	**Informal methods to support mental calculations** *Pupils should use knowledge of BODMAS to understand the order of operations when carrying out calculation involving more than one operation* • Perform mental calculations, including with mixed operations and large numbers (more complex calculations)

- Consolidate partitioning and repartitioning
- Use compensation for adding too much/ little and adjusting.
- Refer back to pictorial and physical representations when needed.

Common mental calculation strategies:
Partitioning and recombining
Doubles and near doubles
Use number pairs to 10 and 100
Adding near multiples of ten and adjusting
Using patterns of similar calculations
Using known number facts
Bridging though ten, hundred
Complementary addition

- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
- Pupils should undertake mental calculations with increasingly large numbers and more complex calculations.

Children draw on basic, Mental subtraction Strategies, (See Year 5.)
Children use, or visualise, representation of choice.
Refer back to physical representations as required.



Written calculations

- Add larger numbers, up to seven-digit whole numbers, using the formal written (columnar) method

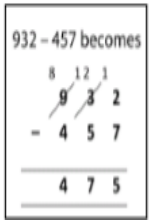
Written calculations

- Subtract whole numbers with more than four digits, using formal written methods (columnar subtraction.)
- Solve problems involving the calculation and conversions of units of measure, using decimal notation of up to three decimal places where appropriate.
- Subtract using a number line using partitioning and counting on

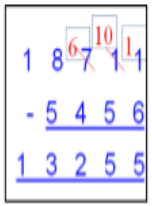
- Add three digit numbers using columnar method and then move onto 4 digits.
- Include decimal addition for money.
- Number line addition using partitioning

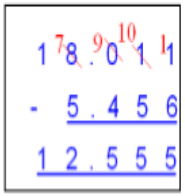
Revert to expanded methods if children find formal calculation method difficult

Move towards consolidation of formal, columnar method.
For more complex calculations, with increasingly larger or smaller numbers, compare representations and expanded algorithms alongside columnar methods. Ask: What is the same? What's different?
Compare and discuss the suitability of different methods, (mental or written), in context.
Revert to expanded methods whenever difficulties arise



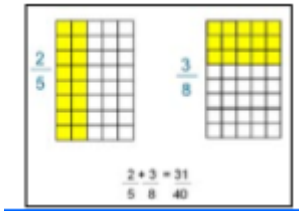
Consolidate columnar methods , paying particular attention to the occurrence of zeros as place holders.





Fractions (if needed)

- Add fractions with different denominators and mixed numbers, using the concept of equivalent fractions.
- Start with fractions where the denominator of one fraction is a multiple of the other (e.g. ½ + 1/8 = 5/8)and progress to varied and increasingly complex problems
- Practise calculations with simple fractions and decimal equivalents to aid fluency



Fractions (if needed)

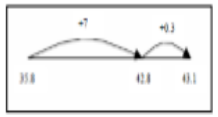
- Subtract fractions with different denominators and mixed numbers.
- Pupils should practise calculations with simple fractions and decimal fraction equivalents to aid fluency.

Concrete and pictorial representations, including:

Use physical/pictorial representations alongside columnar methods where needed. Ask what is the same and what is different?

12 462 + 2300
= 12 462 + 2000 + 300
= 14 462 + 300
= 14 762

Partitioning and recombining

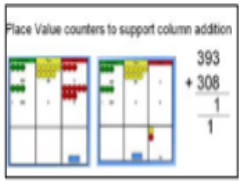


234 kg + 49 kg = 273 kg

200 + 30 + 4
40 + 9
200 + 70 + 13

I can explain my method using place value counters

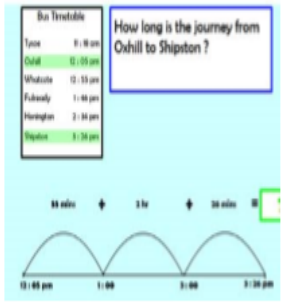
What is the same and what is different about all these methods?

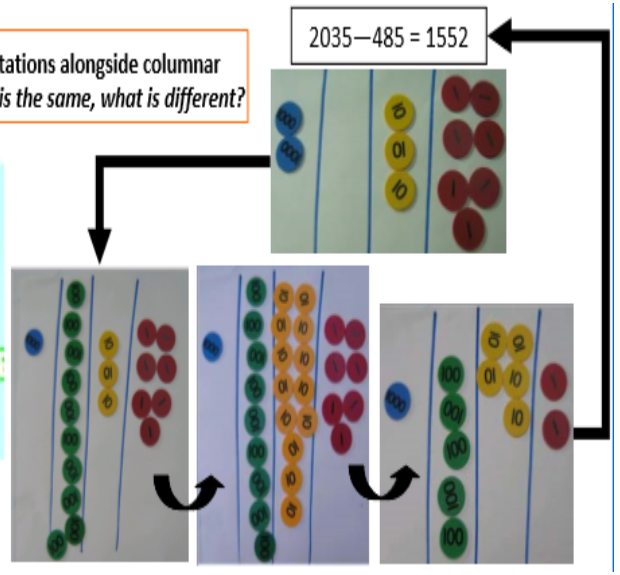


Concrete and pictorial representations, including:

Use physical/pictorial representations alongside columnar methods where needed. *What is the same, what is different?*

2035—485 = 1552





Calculation Policy for Year 6: Calshot Primary School

MULTIPLICATION | DIVISION

Informal methods to support mental calculations

Pupils should use knowledge of BODMAS to understand the order of operations when carrying out calculation involving more than one operation

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Perform mental calculations, including with mixed operations and large numbers (increasingly large numbers and more complex calculations)
- Use all the multiplication tables to calculate mathematical statements in order to maintain fluency
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
- Identify the value of each digit in numbers given to three decimal places and multiply numbers by 10,100 and 1000 giving answers up to three decimal places.

Children should know the square numbers up to 12 × 12 & derive the corresponding squares of multiples of 10 e.g. 80 × 80 = 6400

Use mental strategies to solve problems e.g.

- x4 by doubling and doubling again
- x5 by x10 and halving
- x20 by x10 and doubling
- x9 by multiplying by 10 and adjusting
- x6 by multiplying by 3 and doubling

What is the best approximation for 4.4 x 18.6?

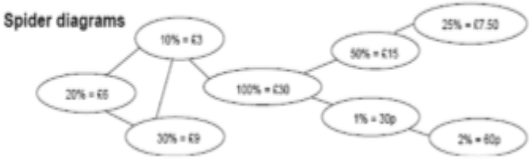
Written calculations

Informal methods to support mental calculations

Pupils should use knowledge of BODMAS to understand the order of operations when carrying out calculation involving more than one operation

Pupils should be taught to:

- Recall multiplication and division facts for multiplication tables up to 12 x 12
- Perform mental calculations, including with mixed operations and large numbers (increasingly large numbers and more complex calculations)

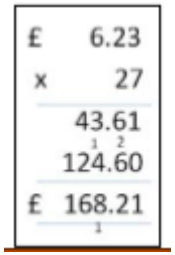


- Identify common factors, common multiples and prime numbers.
- Solve problems involving division
- Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.
- Identify the value of each digit in numbers given to three decimal place and divide numbers by 10,100 and 1000 giving answers up to three decimal places.

I know that 366 will divide by 6 because it has 2 and 3 as factors

Written calculations

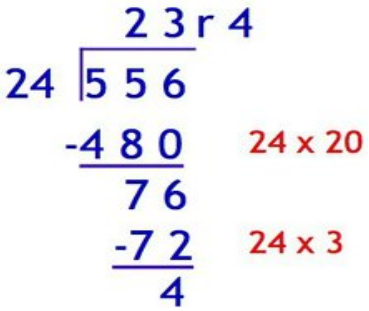
- Identify common factors and then split into prime numbers to find the prime factors
- Multiply multi-digit numbers up to four-digits by a two-digit whole number using the formal written method of long multiplication (short and long multiplication)
- Multiply one-digit numbers with up to two decimal places by whole numbers



Revert to expanded methods if children find formal calculation method difficult

Pupils practise and extend their use of the formal written methods of short division.

- Divide numbers up to four-digits by a one or two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context.
- Divide numbers up to four-digits by a two-digit 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.



Revert to expanded methods if children find formal calculation method difficult

Fractions (if needed)

- Multiply simple pairs of proper fractions, writing the answer in its simplest form e.g. $\frac{1}{4} \times \frac{1}{2} = 1/8$

Fractions (if needed)

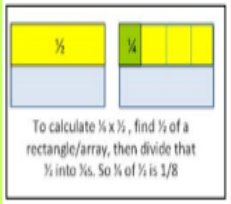
- Use common factors to simplify fractions
- Compare and order fractions, including fractions > 1
- Divide proper fractions by whole numbers (e.g. 1/3 ÷2 = 1/6)

- Pupils should be able to answer calculations such as '2/5 of a number is 20, what is the number?'

•multiply simple pairs of proper fractions, writing the answer in its simplest form e.g. ¼ x ½ = 1/8

Three key applications of understanding:

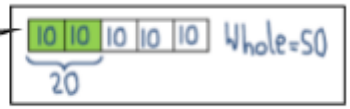
- Recognise that ¼ of 12, ¼ x 12 and 12 divided by 4 are equivalent
- Use cancellation to simplify the product of a fraction and an integer e.g. ⅓ x 15 = 3, ⅗ x 15 = 2 x ⅓ x 15 = 2x3 = 6
- Work out how many ⅕s in 15, how many ⅗s in 15, how many 2/5s in 1 etc.



Pupils should use a variety of images to support their understanding of multiplication with fractions. This follows earlier work about fractions as operators (fractions of), as numbers, and as equal parts of objects, e.g. as parts of a rectangle.

- Associate a fraction with division and calculate decimal fraction equivalents (e.g. 0.375.)
- Pupils use their understanding of the relationship between unit fractions and division to work backwards.

2/5 of a number is 20.
What is the number?



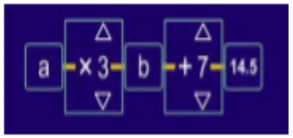
Concrete and pictorial representations, including:

Look at long-multiplication calculations containing errors, identify the errors and determine how they should be corrected

x	8	0.4	0.06	
11	88	4.4	0.66	= 93.06

8.46
X 11
93.06

What's the same?
What's different?



Concrete and pictorial representations, including

Revert to expanded methods if children find formal calculation method difficult

To introduce the long division model, use a calculation which can be represented both with manipulatives and by a short division algorithm. Use questioning and discussion to compare written methods.

£1362.72 ÷ 40 = ?

£1362.72 ÷ 4 = £340.68
[¼ and ¼ again.]
£340.68 ÷ 10 = £34.068
which rounds to £34.07