LEONARD STANLEY PRIMARY SCHOOL CALCULATION POLICY

The calculation policy at Leonard Stanley Primary is based on resources produced by the NCETM (National Centre for Excellence in the Teaching of Mathematics).
Progression within in each area of calculation follows the programme of study for maths in the National Curriculum.

It has been adapted for use within our school and includes written strategies and visual representations for each operation throughout the primary age range. It is used in conjunction with the objectives from the Revised Programme of Study for maths and the maths vocabulary glossary:
https://www.ncetm.org.uk/resources/42990#glossary

At the centre of the mastery approach to the teaching of mathematics is the belief that all pupils have the potential to succeed. Children should all have access to their age-appropriate curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling varied and challenging problems. Similarly with calculation strategies, pupils must not simply rote learn procedures but demonstrate their understanding of these principles and concepts through the use of concrete materials and pictorial representations to ensure fluency and depth of understanding.

The rationale of the concrete-pictorial-abstract (CPA) approach is that for pupils to 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. Pupils who grasp concepts rapidly should be challenged through rich and sophisticated problems before any acceleration through new content. Those pupils who are not sufficiently fluent with earlier material should consolidate their understanding, including additional practice, before moving on.

There is also an emphasis placed on instant recall of number bonds and times tables. These need to be mastered to aid with calculations and more challenging problems in readiness for the Multiplication Test at the end of Year 4.

This document outlines the progression of different calculation strategies that could be taught and used from Reception – Year 6, in line with the requirements of the 2014 Primary National Curriculum.

This guidance is to make teachers and parent/carers aware of the progression of strategies that pupils are formally taught that will support them to perform mental and written calculations. In addition, it will support teachers in identifying appropriate pictorial representations and concrete materials to help develop understanding. We have assigned objectives to year groups based upon National Curriculum expectations. However, it is important to remember that it may sometimes be necessary to revisit strategies from previous year groups if children are working below age related expectations.

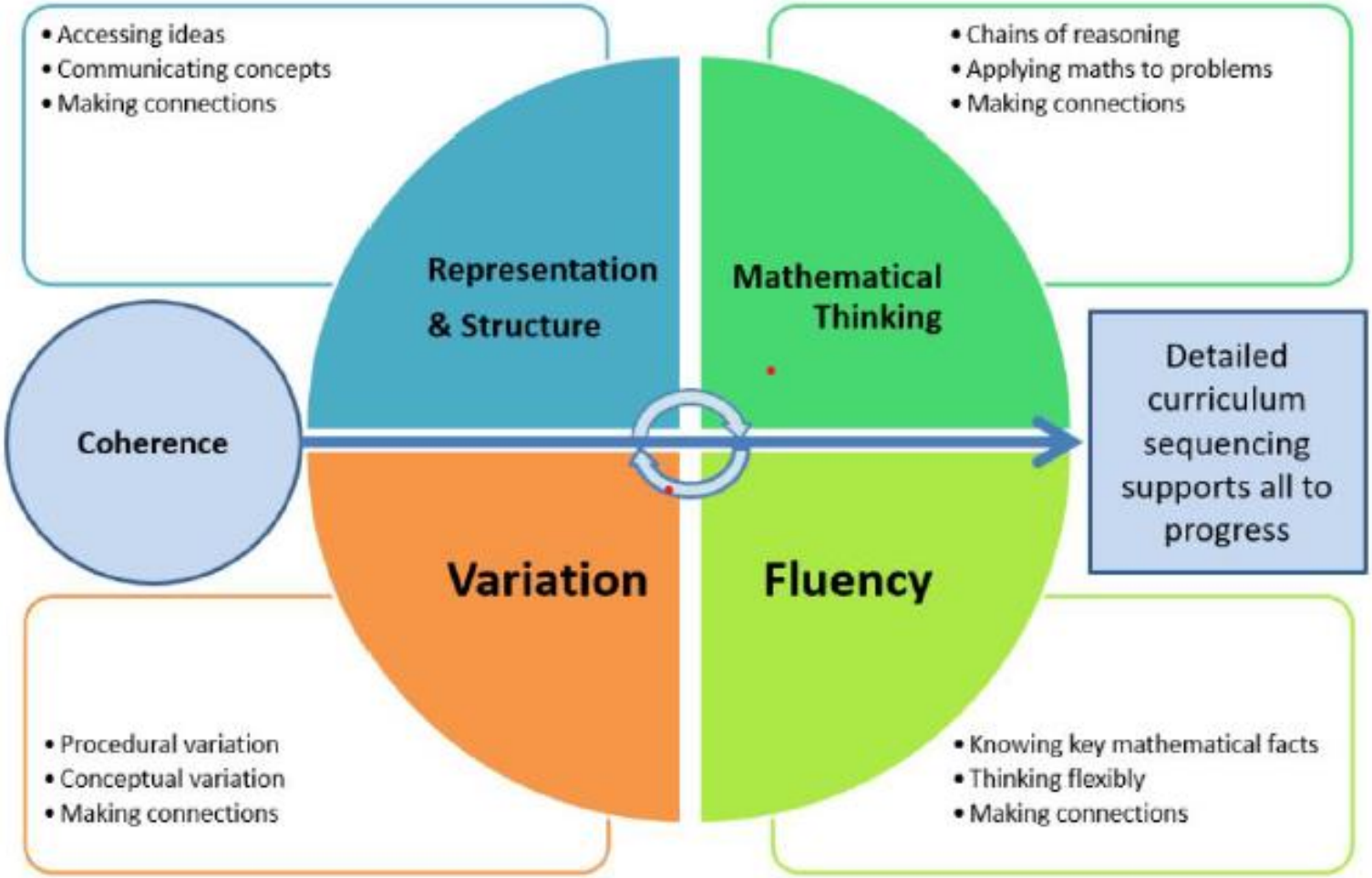
Mathematical understanding is developed through use of representations that are first of all concrete (e.g. Dienes, Numicon, Cuisenaire, place value apparatus), then pictorial (e.g. arrays, place value counters) to then facilitate abstract working (e.g. columnar addition, long multiplication).

Progression in Calculation:

This policy guides Leonard Stanley Primary in the progression for each operation to ensure smooth transition from one year group to the next. It is important that conceptual understanding, supported by the use of representation, is secure for all procedures. If at any point a pupil is struggling with a process, they should revert to concrete and/or pictorial resources and representations to revise, reinforce and consolidate understanding.

This calculation progression document is based on key mastery principles as outlined in the diagram below:

Teaching for Mastery



ADDITION AND SUBTRACTION

Addition and Subtraction

Year 1

- 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 0
- solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as 7 = ? − 9

Year2

- solve problems with addition and 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 1s
  - a two-digit number and 10s
  - 2 two-digit numbers
  - adding 3 one-digit numbers
- show that addition of 2 numbers can be done in any order (commutative) and subtraction of 1 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

Year 3

- add and subtract numbers mentally, including:
  - a three-digit number and 1s
  - a three-digit number and 10s
  - a three-digit number and 100s
- add and subtract numbers with up to 3 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

Year 4

- 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

Year 5

- 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

Year 6

- 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 4 operations
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy

Addition -EYFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
If available, Numicon shapes are introduced straight away and can be used to: • identify 1 more/less • combine pieces to add. • find number bonds. • add without counting.  Children can record this by printing or drawing around Numicon pieces.	**Games and songs can be a useful way to begin using vocabulary involved in addition e.g.** Alice the Camel
Children begin to combine groups of objects using concrete apparatus 	add more
Construct number sentences verbally or using cards to go with practical activities.	and make
Children are encouraged to read number sentences aloud in different ways "Three add two equals 5" "5 is equal to three and two"	sum total
Children make a record in pictures, words or symbols of addition activities already carried out.	altogether
Solve simple problems using fingers  5 + 1 = 6	score double
Number tracks can be introduced to count up on and to find one more:  	one more, two more, ten more...
What is 1 more than 4? 1 more than 13?	
Number lines can then be used alongside number tracks and practical apparatus to solve addition calculations and word problems.  	how many more to make...?
Children will need opportunities to look at and talk about different models and images as they move between representations.	how many more is... than...?

Addition - Year 1

+ = signs and missing numbers

Children need to understand the concept of equality before using the '=' sign. Calculations should be written either side of the equality sign so that the sign is not just interpreted as 'the answer'.

2 = 1+ 1

2 + 3 = 4 + 1

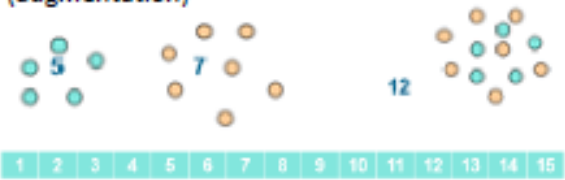
Missing numbers need to be placed in all possible places.

3 + 4 = □ □ = 3 + 4

3 + □ = 7 7 = □ + 4

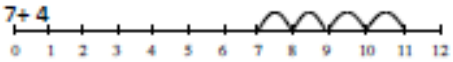
Counting and Combining sets of Objects

Combining two sets of objects (aggregation) which will progress onto adding on to a set (augmentation)



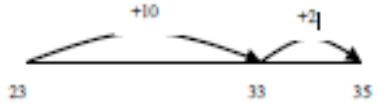
Understanding of counting on with a numbertrack.

Understanding of counting on with a numberline (supported by models and images).



Addition - Year 2

Missing number problems e.g 14 + 5 = 10 + □ 32 + □ + □ = 100 35 = 1 + □ + 5



23 + 12 = 23 + 10 + 2

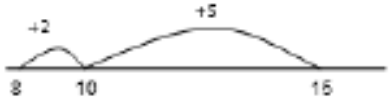
= 33 + 2

= 35

Partitioning and bridging through 10.

The steps in addition often bridge through a multiple of 10 e.g. Children should be able to partition the 7 to relate adding the 2 and then the 5.

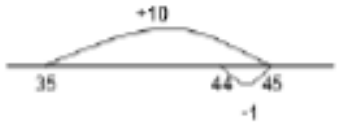
8 + 7 = 15



Adding 9 or 11 by adding 10 and adjusting by 1

e.g. Add 9 by adding 10 and adjusting by 1

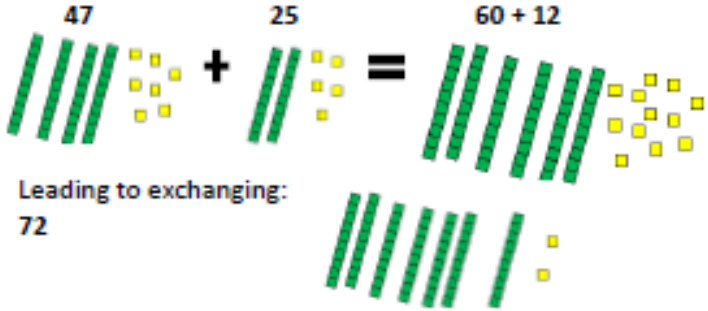
35 + 9 = 44



Towards a Written Method

Partitioning in different ways and recombine

47+25



Leading to exchanging:

72

Expanded written method

40 + 7 + 20 + 5 =

40+20 + 7 + 5 =

60 + 12 = 72

40 + 7
+ 20 + 5
60 + 12 = 72

Addition - Year 3

Missing number problems using a range of equations as in Year 1 and 2 but with appropriate, larger numbers.

Partition into tens and ones

Partition both numbers and recombine.

Count on by partitioning the second number only e.g.

247 + 125 = 247 + 100 + 20+ 5

= 347 + 20 + 5

= 367 + 5

= 372

Children need to be secure adding multiples of 100 and 10 to any three-digit number including those that are not multiples of 10.

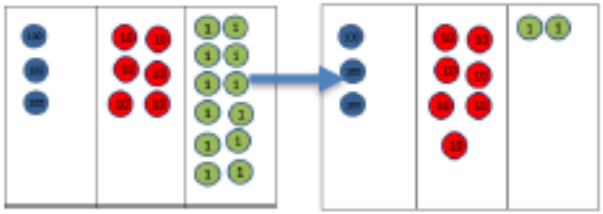
Towards a Written Method

Introduce expanded column addition modelled with place value counters (Dienes could be used for those who need a less abstract representation)

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

247
+125
12
60
300
372

Leading to children understanding the exchange between tens and ones.

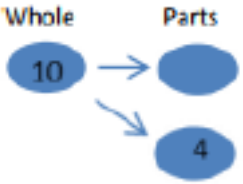


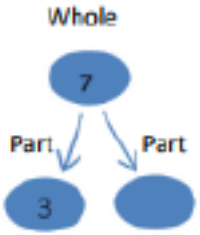
Some children may begin to use a formal column algorithm, initially introduced alongside the expanded method. The formal method should be seen as a more streamlined version of the expanded method, not a new method.

247
+125
372
10

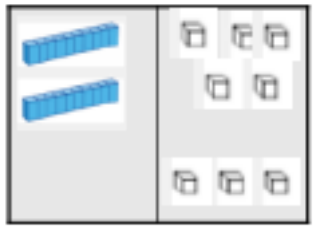
Addition - Year 1

Understanding missing parts





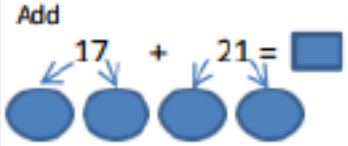
Addition - Year 2



25 + 3 = 28

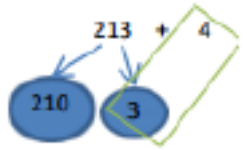
Tens	Ones
2	5
+	3
	8

Tens	Ones
2	5
+	3
2	8



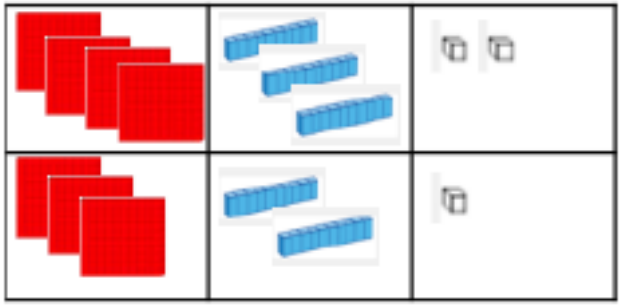
Tens	Ones
2	4
+	7
1	1
+ 2	0
3	1

Addition - Year 3



3 + 4 = 7
210 + 7 = 217

Add the ones, then the tens and then the hundreds



Hundreds	Tens	Ones
4	3	2
+ 3	2	1
7	5	3

432 + 321 = 753

Addition - Year 4

Missing number/digit problems:

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods (progressing to 4-digits)

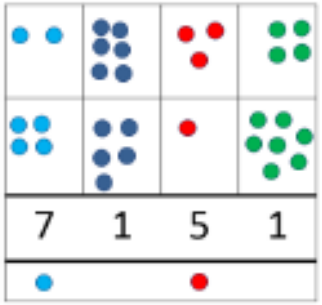
Expanded column addition modelled with place value counters, progressing to calculations with 4-digit numbers.

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

```
 247
+125
 ---
  12
  60
 300
 ---
 372
```

Compact written method

Extend to numbers with at least four digits.




```
 2634
+4517
------
 7151
 1  1
```

Children should be able to make the choice of reverting to expanded methods if experiencing any difficulty.

Extend to up to two places of decimals (same number of decimals places) and adding several numbers (with different numbers of digits).

```
  72.8
+ 54.6
------
 127.4
 1 1
```

Addition - Year 5

Missing number/digit problems:

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving. Children should practise with increasingly large numbers to aid fluency

e.g. 12462 + 2300 = 14762

Written methods (progressing to more than 4-digits)

As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers as an efficient written algorithm.

```
 172.83
+ 54.68
------
 227.51
 1 1 1
```

Place value counters can be used alongside the columnar method to develop understanding of addition with decimal numbers.

Addition - Year 6

Missing number/digit problems:

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods

As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. Continue calculating with decimals, including those with different numbers of decimal places

Problem Solving

Teachers should ensure that pupils have the opportunity to apply their knowledge in a variety of contexts and problems (exploring cross curricular links) to deepen their understanding.

Subtraction -EYFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

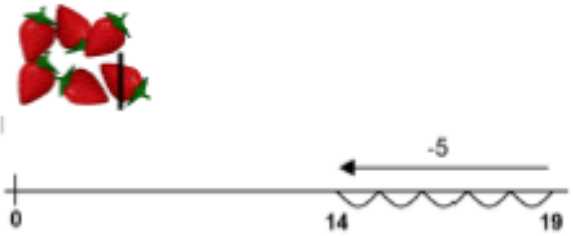
GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
Children begin with mostly pictorial representations XXX XX Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left. Concrete apparatus models the subtraction of 2 objects from a set of 5. Construct number sentences verbally or using cards to go with practical activities. Children are encouraged to read number sentences aloud in different ways "five subtract one leaves four" "four is equal to five subtract one" Children make a record in pictures, words or symbols of subtraction activities already carried out. Solve simple problems using fingers Number tracks can be introduced to count back and to find one less: What is 1 less than 9? 1 less than 20? Number lines can then be used alongside number tracks and practical apparatus to solve subtraction calculations and word problems. Children count back under the number line. **Children will need opportunities to look at and talk about different models and images as they move between representations.**	**Games and songs can be a useful way to begin using vocabulary involved in subtraction e.g.** Five little men in a flying saucer 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

Subtraction - Year 1

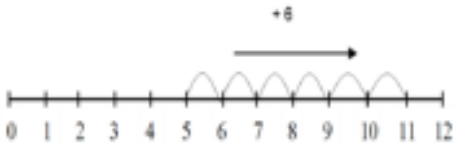
Missing number problems e.g. 7 = □ - 9; 20 - □ = 9; 15 – 9 = □; □ - □ = 11; 16 – 0 = □

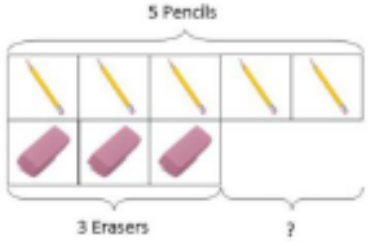
Use concrete objects and pictorial representations. If appropriate, progress from using number lines with every number shown to number lines with significant numbers shown.

Understand subtraction as take-away:



Understand subtraction as finding the difference:





The above model would be introduced with concrete objects which children can move (including cards with pictures) before progressing to pictorial representation.

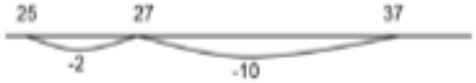
The use of other images is also valuable for modelling subtraction e.g. Numicon, bundles of straws, Dienes apparatus, multi-link cubes, bead strings

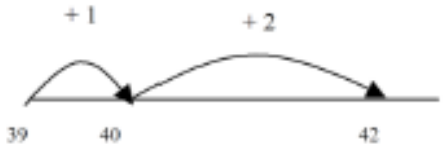
Subtraction - Year 2

Missing number problems e.g. 52 – 8 = □; □ – 20 = 25; 22 = □ – 21; 6 + □ + 3 = 11

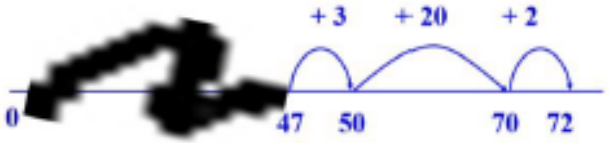
It is valuable to use a range of representations (also see Y1). Continue to use number lines to model take-away and difference.

Eg.





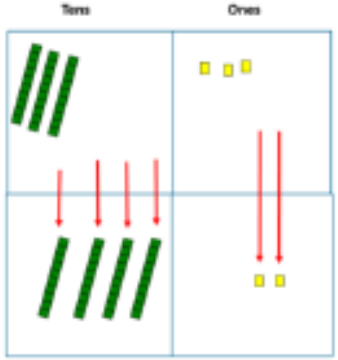
The link between the two may be supported by an image like this, with 47 being taken away from 72, leaving the difference. which is 25.



The bar model should continue to be used, as well as images in the context of measures.

Towards written methods

Recording addition and subtraction in expanded columns can support understanding of the quantity aspect of place value and prepare for efficient written methods with larger numbers. The numbers may be represented with Dienes apparatus.



70 5
-40 2
30 3

Subtraction - Year 3

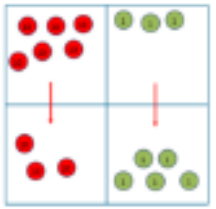
Missing number problems e.g. □ = 43 – 27; 145 – □ = 138; 274 – 30 = □; 245 – □ = 195; 532 – 200 = □; 364 – 153 = □

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving (see Y1 and Y2).

Children should make choices about whether to use complementary addition or counting back, depending on the numbers involved.

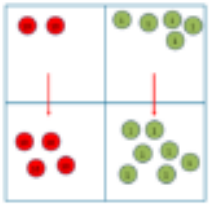
Written methods (progressing to 3-digits)

Introduce expanded column subtraction with no decomposition, modelled with place value counters (Dienes could be used for those who need a less abstract representation)



90 8
- 30 5
60 3

For some children this will lead to exchanging, modelled using place value apparatus (or Dienes).



~~70~~ 12
- 40 7
20 5

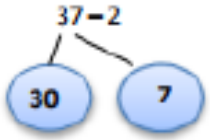
A number line and expanded column method may be compared next to each other.

Some children may begin to use a formal columnar algorithm, initially introduced alongside the expanded method. The formal method should be seen as a more streamlined version of the expanded method, not a new method.

Subtraction - Year 1

Using number bonds

Subtraction - Year 2



7 - 2 = 5
30 + 5 = 35

23 – 5 =

Tens	Ones
1 ~~2~~	13 ~~3~~
-	5
	8

Tens	Ones
1 ~~2~~	13
-	5
1	8

23 – 5 = 18

Moving onto 2-digit minus 2-digit
32 – 16

Subtract the ones first

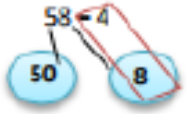
Tens	Ones
2 ~~3~~	12 ~~2~~
- 1	6
	6

Then subtract the tens

Tens	Ones
2 ~~3~~	12 ~~2~~
- 1	6
1	6

32 – 16 = 16

Subtraction - Year 3



8 – 4 = 4
50 + 4 = 54

Hundreds	Tens	ones
9	7	5
- 7	2	3
2	5	2

H	T	O
~~8~~	~~2~~ 3	11 ~~1~~
-	2	6
8	0	5

Cubes can be used
Link to the Bar Model

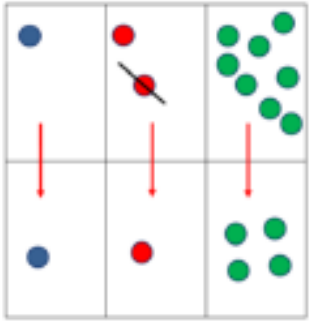
Year 4

Missing number/digit problems: 456 + □ = 710; 1□7 + 6□ = 200; 60 + 99 + □ = 340; 200 – 90 – 80 = □; 225 - □ = 150; □ – 25 = 67; 3450 – 1000 = □; □ - 2000 = 900

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

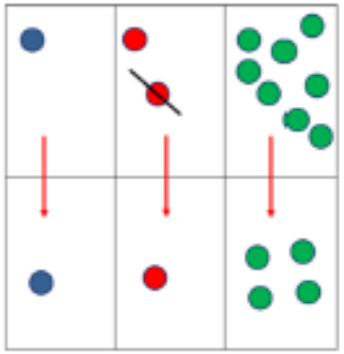
Written methods (progressing to 4-digits)

Expanded column subtraction with decomposition, modelled with place value counters, progressing to calculations with 4-digit numbers.



$$\begin{array}{r} 200\ \ 30\ \ 2 \\ -\ 100\ \ 10\ \ 4 \\ \hline 100\ \ 10\ \ 8 \end{array}$$

If understanding of the expanded method is secure, children will move on to the formal method of decomposition, which again can be initially modelled with place value s.



$$\begin{array}{r} 2\ \ 1 \\ 2\not{3}2 \\ -\ 114 \\ \hline 118 \end{array}$$

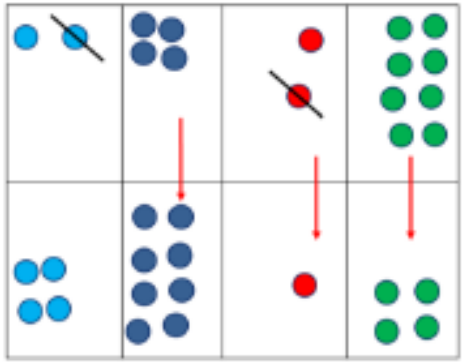
Year 5

Missing number/digit problems: 6.45 = 6 + 0.4 + □; 119 - □ = 86; 1 000 000 - □ = 999 000; 600 000 + □ + 1000 = 671 000; 12 462 – 2 300 = □

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods (progressing to more than 4-digits)

When understanding of the expanded method is secure, children will move on to the formal method of decomposition, which can be initially modelled with place value counters.



$$\begin{array}{r} 5\ \ 1\ \ 2\ \ 1 \\ \not{6}\not{2}32 \\ -\ 4814 \\ \hline 1418 \end{array}$$

Progress to calculating with decimals, including those with different numbers of decimal places.

Year 6

Missing number/digit problems: □ and # each stand for a different number. # = 34. # + # = □ + □ + #. What is the value of □? What if # = 28? What if # = 21

10 000 000 = 9 000 100 + □

7 – 2 x 3 = □; (7 – 2) x 3 = □; (□ - 2) x 3 = 15

Mental methods should continue to develop, supported by a range of models and images, including the number line. The bar model should continue to be used to help with problem solving.

Written methods

As year 5, progressing to larger numbers, aiming for both conceptual understanding and procedural fluency with decomposition to be secured.

Teachers may also choose to introduce children to other efficient written layouts which help develop conceptual understanding. For example:

$$\begin{array}{r} 326 \\ -\underline{148} \\ -2 \\ -20 \\ \underline{200} \\ 178 \end{array}$$

Continue calculating with decimals, including those with different numbers of decimal places.

Multiplication and Division

Multiplication and Division

Year 1	Year2	Year 3
• 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	• recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers • calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs • show that multiplication of 2 numbers can be done in any order (commutative) and division of 1 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.	• 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

Multiplication and Division

Multiplication and Division

Year 4	Year 5	Year 6
• 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 3 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 1 digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects	• identify multiples and factors, including finding all factor pairs of a number, and common factors of 2 numbers • know and use the vocabulary of prime numbers, prime factors and composite (non-prime) 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 1,000 • 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.	• 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

Multiplication -EYFS

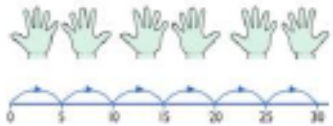
Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
The link between addition and multiplication can be introduced through doubling. If available, Numicon is used to visualise the repeated adding of the same number. These can then be drawn around or printed as a way of recording. Children begin with mostly pictorial representations:   How many groups of 2 are there? Real life contexts and use of practical equipment to <u>count in repeated groups of the same size</u>:  How many wheels are there altogether?  How much money do I have? Count in twos; fives; tens both aloud and with  objects Children are <u>given multiplication problems set in a real life context</u>. Children are encouraged to visualise the problem. How many fingers on two hands? How many sides on three triangles? How many legs on four ducks? Children are encouraged to read number sentences aloud in different ways "five times two makes ten" "ten is equal to five multiplied by two"	lots of groups of times multiply multiplied by multiple of once, twice, three times... ten times... ...times as (big, long, wide... and so on) repeated addition double

Multiplication - Year 1

Understand multiplication is related to doubling and combining groups of the same size (repeated addition)

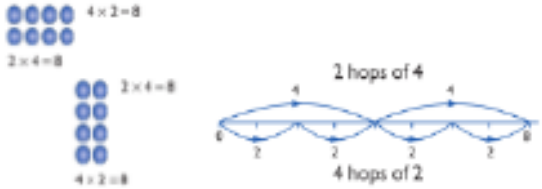
Washing line, and other practical resources for counting. Concrete objects. Numicon; bundles of straws, bead strings



Problem solving with concrete objects (including money and measures

Use cuissenaire and bar method to develop the vocabulary relating to 'times' –
Pick up five, 4 times

Use arrays to understand multiplication can be done in any order (commutative)



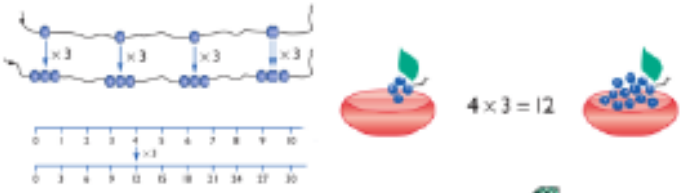
Multiplication - Year 2

Expressing multiplication as a number sentence using x
Using understanding of the inverse and practical resources to solve missing number problems.

7 x 2 = □ □ = 2 x 7
7 x □ = 14 14 = □ x 7
□ x 2 = 14 14 = 2 x □
□ x ◯ = 14 14 = □ x ◯

Develop understanding of multiplication using array and number lines (see Year 1). Include multiplications not in the 2, 5 or 10 times tables.

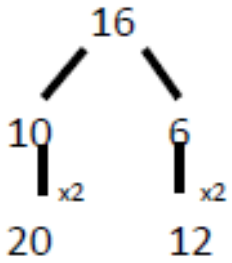
Begin to develop understanding of multiplication as scaling (3 times bigger/taller)



Doubling numbers up to 10 + 10
Link with understanding scaling
Using known doubles to work out double 2d numbers
(double 15 = double 10 + double 5)

Towards written methods

Use jottings to develop an understanding of doubling two digit numbers.



Multiplication - Year 3

Missing number problems
Continue with a range of equations as in Year 2 but with appropriate numbers.

Mental methods
Doubling 2 digit numbers using partitioning

Demonstrating multiplication on a number line – jumping in larger groups of amounts

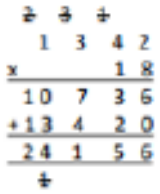
13 x 4 = (10 groups 4) + (3 groups of 4)

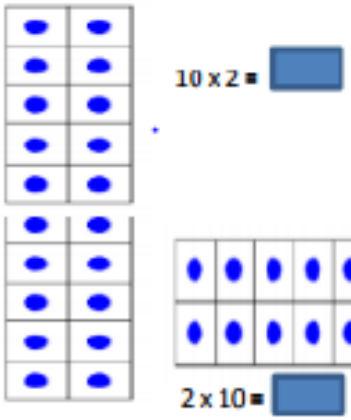
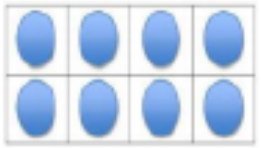
Written methods (progressing to 2d x 1d)

Developing written methods using understanding of visual images

Develop onto the grid method

Give children opportunities for children to explore this and deepen understanding using Dienes and place value apparatus.



Multiplication - Year 1	Multiplication - Year 2	Multiplication - Year 3
	Using an array e.g. 10 x 2 = or 2 x 10 =  10 x 2 = 2 x 10 =	2 x 4 = 8  Ones 2 x 4 8 Move onto 20 x 4 =  Tens Ones 2 0 x 4 8 0 23 x 2 = 46 Tens Ones 2 3 x 2 6 Tens Ones 2 3 x 2 6 4 0 Tens Ones 2 3 x 2 6 + 4 0 4 6

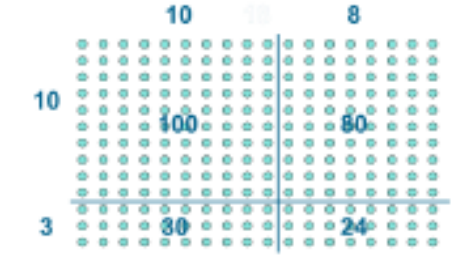
Multiplication - Year 4

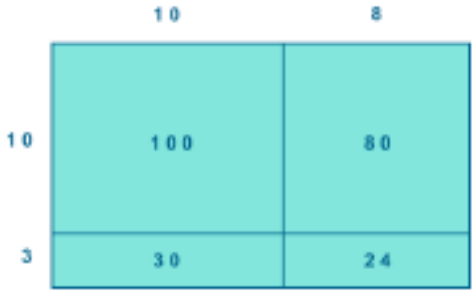
Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits
□2 x 5 = 160

Mental methods
Counting in multiples of 6, 7, 9, 25 and 1000, and steps of 1/100.

Solving practical problems where children need to scale up. Relate to known number facts. (e.g. how tall would a 25cm sunflower be if it grew 6 times taller?)

Written methods (progressing to 3d x 2d)
Children to embed and deepen their understanding of the grid method to multiply up 2d x 2d. Ensure this is still linked back to their understanding of arrays and place value apparatus.





Multiplication - Year 5

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits.

Mental methods
X by 10, 100, 1000 using moving digits ITP.

Use practical resources and jottings to explore equivalent statements (e.g. 4 x 35 = 2 x 2 x 35).

Recall of prime numbers up 19 and identify prime numbers up to 100 (with reasoning).

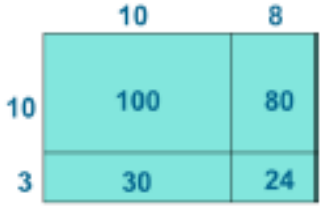
Solving practical problems where children need to scale up. Relate to known number facts.

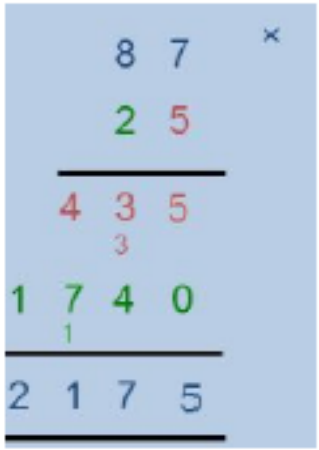
Identify factor pairs for numbers.

Written methods (progressing to 4d x 2d)

Long multiplication using place value apparatus.

Children to explore how the grid method supports an understanding of long multiplication (for 2d x 2d).





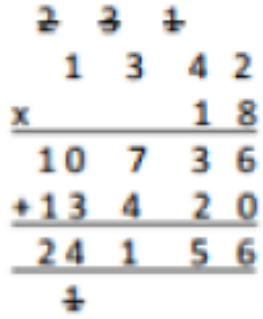
Multiplication - Year 6

Continue with a range of equations as in Year 2 but with appropriate numbers. Also include equations with missing digits.

Mental methods
Identifying common factors and multiples of given numbers
Solving practical problems where children need to scale up. Relate to known number facts.

Written methods
Continue to refine and deepen understanding of written methods including fluency for using long multiplication.

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16



Multiplication - Year 4	Multiplication - Year 5	Multiplication - Year 6
23 x 6 18 + 120 138 23 x 6 = 20 3 6 120 18 20 x 6 3 x 6 23 x 6 = 120 + 18 = 138		2 3 1 1 3 4 2 x 1 8 1 3 4 2 0 1 0 7 3 6 2 4 1 5 6 1

Division and Fractions -EYFS

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
The ELG states that children **solve problems, including doubling, halving and sharing.** Children need to see and hear representations of division as both grouping and sharing. Division can be introduced through halving. Children begin with mostly pictorial representations linked to real life contexts:  **Grouping model** Mum has 6 socks. She grouped them into pairs – how many pairs did she make?  **Sharing model** I have 10 sweets. I want to share them with my friend. How many will we have each? Children have a go at recording the calculation that has been carried out.	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

FRACTIONS

GUIDANCE / MODELS AND IMAGES	KEY VOCABULARY
Although not explicit in the Development Matters document, the sharing model is a useful way of introducing young children to fractions and calculating with fractions. Setting the problems in real life context and solving them with <u>concrete apparatus</u> will support children's understanding. "I have got 5 bones to share between my two dogs. How many bones will they get each?"  Children have a go at recording the calculation that has been carried out. 2 ½ + 2 ½ = 5	As division vocabulary plus: fraction half halves third thirds

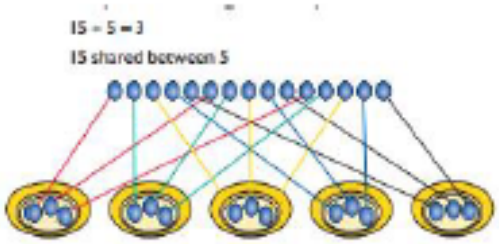
Division - Year 1

Children must have secure counting skills- being able to confidently count in 2s, 5s and 10s. Children should be given opportunities to reason about what they notice in number patterns.

Group AND share small quantities- understanding the difference between the two concepts.

Sharing

Develops importance of one-to-one correspondence.



Children should be taught to share using concrete apparatus.

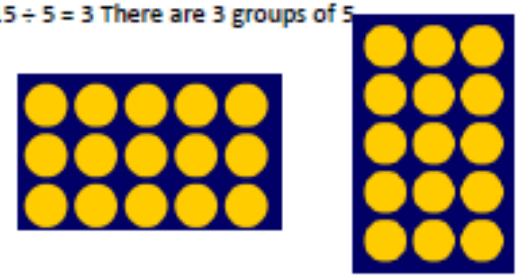
Grouping

Children should apply their counting skills to develop some understanding of grouping.

Use of arrays as a pictorial representation for division.

15 ÷ 3 = 5 There are 5 groups of 3.

15 ÷ 5 = 3 There are 3 groups of 5



Children should be able to find ½ and ¼ and simple fractions of objects, numbers and quantities.

Division - Year 2

÷ = signs and missing numbers

6 ÷ 2 = □	□ = 6 ÷ 2
6 ÷ □ = 3	3 = 6 ÷ □
□ ÷ 2 = 3	3 = □ ÷ 2
□ ÷ ∇ = 3	3 = □ ÷ ∇

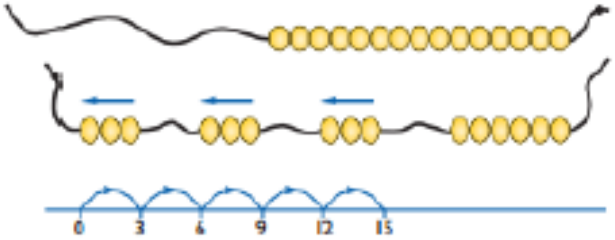
Know and understand sharing and grouping- introducing children to the ÷ sign.

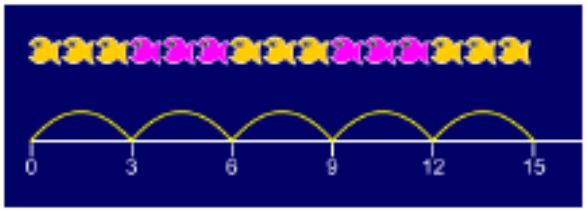
Children should continue to use grouping and sharing for division using practical apparatus, arrays and pictorial representations.

Grouping using a numberline

Group from zero in jumps of the divisor to find our 'how many groups of 3 are there in 15?'.

15 ÷ 3 = 5





Continue work on arrays. Support children to understand how multiplication and division are inverse. Look at an array – what do you see?

Division - Year 3

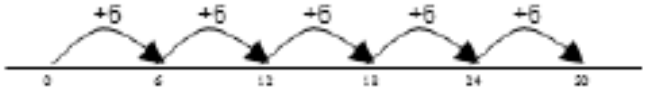
÷ = signs and missing numbers

Continue using a range of equations as in year 2 but with appropriate numbers.

Grouping

How many 6's are in 30?

30 ÷ 6 can be modelled as:



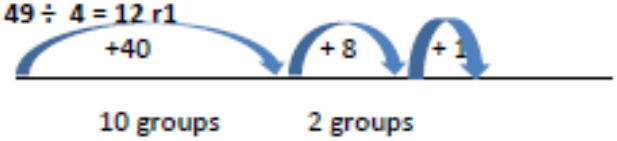
Becoming more efficient using a numberline

Children need to be able to partition the dividend in different ways.

48 ÷ 4 = 12

Remainders

49 ÷ 4 = 12 r1



Sharing – 49 shared between 4. How many left over?

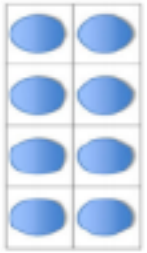
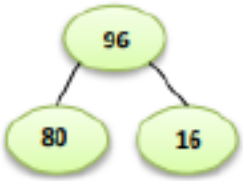
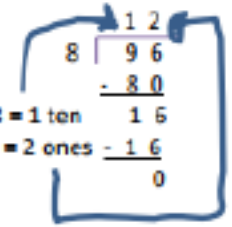
Grouping – How many 4s make 49? How many are left over?

Place value apparatus can be used to support children apply their knowledge of grouping.

For example:

60 ÷ 10 = How many groups of 10 in 60?

600 ÷ 100 = How many groups of 100 in 600?

Division - Year 1	Division - Year 2	Division - Year 3
	 8 ÷ 2 = 4  or 	68 ÷ 2 =   6 tens ÷ 2 = 30   8 ones ÷ 2 =  34 68 ÷ 2 = 30 + 4 = 34 96 ÷ 8 = 12  8 tens ÷ 8 = 1 ten 16 ones ÷ 8 = 2 ones 

Division - Year 4

÷ = signs and missing numbers

Continue using a range of equations as in year 3 but with appropriate numbers.

Sharing, Grouping and using a number line

Children will continue to explore division as sharing and grouping, and to represent calculations on a number line until they have a secure understanding. Children should progress in their use of written division calculations:

- Using tables facts with which they are fluent
- Experiencing a logical progression in the numbers they use, for example:

1. Dividend just over 10x the divisor, e.g. 84 ÷ 7
2. Dividend just over 10x the divisor when the divisor is a teen number, e.g. 173 ÷ 15 (learning sensible strategies for calculations such as 102 ÷ 17)
3. Dividend over 100x the divisor, e.g. 840 ÷ 7
4. Dividend over 20x the divisor, e.g. 168 ÷ 7

All of the above stages should include calculations with remainders as well as without.
Remainders should be interpreted according to the context. (i.e. rounded up or down to relate to the answer to the problem).

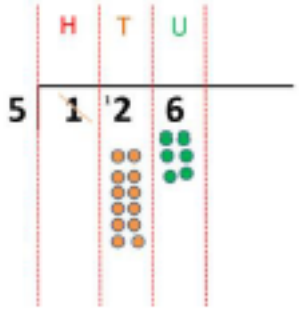
e.g. 840 ÷ 7 = 120

Jottings
7 x 100 = 700
7 x 10 = 70
7 x 20 = 140

Formal Written Methods

Formal short division should only be introduced once children have a good understanding of division, its links with multiplication and the idea of 'chunking up' to find a target number (see use of number lines above)

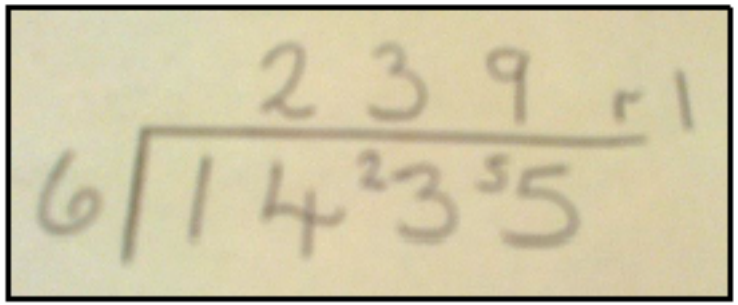
Short division to be modelled for understanding using place value counters as shown below.
Calcula[illegible]idends. E.g. fig 1



Division - Year 5

Formal Written Methods

Continued as shown in Year 4, leading to the efficient use of a formal method. The language of grouping to be used (see link from fig. 1 in Year 4)
E.g. 1435 ÷ 6



Children begin to practically develop their understanding of how express the remainder as a decimal or a fraction. Ensure practical understanding allows children to work through this (e.g. what could I do with this remaining 1? How could I share this between 6 as well?)

Division - Year 6

÷ = signs and missing numbers

Continue using a range of equations but with appropriate numbers

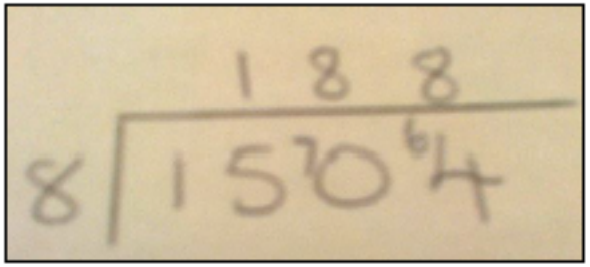
Sharing and Grouping and using a number line

Children will continue to explore division as sharing and grouping, and to represent calculations on a number line as appropriate.

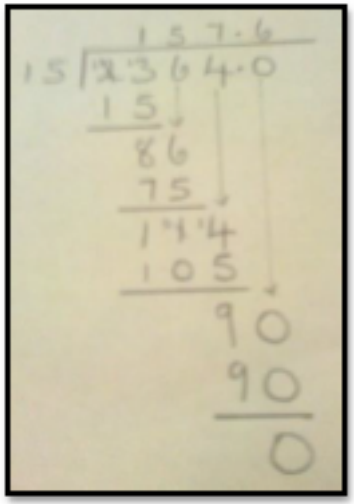
Quotients should be expressed as decimals and fractions

Formal Written Methods – long and short division

E.g. 1504 ÷ 8



E.g. 2364 ÷ 15



Division - Year 4

```
  3 4
2 6 8      6 tens ÷ 2
- 6
  8        8 ones ÷ 2
- 8
  0
```

68 ÷ 2 = 34

75 ÷ 6 =

```
  1 2
6 7 5      6 tens ÷ 6
- 6
  1 5      12 ones ÷ 6
- 1 2
    3      remainder
```

75 ÷ 6 = 12 r 3

Division - Year 5

930 ÷ 3

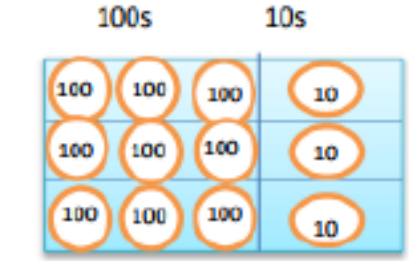
930 → 900 and 30

30 ÷ 3 = 10
900 ÷ 3 = 300
930 ÷ 3 = 310

930 ÷ 3 =

930 → 900 and 30

```
3 | 930
- 900  → 300
  30
- 30   → 10
  0
```




```
  1 4 4
4 5 7 6
-4 0 0
  1 7 6
-1 6 0
    1 6
-   1 6
      0
```

```
    8 2 r 2
7 | 5 7 6
- 5 6
    1 6
-   1 4
      2
```

Division - Year 6