Beechwood Primary School Calculation Policy

This policy has been written following consultation with all teaching staff. The stages show the stages of development within each of the areas of addition, subtraction, multiplication and division. This is a first draft and adaptations may well be made throughout the year.

You must be clear as a class teacher which stage the new National Curriculum requires the children to be using by the end of the year that you teach. It may be appropriate to cover previous stages of development first to ensure the children have a solid conceptual understanding of each of the four areas.

This policy sets out how the children should calculate not the context with which they should do it. Remember that links between areas of Maths and other curriculum areas should be exploited wherever possible. Children should also be given a range of opportunities to use these calculations to solve a range of problems (not just word problems).

Examples have been included from the Beechwood Calculation Policy, Leeds Draft Policy and Westerton Primary Policy.

Updated June 2022

Nursery

Pre counting

Sorting objects into **sets** and **categories** and noticing **same** and **different**. **T**he key focus in pre-counting is an understanding of the concepts **more, less** and the **same** and an appreciation of how these are related. At this stage these concepts are developed by **comparison** and use of language and no counting is involved.

Examples of this in practise:

- Tidying up areas, placing all the pens/pencils into the corresponding pots.
- Sorting groups using the language of more and less. Who has the most/least sweets.
- Sorting items into different criteria. E.g. Colour, type, size


Ordering /counting by rote

Count by reciting the number names in order forwards and backwards. Focusing on one more/one less and developing children's stable order.

Examples of this in practise:

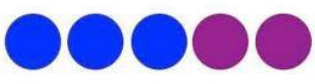
- Number songs focusing on numbers 1-5 forwards and backwards
- Counting using different voices
- Number aerobics – counting orally while doing physical actions

One to one correspondence

One number word to be matched to one object consistently. Children to develop this skill through counting objects that can and cannot be moved using a range of objects and contexts. Children to be encouraged to say how many they have at the end to ensure they understand the last number counted indicates how many things are in the set.

Examples of this in practise:

- Counting songs using props e.g. 5 little ducks, frogs.
- Counting counters, dots on a dice, objects.
- Counting out objects from a larger quantity – can you get me 5 gems from the basket?



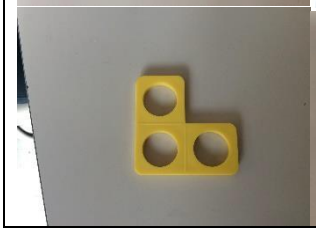
Maths mastery 1 -5

Children to work on developing a sound understanding of the numbers 1 – 5. Focusing on one number at a time each number will be looked at how it can be represented in many ways using a variety of resources and through lots of talk. They will represent their learning by making a number book.

Example of this is practise (using three as an example):

- Counting out three counters, gems, leaves, blocks, teddies etc.
- Finding the three dots on a dice.
- Counting out three fingers. – looking at how we can do this in a different way.
- Putting three candles on a cake – talk about being three years old.
- Looking at mathematical equipment that represents three. The three numicon, three on a ten frame.
- Looking at stories that have three. Goldilocks and the three bear etc.
- Coming 3rd in a race.




Reception

Counting

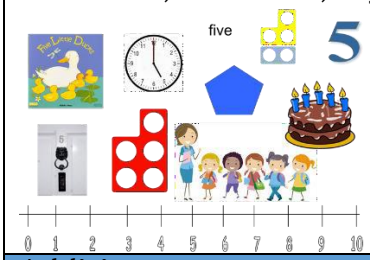
Reception teaching of mathematics continues to develop and embed the key concepts that the children worked on in Nursery. The children will continue to develop counting forwards and backwards in ones and multiples and continue to develop the skill of one to one correspondence in a range of contexts.


Maths mastery 1-10

Children to work on developing a sound understanding of the numbers 1 – 10 (concrete, pictorial, abstract). Focusing on one number a week initially developing a secure conceptual understanding of the number.

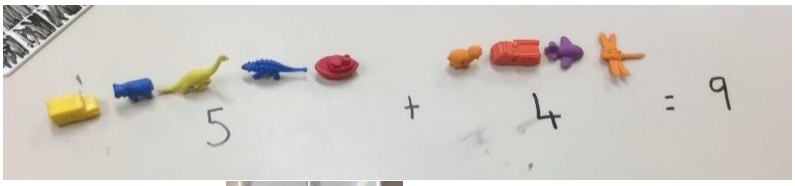
For example, looking at the 'fiveness' of five and how five can also represent the numeral two, 5th place, a 5p coin, 2 five fingers, 5 o'clock, 1 more than 4, 1 less than 6, 1 +4 = 5 and many more representations.

This concept will be developed using the number blocks series and a wide range of resources such as numicon, ten frames, objects, dice number tracks/lines and mathematical graphics.



Addition

To record their work with objects, counters, numicon, ten frames and mathematical graphics.
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

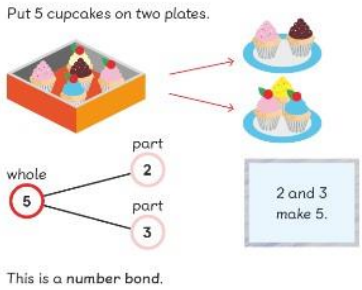


3+ 3 = 6 5 + 2 = 7 4 + 2 = 6

To begin to use number lines to calculate (add) once children have understood the concept of addition using practical/pictorial representations.

e.g. 5 + 2 = 7

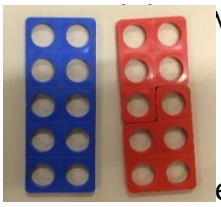
Introduction of part part whole in the summer term for them to understand that a whole number can be made up of different parts (number bonds)



Subtraction

As addition but inverse. Taught once children have the understanding of mastery. Children to be given lots of opportunities to take away objects from a group.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

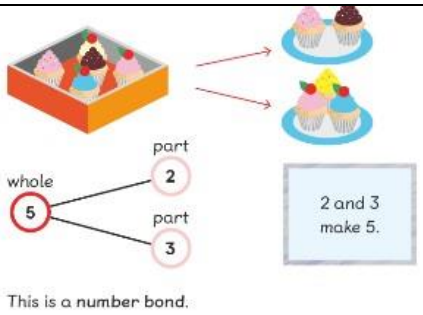


work with objects, counters, numicon, ten frames and mathematical graphics.

e.g. 10 – 5 = 5

To begin to use number lines to calculate (subtract) once children have understood the concept of addition using practical/pictorial representations.

To use the part part whole model as above to look at subtraction



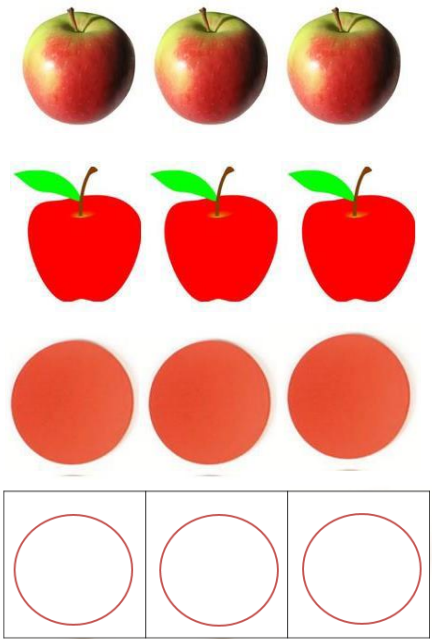
This is a number bond.

If I had 5 cupcakes and Jake took 2 how many would I have left? 5- 2 = 3

Bar Model

Introduction of the bar model by arranging objects in a line. Starting with concrete, moving to pictorial and then abstract.

e.g show me three apples



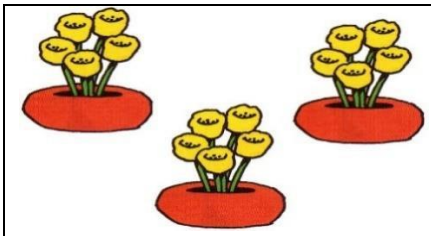
Multiplication

Children to begin to develop an understanding of multiplication through counting in multiples of 2s 5s and 10s.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Children to have plenty of opportunities to use objects and graphics to solve problems involving multiplication.

E.g. if there was three children with 5 flowers each how many would we have altogether.



3 lots of 5 (5 + 5 + 5 = 15)

If there was 4 people how many legs altogether.

2 + 2 + 2 + 2 = 8

Division

Children to begin to develop an understanding of division through sharing.

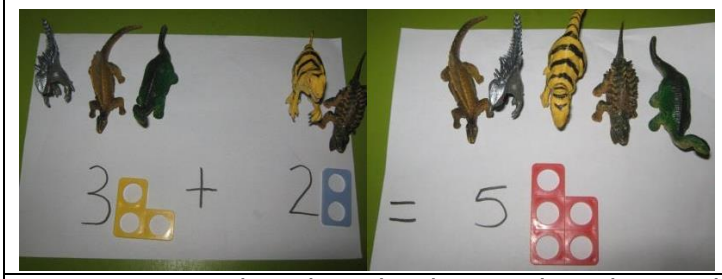
Children to have plenty of opportunities to use objects and graphics to solve problems involving sharing.
e.g. if there was 10 buns and 5 children how many buns would we have altogether.
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Year 1

Addition

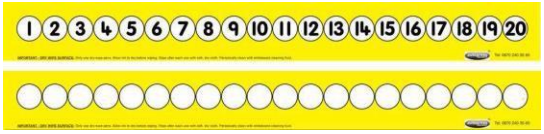
To record their work with objects, counters, Numicon, ten frames and mark making.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

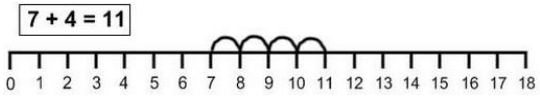


Begin to use numbered number lines and number tracks to calculate.

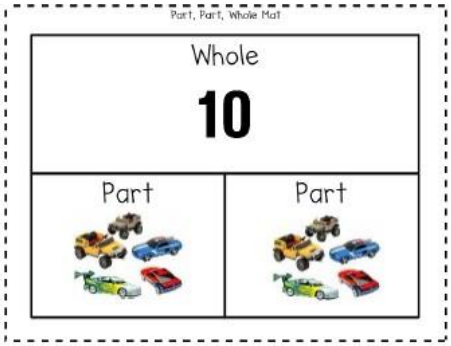
Use counters on a number track to count on.



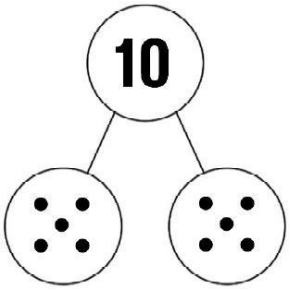
Start at the larger number on the number line and count on in ones or in one jump to find the answer.

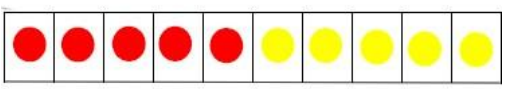


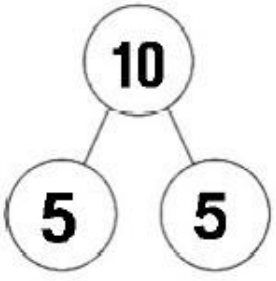
Combine two parts to make a whole model. Part-part-whole model and bar model.



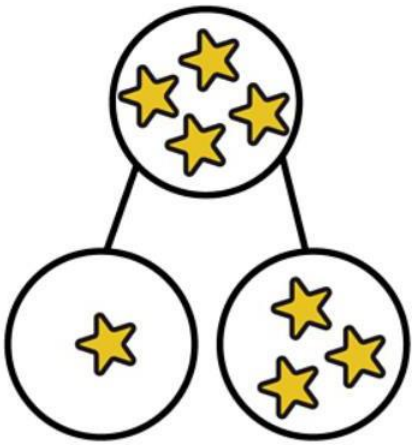
Use the part-part whole diagram as shown above to move into the abstract.

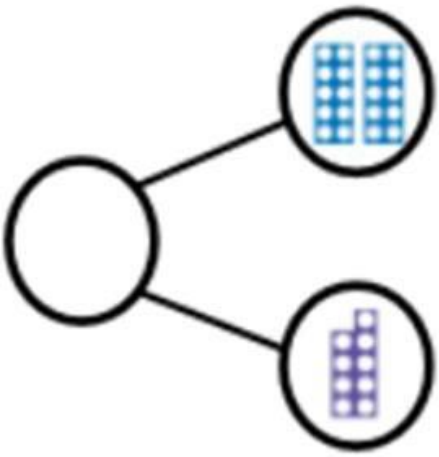




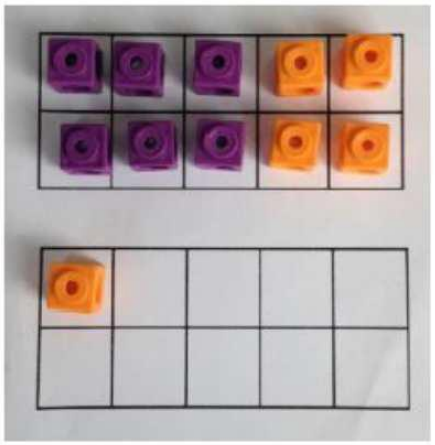


Ensure you use part whole models with different representations of number.

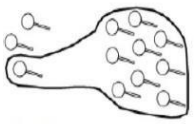




Start with the bigger number and use the smaller number to make 10.

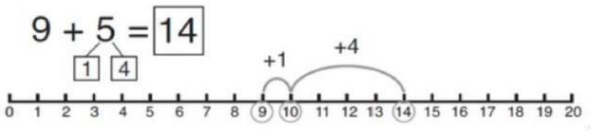


6 + 5 = 11

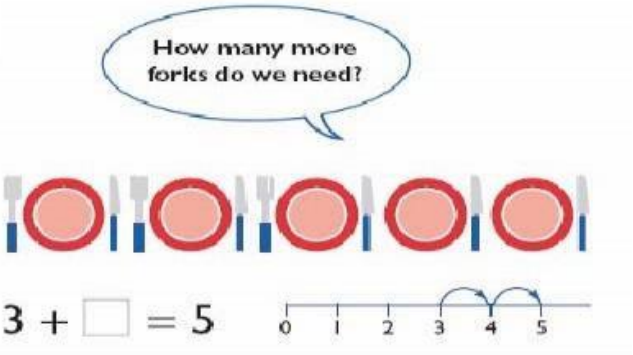


3 + 9 =

Use pictures or a number line. Regroup or partition the smaller number to make 10.



Children to develop an understanding of equality.
e.g.



6 + = 11

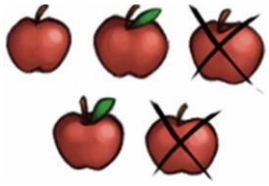
Subtraction

To record their work with objects, counters, ten frames, Numicon and mark making.

Children should be able to take away objects from a group of objects and be able to say how many they started with, how many they took away and how many they have left. Use real-life physical objects, counters, cubes etc. to show how objects can be taken away.
e.g. The child starts with 3 dinosaurs, removes one and knows that there are two left.
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

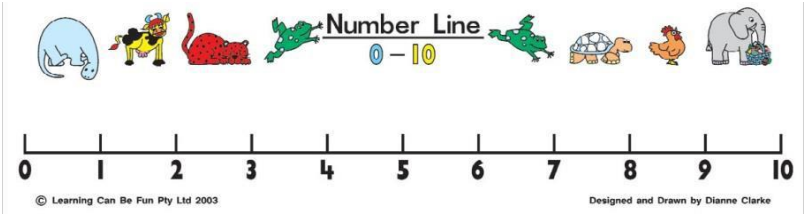
Concrete, pictorial to abstract

Cross out drawn objects to show what has been taken away.

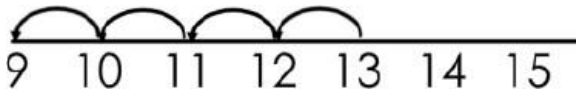


5 – 2 = 3

Begin to use numbered number lines to calculate

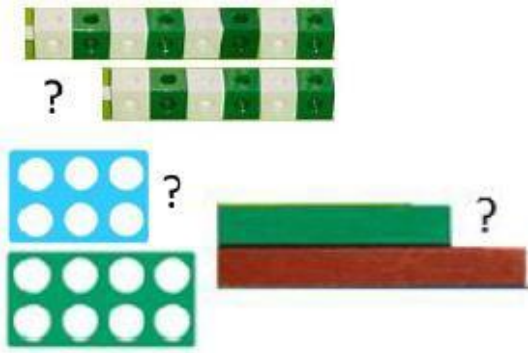


Start at the bigger number and count back the smaller number showing the jumps on the number line.



13 – 4 = 9

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



4 = 6 – 2

8 – 2 = 6

8 -5, the difference is 3

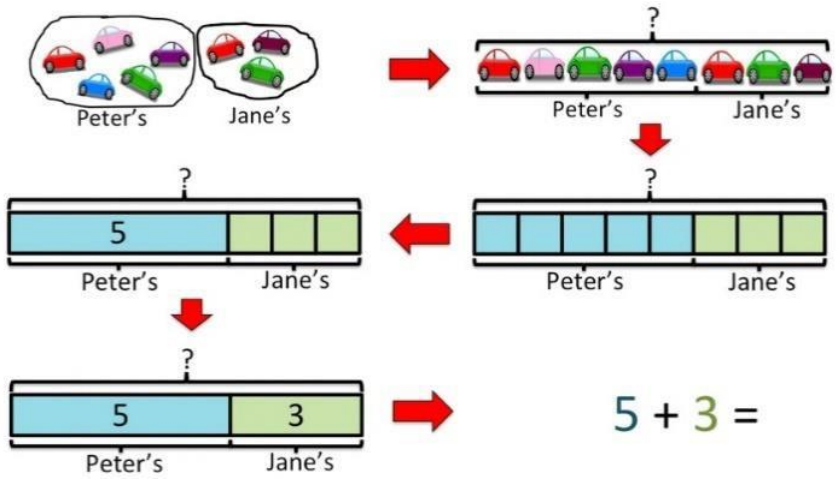
Explore why 9 -6 and 7-4 have the same difference.

Bar Model

To begin to use the bar model to calculate and to show relationship between addition and subtraction

e.g. Peter has 5 toy cars and Jane has 3 toy cars. How many toy cars do they have altogether?

Moving from concrete, pictorial to abstract

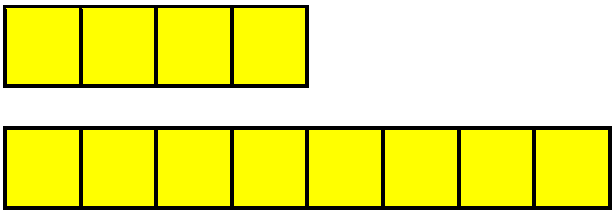


5 + 3 = 8, 8 – 3 = 5, 8 – 5 = 3

Multiplication

Doubling numbers

Use practical activities and equipment to show how to double a number.



Draw pictures to show how to double a number.

Double 4 is 8

Counting in multiples

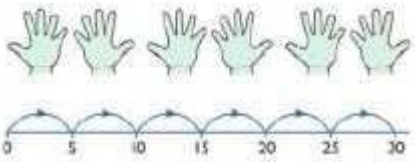
Count in multiples of a number aloud. Supported by concrete objects in equal groups.

Write sequences with multiples of numbers.

2, 4, 6, 8, 10

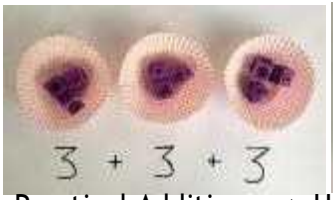
5, 10, 15, 20, 25, 30

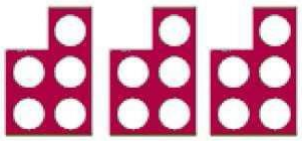
Use a number line or pictures to continue support in counting in multiples.



Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Repeated Addition:



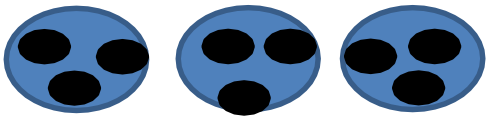


Use different objects to add equal groups.

Practical Addition e.g. How many legs on 5 teddies?

2 + 2 + 2 + 2 + 2 = 10

There are 3 sweets in a bag. How many sweets in 3 bags?



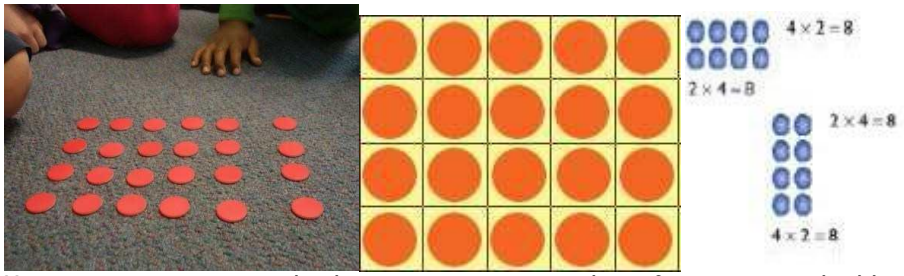
3 + 3 + 3 = 9

Write addition sentences to describe objects and pictures.

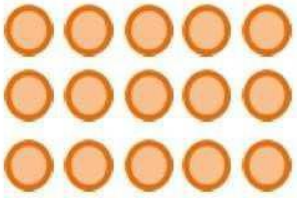
2 + 2 + 2 + 2 + 2 = 10

Arrays- showing commutative multiplication.

Create arrays using counters/ cubes to show multiplication sentences. Using a range of physical counters and then moving onto drawn arrays.



Use an array to write multiplication sentences and reinforce repeated addition.



5 + 5 + 5 = 15

3 + 3 + 3 + 3 + 3 = 15

5 x 3 = 15

3 x 5 = 15

Division

Practical Division

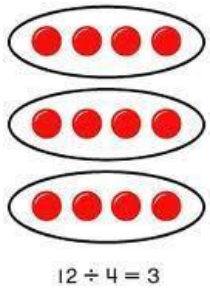
Children should have plenty of opportunity to use objects, diagrams and pictorial representations to solve problems involving both grouping *and* sharing.

Children should be taught to understand the difference between grouping and sharing (how many groups of 2 can you make with 6 sweets? Share these 6 sweets between 2 people).

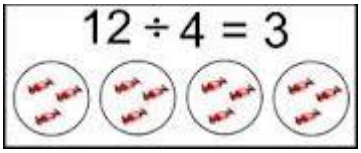
Children should be able to find half of a group of objects by sharing it into 2 equal groups.

e.g. Group these 12 sweets into 4s (how many groups of 4 in 12?):

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

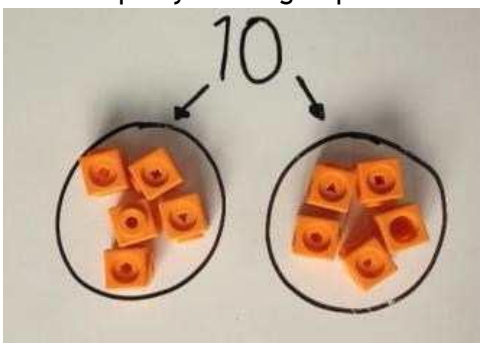


e.g. Share these 12 sweets equally between 4 people:

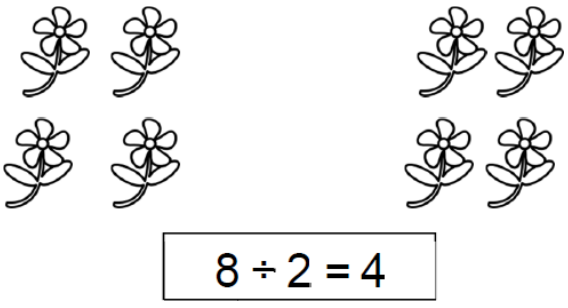


Sharing objects into groups

I have 10 cubes; can you share them equally into 2 groups?

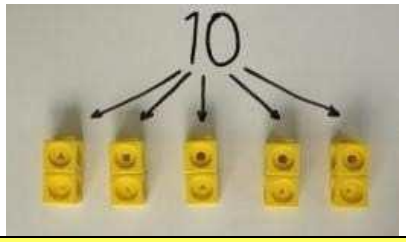


Children use pictures or shapes to share quantities.



One half of 14 is 7
½ of 14 = 7
14 ÷ 2 = 7

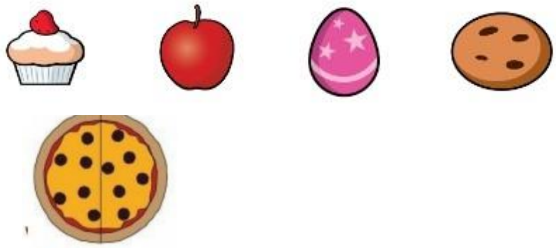
Share 10 cakes between 5 people.
10 ÷ 5 = 2
Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.



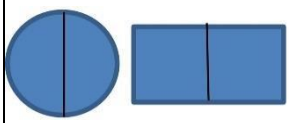
Fractions

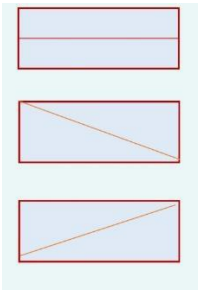
Recognise, find and name a half as 1 of 2 equal parts of an object, shape or quantity.
To explore finding a half for the first time practically using real objects, shapes and a variety of objects. To use the vocabulary 'half' and 'whole' and 'one of two **equal** parts'.

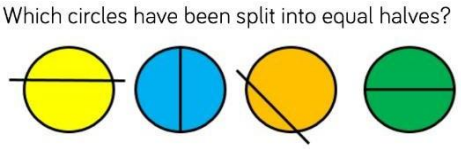
Half of an object: Show real life objects and how they can be cut in half equally.



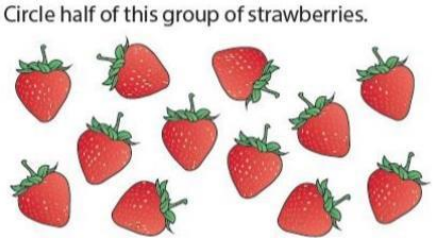
Half of a shape: Exploring how shapes can be halved in different ways.





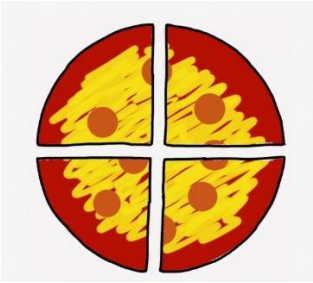


Half of a quantity:

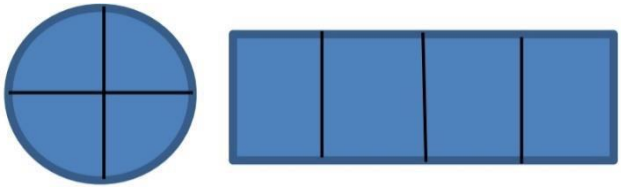


Recognise, find and name a quarter as 1 of 4 equal parts of an objects, shape or quantity. Children to build on their understanding of fractions by exploring quarters using real objects, shapes and a variety of objects.

Quarter of an object: Model how real life objects can be cut/separated into 4 equal parts

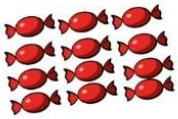


Quarter of a shape: Exploring how shape can be quartered in different ways. Children to explore this concept by cutting and drawing on shapes.



Quarter of a quantity: Sharing each quantity into four equal groups. Using real life objects and then moving onto mathematical equipment.

There are ___ cakes.
There is ___ cake in each quarter.
A quarter of ___ is ___



There are ___ sweets.
There are ___ sweets in each quarter.
A quarter of ___ is ___

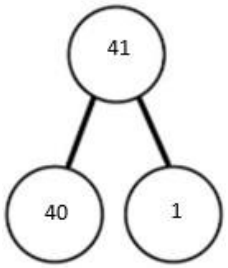
There are ___ peaches.
There are ___ peaches in each quarter.
A quarter of ___ is ___

Year 2

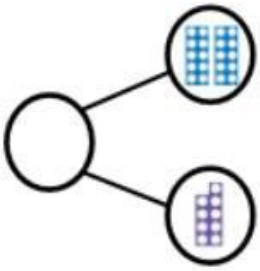
Place value to support with addition and subtraction

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

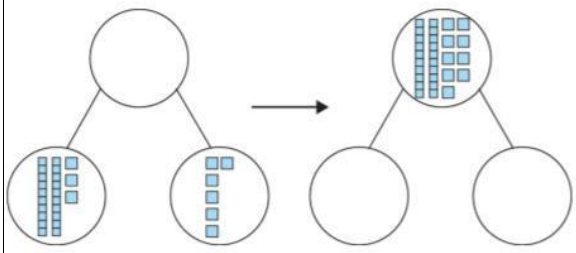
Children to also use and explore the part-whole model to develop understanding and place value



40 + 1 = 41



Different orientations and different representations of numbers to be used to ensure children develop a good Understanding



23 + 6 = 29

- *'What does the 23 represent?'*
- *'What does the 6 represent?'*
- *'What does the 29 represent?'*

Addition

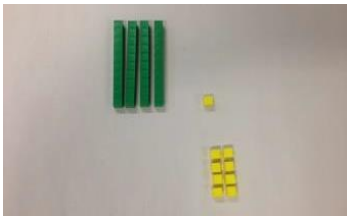
It should be taught using base ten apparatus and other practical resources, it is important that children can do this practically before they start to record their method. The children can begin with examples that do not cross the tens barrier.

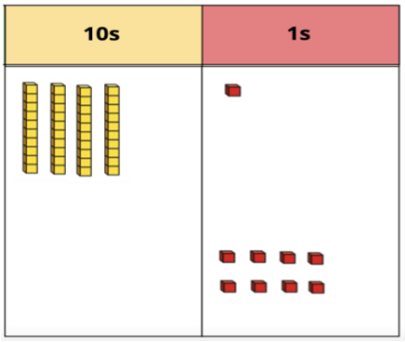
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

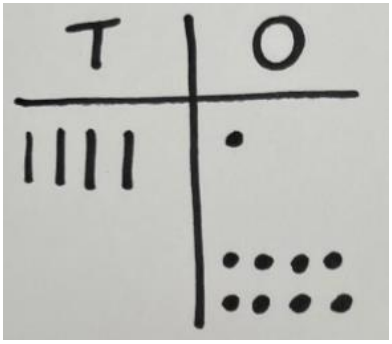
At each part of the method children are asked – Do we need to make an exchange?

TO + O using base 10. Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. lines for 10s and dots for 1s

e.g. 41+ 8





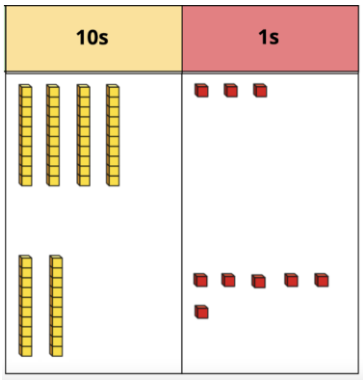


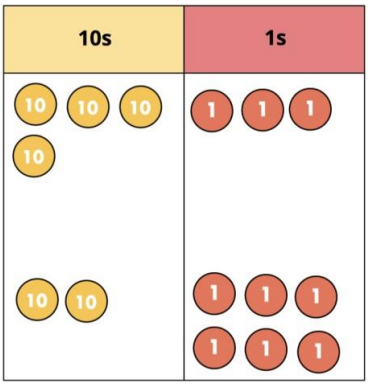
TO + TO using base 10. Continue to develop understanding of partitioning and place value and use this to support addition. Begin with no exchanging.Children can also represent the base 10 in a place value chart (lines and dots).

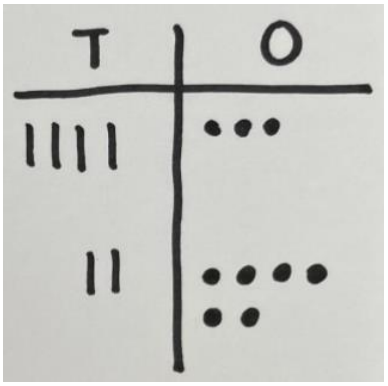
Addition with no regrouping

Use base ten before moving onto place value counters.

43 + 26 = 69





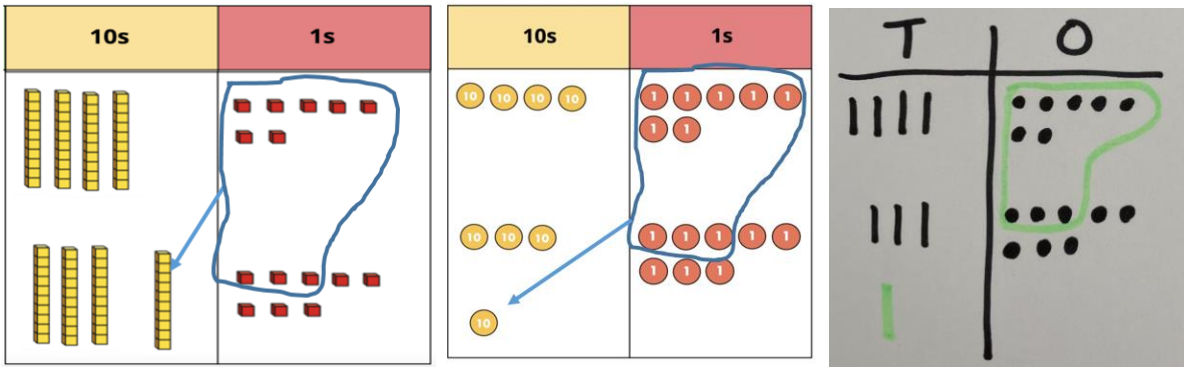


After practically using the base 10 blocks and place value counters, children can draw the 'tens' and 'ones' to help them to solve addition calculations.

Addition with regrouping

Use base ten before moving onto place value counters.

47 + 38 = 85



After practically using the base 10 blocks and place value counters, children can draw the 'tens' and 'ones' to help them to solve addition calculations.

Subtraction

It should be taught using base ten apparatus and other practical resources, it is important that children can do this practically before they start to record their method. The children can begin with examples that do not cross the tens barrier.

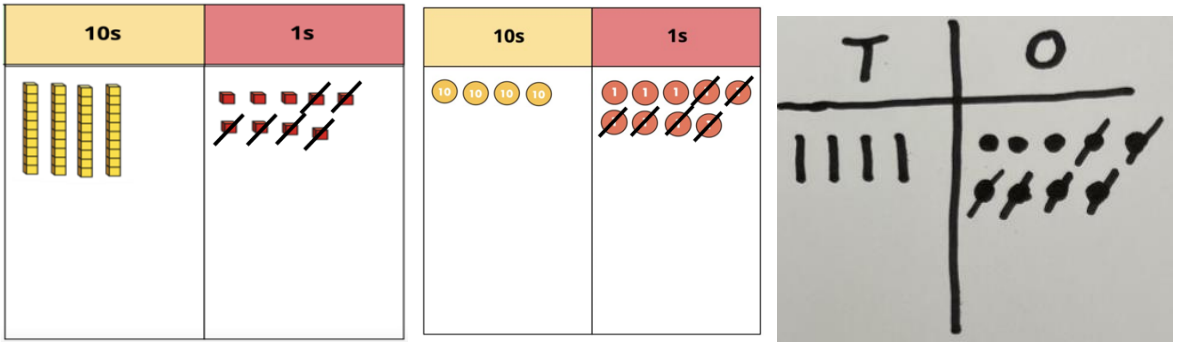
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange??

To use number lines to subtract, moving onto blank number lines. E.g. 74 - 27

TO - O using base 10. Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. lines for 10s and dots for 1s

49 – 6 = 43

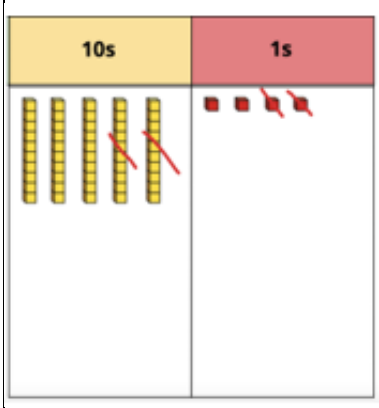


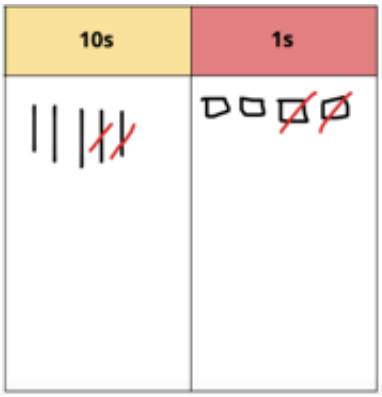
TO - TO using base 10. Continue to develop understanding of partitioning and place value and use this to support subtraction. Begin with no exchanging.Children can also represent the base 10 in a place value chart (lines and dots).

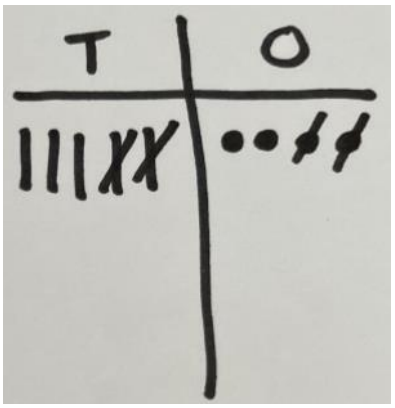
Subtraction with no regrouping

Use base ten before moving onto place value counters.

54 – 22 = 32



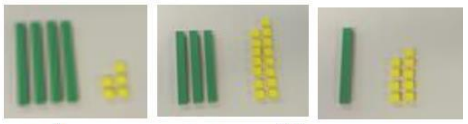




After practically using the base 10 blocks and place value counters, children can draw the 'tens' and 'ones' to help them to solve addition calculations.

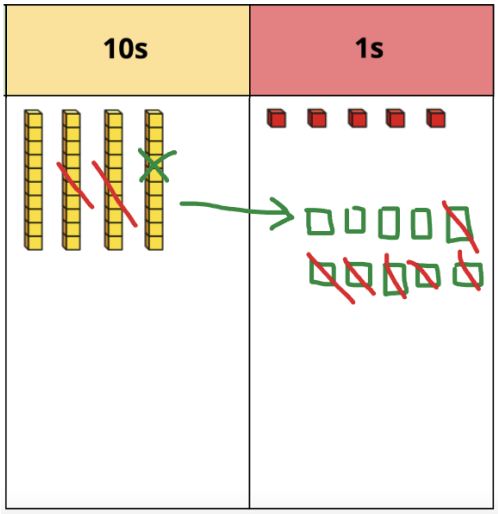
Regrouping (using base 10 and having to exchange)

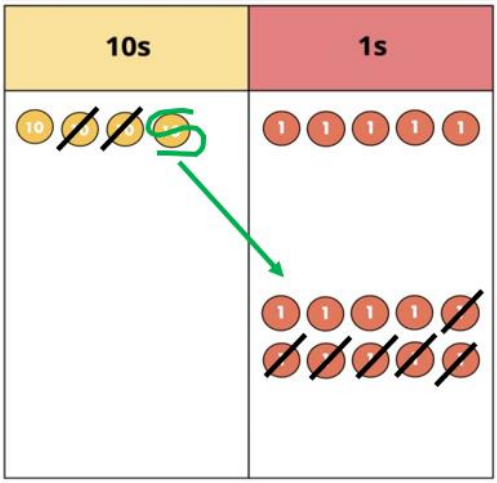
45-26

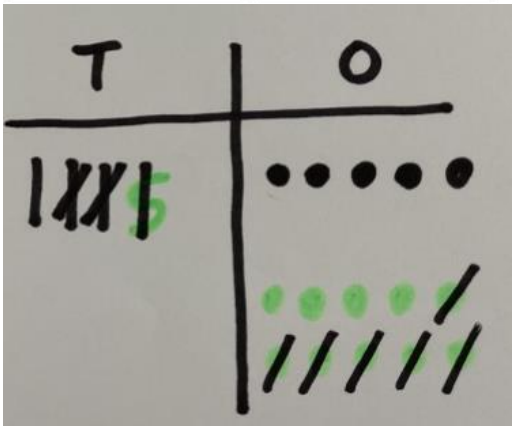


1) Start by partitioning 45
2) Exchange one ten for ten more ones
3) Subtract the ones, then the tens.

Represent the base 10 pictorially.







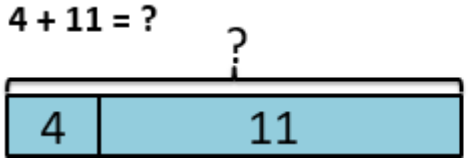
It's crucial that the children understand that when they have exchanged the 10 they still have 45.

45 = 30 + 15

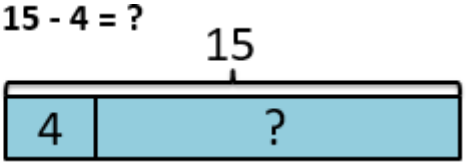
Bar Model

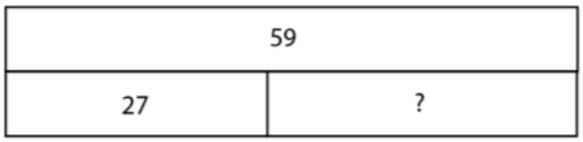
Bar modelling to show commutative law and relationship between addition and subtraction (using language of whole/parts)

4 + 11 = ?



15 - 4 = ?





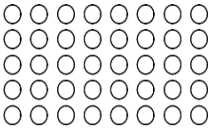
59 – 27 = ? **27 +___= 59**

Multiplication

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

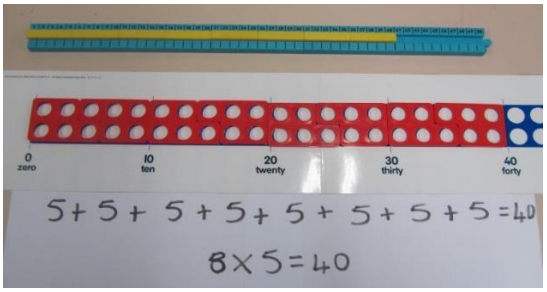
Repeated Addition: Arrays

Children can represent 8 x 5 pictorially as (this can also be done using the 5 and 8 Cuisenaire rods):



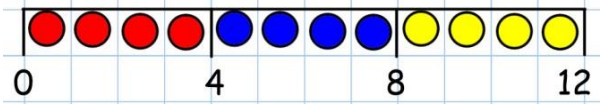
Repeated Addition : Number lines

To work out 8 x 5 children can use numicon or Cuisenaire to create a number line:



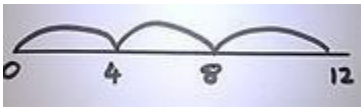
Use number lines to show repeated groups- 3 x 4

Represent this pictorially alongside a number line



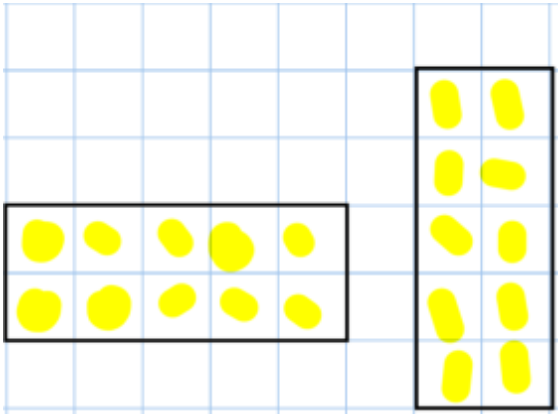
Abstract number line

3 x 4 = 12



Arrays:
Use arrays to illustrate commutativity (counters and other objects can also be used)
2 x 5 = 5 x 2

Children to draw the arrays



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

2 x 5 = 10

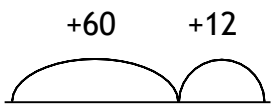
5 x 2 = 10

2 + 2 + 2 + 2 + 2 = 10

5 + 5 =10

Children can then move onto using a number line

e.g. 12 x 6
(10 x 6) (2 x 6)



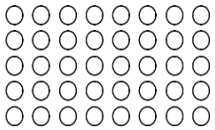
Division

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Arrays

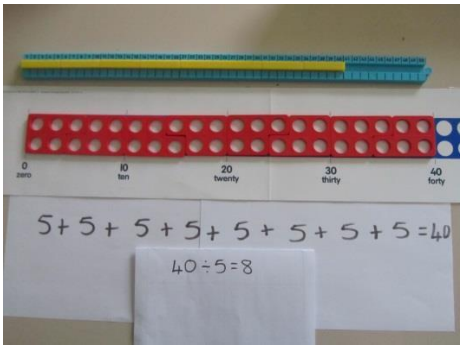
e.g. 40 ÷ 5 can be asked as how many 5s in 40? This can be linked back to grouping.

Children can then draw this as an array:



Number line

40 ÷ 5 = 8 (Phrase this as "how many 5s in 40?")

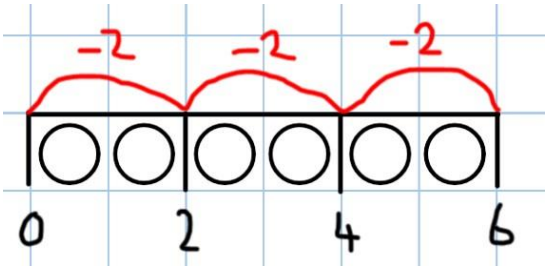


5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 = 40

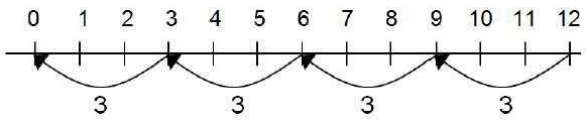
0 5 10 15 20 25 30 35 40

40 ÷ 5 = 8

Understand division as repeated grouping and subtracting. Use a number line to show jumps in groups. The number of jumps equals the number of groups.



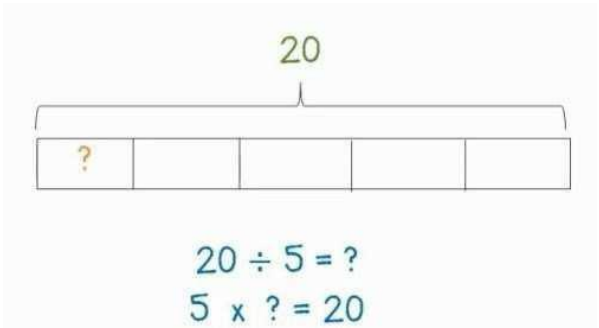
6 ÷ 2 = 3



12 ÷ 3 = 4

Bar model

Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group

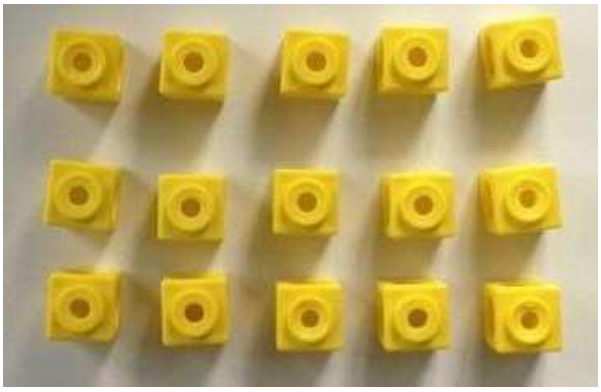


Division within arrays

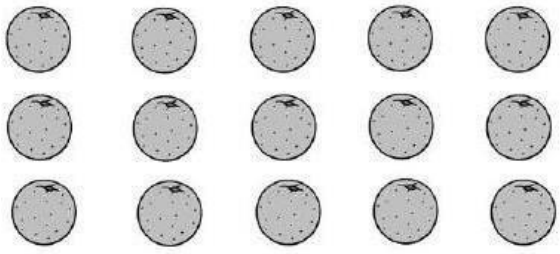
Link division to multiplication by creating an array and thinking about the number sentences that can be created. Creating four linking number sentences.

Eg 15 ÷ 3 = 5 5 x 3 = 15

15 ÷ 5 = 3 3 x 5 = 15



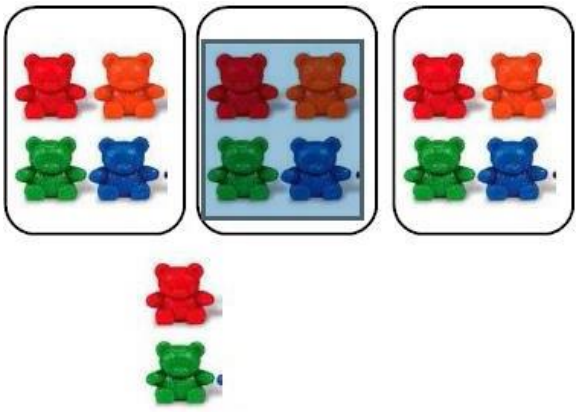
Draw an array and use lines to split the array into groups to make multiplication and division sentences.



Division with a remainder

14 ÷ 3 =

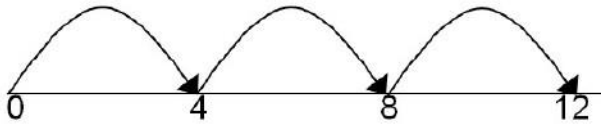
Divide objects between groups and see how much is left over



Draw dots and group them to divide an amount and clearly show a remainder.

14 ÷ 3 =

Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.



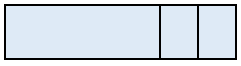
Complete written divisions and show the remainder using r.

Fractions

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

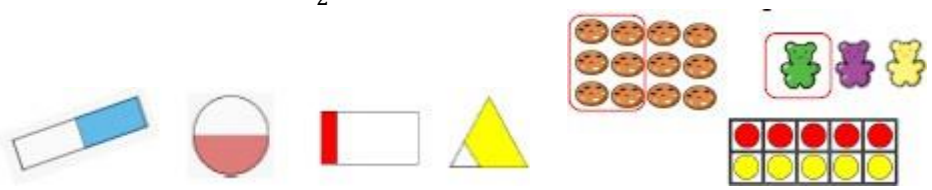
To use pictorial representations to begin to understand the concept of a whole as being one object or one quantity and to be able to recognise equal and unequal parts.

E.g. Which shows three equal parts?



Using pictorial representations children to recognise $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{4} and \frac{3}{4}$ of a length, shape, set of objects or quantity.

E.g. Which pictures show a $\frac{1}{2}$? (Repeat with different fractions)



Using concrete and pictorial representations children to find, name and write $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{4} and \frac{3}{4}$ of a length, shape and set of objects or quantity.

E.g. Circle one quarter of the cars

One quarter of ____ is ____

____ is $\frac{1}{4}$ of ____

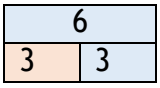
Use of bar model to complete fractions of quantity.

$\frac{1}{3}$ of 9 = ☐ $\frac{1}{3}$ of 15 = ☐ 

$\frac{1}{3}$ of 12 = ☐ $\frac{1}{3}$ of 18 = ☐

Children to recognise the notation of $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{2}{4} and \frac{3}{4}$ and be able to write simple fractions.

E,g. $\frac{1}{2}$ of $6 = 3$.



Children to use visuals such as bar model to show fractions in different ways and problem solve.

Children to use concrete and pictorial representations to understand the equivalence of $\frac{1}{2} and \frac{2}{4}$

Year 3

Addition

It should be taught using base ten apparatus and other practical resources, it is important that children can do this practically before they start to record their method. The children can begin with examples that do not cross the tens barrier.

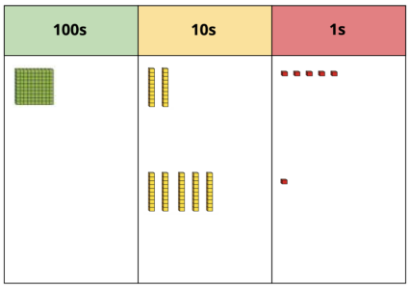
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

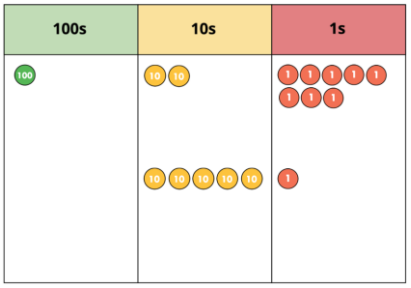
At each part of the method children are asked – Do we need to make an exchange?

Addition with no exchanging

Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. squares for hundreds, lines for 10s and dots for 1s. (Children still use base ten, place value counters, bar models and part-part-whole models to show different representations of numbers and within problem solving questions.)

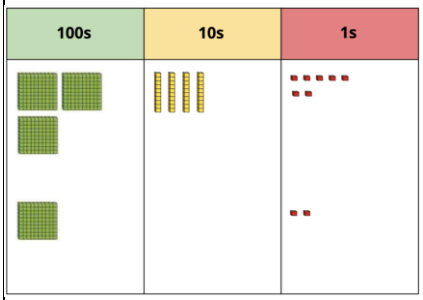
e.g. 128 + 51 =

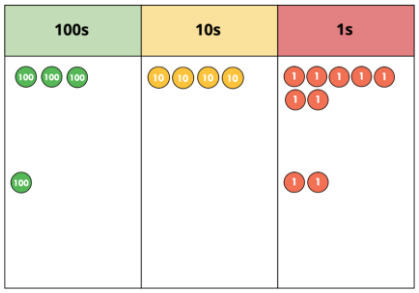




$$\begin{array}{r} 1\ 2\ 8 \\ +\quad 5\ 1 \\ \hline 1\ 7\ 9 \\ \hline \end{array}$$

e.g. 347 + 102 =



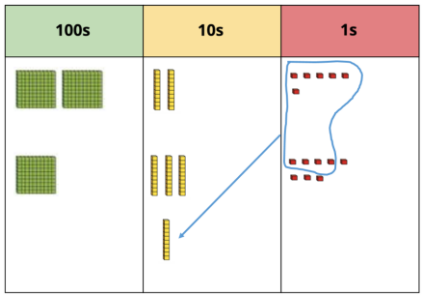


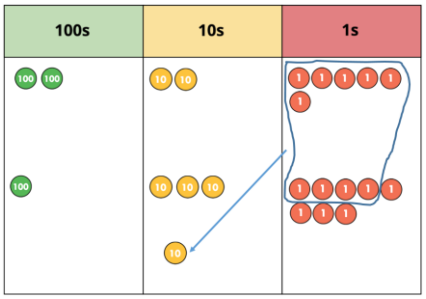
$$\begin{array}{r} 3\ 4\ 7 \\ +\ 1\ 0\ 2 \\ \hline 4\ 4\ 9 \\ \hline \end{array}$$

Addition with exchanging

Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. squares for hundreds, lines for 10s and dots for 1s. (Children still use base ten, place value counters, bar models and part-part-whole models to showdifferent representations of numbers and within problem solving questions.)

e.g. 226 + 138 =





$$\begin{array}{r} {\scriptstyle 1} \\ 226 \\ +\ 138 \\ \hline 364 \end{array}$$

Subtraction

It should be taught using base ten apparatus and other practical resources, it is important that children can do this practically before they start to record their method. The children can begin with examples that do not cross the tens barrier.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

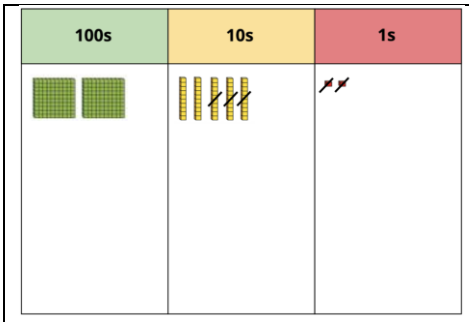
At each part of the method children are asked – Do we need to make an exchange??

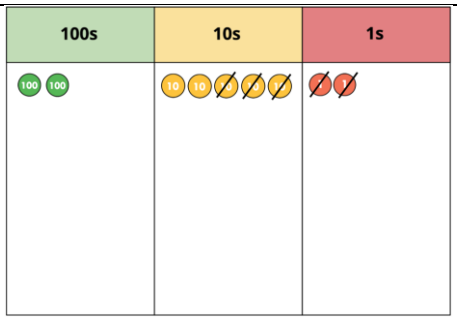
To use number lines to subtract, moving onto blank number lines. E.g. 74 - 27

Subtraction with no exchanging

Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. squares for hundreds, lines for 10s and dots for 1s. (Children still use base ten, place value counters, bar models and part-part-whole models to showdifferent representations of numbers and within problem solving questions.)

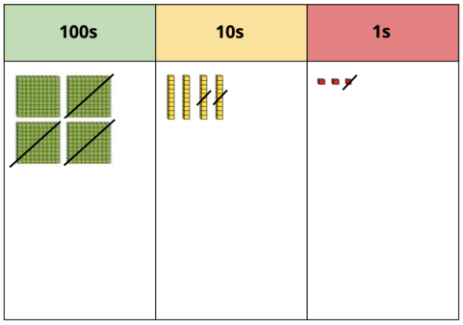
e.g. 252 – 32 =





$$\begin{array}{r} 2\ 5\ 2 \\ -\quad 3\ 2 \\ \hline 2\ 2\ 0 \end{array}$$

e.g. 443 – 321 =

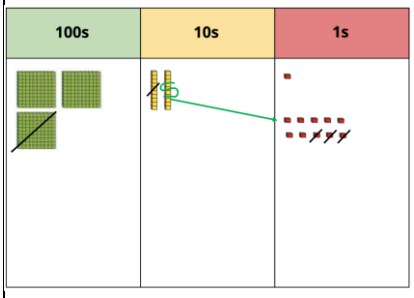


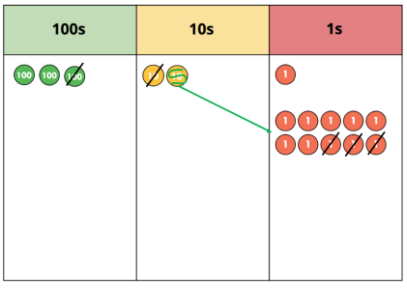
$$\begin{array}{r} 4\ 4\ 3 \\ -\ 3\ 2\ 1 \\ \hline 1\ 2\ 2 \end{array}$$

Subtraction with exchanging

Continue to develop understanding of partitioning and place value. Children can also represent the base 10 e.g. squares for hundreds, lines for 10s and dots for 1s. (Children still use base ten, place value counters, bar models and part-part-whole models to showdifferent representations of numbers and within problem solving questions.)

e.g. 321 – 113 =





$$\begin{array}{r} 3\ \ {}^{1}\!\not{2}\ \ {}^{11}1 \\ -\ 1\ 1\ 3 \\ \hline 2\ 0\ 8 \end{array}$$

It's crucial that the children understand that when they have exchanged the 10 they still have 21.
21 = 10 + 11

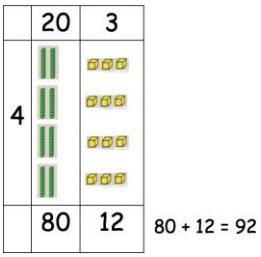
Multiplication

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

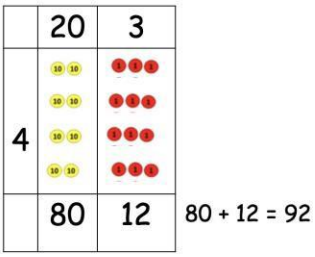
Grid method used to multiply a 2-digit number by a 1-digit number.

Grid method using base 10 and place value counters.

23 x 4 =



23 x 4 =



Written grid method

23 x 4 =

	20	3
4	80	12

80 + 12 = 92

Introduction to short multiplication method

241 x 2 =

$$\begin{array}{r} 2\ 4\ 1 \\ \times\quad\ \ 2 \\ \hline 4\ 8\ 2 \\ \hline\hline \end{array}$$

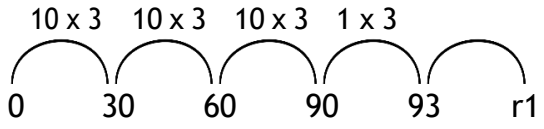
Division

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

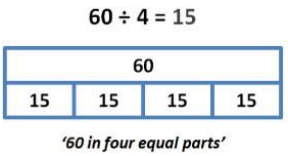
Short division method used to divide 3-digit and 4-digit numbers by a 1-digit number.

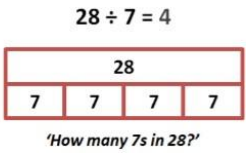
Chunking method on a number line using key times tables facts.

94 ÷ 3

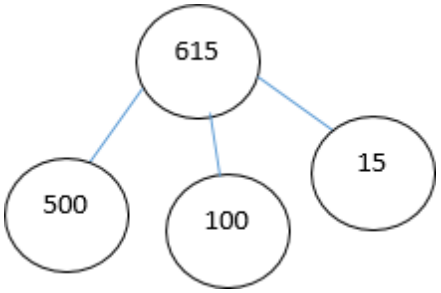


Bar models could be used to show division as sharing and grouping.





Part whole model could be used to partition the number first.	Introduction to simple formal short division method. Short division (no regrouping) 284 ÷ 2 = 142 1 4 2 2 | 2 8 4

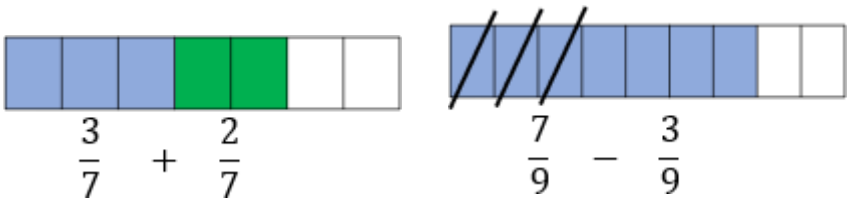


Fractions

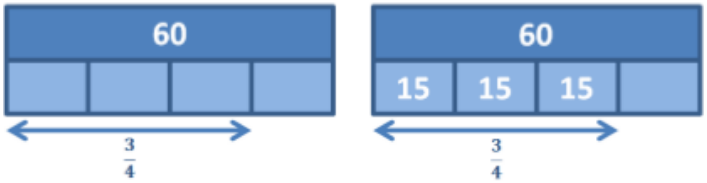
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Adding fractions with the same denominator (within one whole)	Subtracting fractions with the same denominator (within one whole)
$\frac{3}{7} + \frac{2}{7} =$	$\frac{7}{9} - \frac{3}{9} =$

Children will also use visual representations to show fractions in different ways and within problem solving.



$\frac{3}{4}$ of 60



Year 4

Addition

Column method to add integers and decimals.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Adding integers (no regrouping)

2618 + 3051 =

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

Adding integers (with regrouping)

3694 + 4912 =

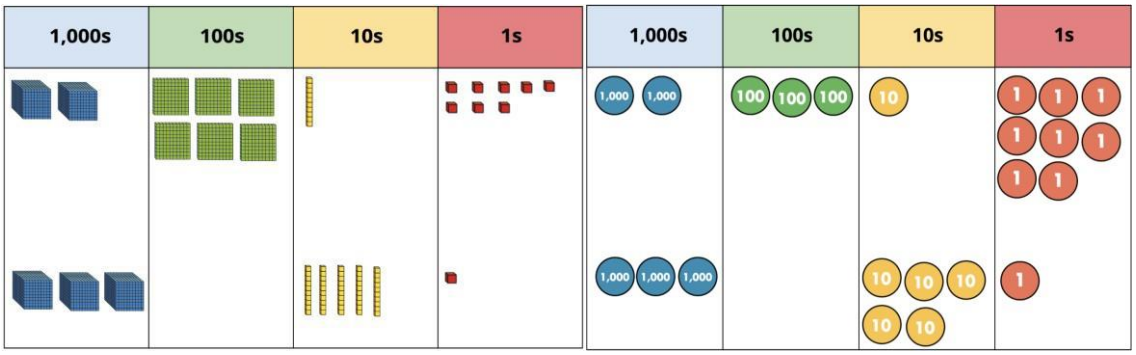
$$\begin{array}{r} {\scriptstyle 1\ \ 1\ \ \ \ } \\ 3\ 6\ 9\ 4 \\ +\ 4\ 9\ 1\ 2 \\ \hline 8\ 6\ 0\ 6 \end{array}$$

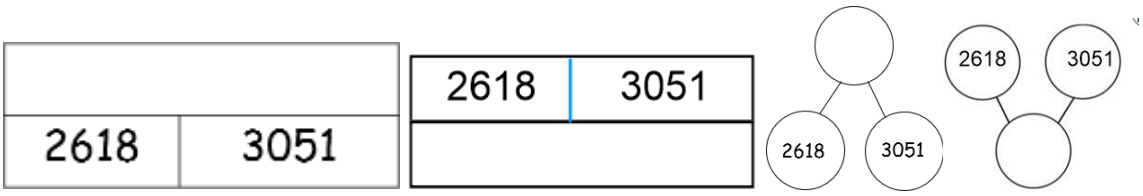
Adding decimals

37.84 + 21.98 =

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

(Children still use base ten, place value counters, bar models and part-part-whole models to show different representations of numbers and within problem solving questions.)





(ensure children are shown models with different orientations).

Subtraction

Column method to subtract integers and decimals.

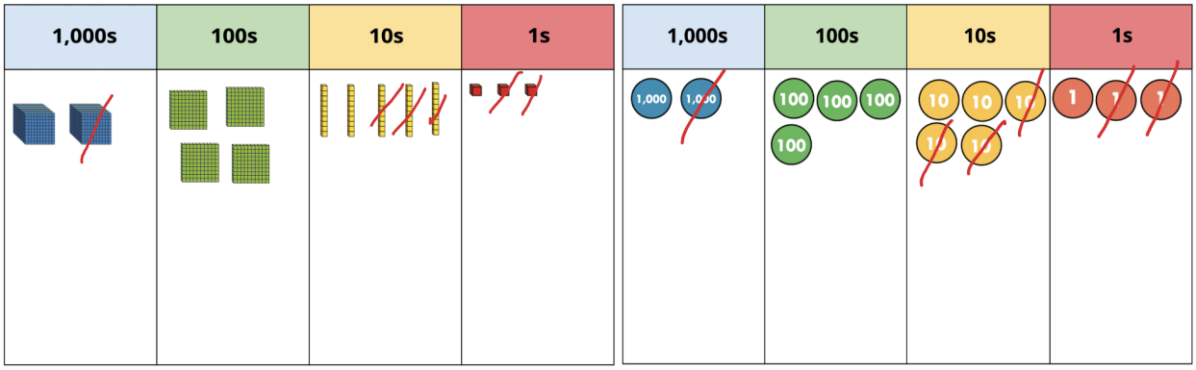
Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

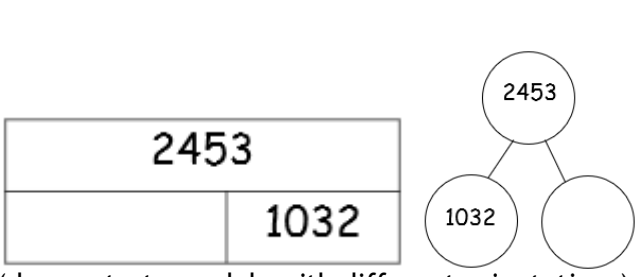
Subtracting integers (no regrouping)	Subtracting integers (with regrouping)
2453 - 1032 = 2 4 5 3 - 1 0 3 2 1 4 2 1	6003 – 4957 = 5 9 9 ~~6~~ ~~10~~ ~~10~~ 13 - 4 9 5 7 1 0 4 6
Subtracting decimals 43.68 – 15.79 = 3 12 15 ~~4~~ ~~3.~~ ~~6~~ 18 - 1 5. 7 9 2 7. 8 9	

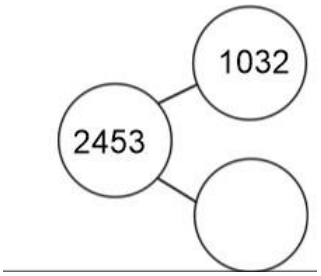
(Children still use base ten, place value counters, bar models and part-part-whole models to show different representations of numbers and within problem solving questions.)

For example, 2453 – 1032 =



For example 2453 - ? = 1032





(demonstrate models with different orientations).

Multiplication

Short multiplication method used to multiply 2-digit and 3-digit numbers by a 1-digit number.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Short multiplication (no regrouping)

241 x 2 =

$$\begin{array}{r} 241 \\ \times \quad 2 \\ \hline 482 \end{array}$$

Short multiplication (with regrouping)

523 x 7 =

$$\begin{array}{r} {\scriptstyle 1\ 2} \\ 523 \\ \times \quad 7 \\ \hline 3661 \end{array}$$

Short multiplication with decimals

3.19 x 8 =

$$\begin{array}{r} {\scriptstyle 1\quad 7} \\ 3.19 \\ \times \quad 8 \\ \hline 25.52 \end{array}$$

Division

Short division method used to divide 3-digit and 4-digit numbers by a 1-digit number.

At each part of the method children are asked – Do we need to make an exchange?

Short division (no regrouping)

2804 ÷ 2 = 1402

$$2\overline{)2804} = 1402$$

Short division (with regrouping)

3752 ÷ 4 = 938

$$4\overline{)3\,{}^{3}7\,{}^{1}5\,{}^{3}2} = 0938$$

Short division with a remainder

4724 ÷ 3 =

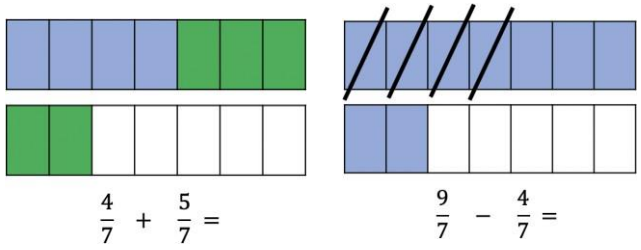
$$3\overline{)4\,{}^{1}7\,{}^{2}2\,{}^{1}4} = 1574\ 2/3$$

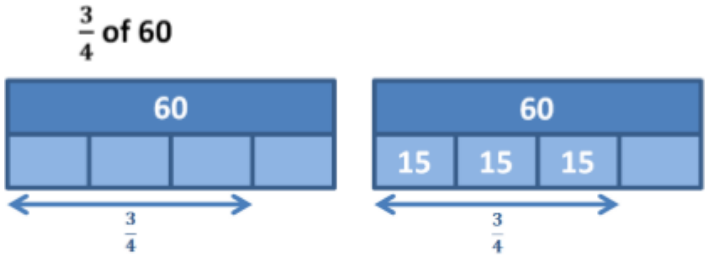
Fractions

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Adding fractions with the same denominator	Subtracting fractions with the same denominator
$\frac{4}{7} + \frac{5}{7} =$	$\frac{9}{7} - \frac{4}{7} =$

Children will also use visual representations to show fractions in different ways and within problem solving.





Year 5 & 6

Addition

Column method to add integers and decimals.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Adding integers (no regrouping)

261604 + 524083 =

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

Adding integers (with regrouping)

246397 + 23698 =

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

Adding decimals

347.845 + 251.983 =

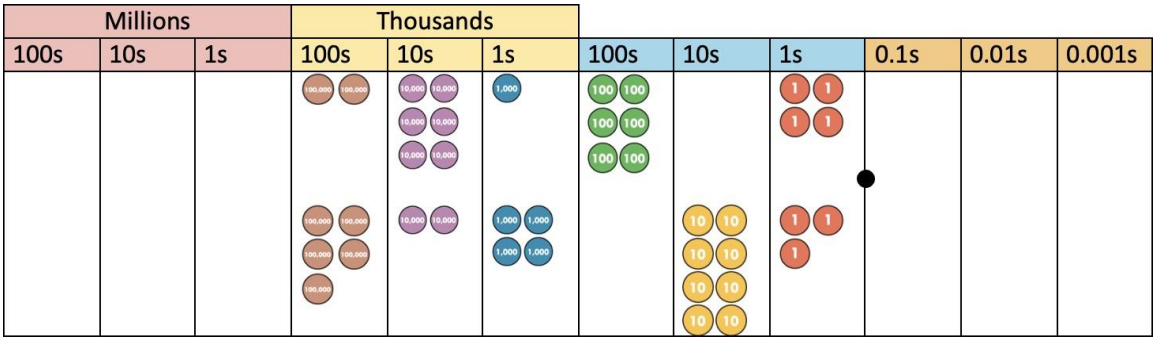
$$\begin{array}{r} {\scriptstyle \ \ 1\ \ 1\ \ } \\ 3\ 4\ 7.\ 8\ 4\ 5 \\ +\ 2\ 5\ 1.\ 9\ 8\ 3 \\ \hline 5\ 9\ 9.\ 8\ 2\ 8 \end{array}$$

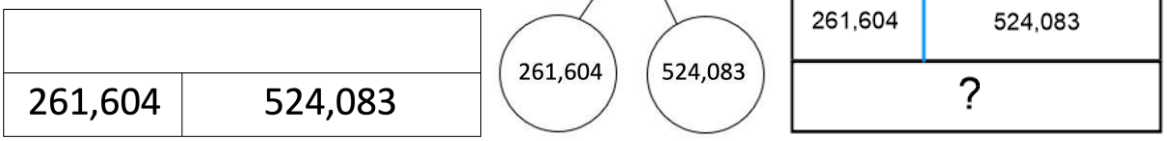
Adding decimals with varying decimal places

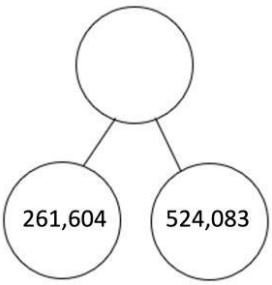
6.05 + 27.316 + 42.5036 =

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

(Children still use bar models and part-part-whole models within problem solving questions to show different representations of numbers.)







(demonstrate models using different orientations)

Subtraction

Column method to subtract integers and decimals.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Subtracting integers (no regrouping)

956284 - 726011 =

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

Subtracting integers (with regrouping)

246397 - 120528 =

$$\begin{array}{r} 2\ 4\ \overset{5}{\cancel{6}}\ {}^{1}3\ \overset{8}{\cancel{9}}\ {}^{1}7 \\ -\ 1\ 2\ 0\ 5\ 2\ 8 \\ \hline 1\ 2\ 5\ 8\ 6\ 9 \end{array}$$

Subtracting decimals

347.845 – 136.204 =

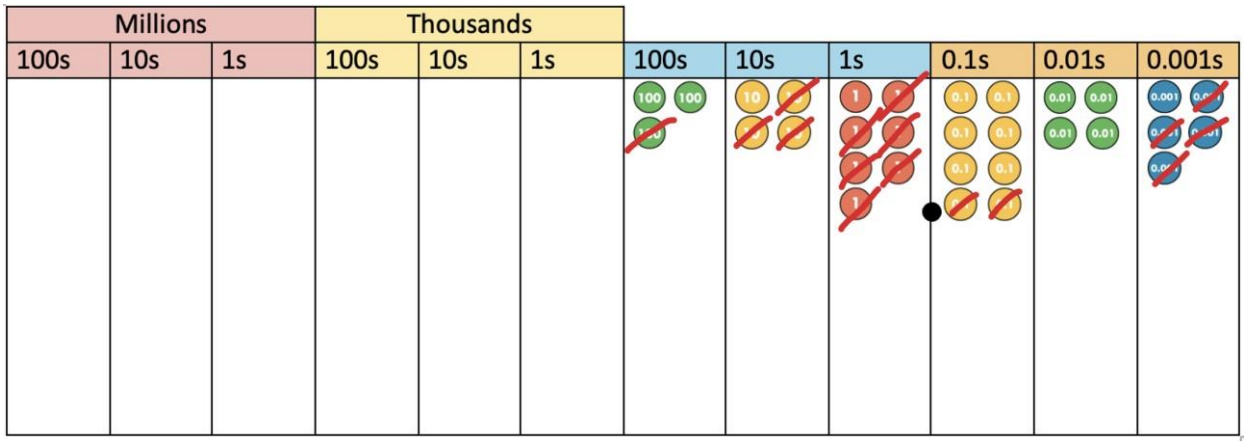
$$\begin{array}{r} 3\ 4\ 7.\ 8\ 4\ 5 \\ -\ 1\ 3\ 6.\ 2\ 0\ 4 \\ \hline 2\ 1\ 1.\ 6\ 4\ 1 \end{array}$$

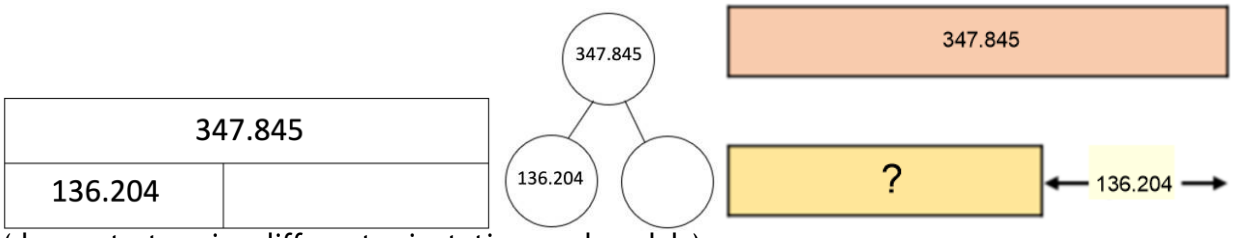
Subtracting decimals with varying decimal places

27.04 -9.3167 =

$$\begin{array}{r} \overset{1}{\cancel{2}}\ \overset{16}{\cancel{7}}.\ {}^{1}0\ \overset{3}{4}\ {}^{1}\overset{9}{\cancel{0}}\ {}^{1}0 \\ -\ 0\ 9.\ 3\ 1\ 6\ 7 \\ \hline 1\ 7.\ 7\ 2\ 3\ 3 \end{array}$$

(Children still use bar models and part-part-whole models within problem solving questions to show different representations of numbers.)





(demonstrate using different orientations and models)

Multiplication

Short multiplication method used to multiply by a 1-digit number. Long multiplication method used to multiply by a 2-digit number.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Short multiplication (no regrouping)

2431 x 2 =

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

Short multiplication (with regrouping)

5231 x 7 =

```
    1 2
  5 2 3 1
x       7
---------
3 6 6 1 7
```

Short multiplication with decimals

23.19 x 8 =

```
    2 1   7
  2 3 . 1 9
x         8
---------
1 8 5 . 5 2
```

Long multiplication (no regrouping)

241 x 12 =

```
    2 4 1
x     1 2
-------
    4 8 2
+ 2 4 1 0
-------
  2 8 9 2
```

Long multiplication (with regrouping)

234 x 26 =

```
    2 3 4
x     2 6
---------
 1  4 (2) 0 (2) 4
+ 4 6 8 0
---------
  6 0 8 4
```

Long multiplication with decimals

12.52 x 14 =

```
    1  2. 5 2
x           1 4
-------------
    5 (1) 0. (2) 0 8
+ 1 2  5.  2 0
-------------
  1 7  5.  2 8
```

Division

Short division method used to divide numbers by a 1-digit number. Long division method used to divide numbers by a 2-digit number.

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

At each part of the method children are asked – Do we need to make an exchange?

Short division (no regrouping)

2804 ÷ 2 = 1402

	1	4	0	2
2	2	8	0	4

Short division (with regrouping)

3752 ÷ 4 = 938

	0	9	3	8
4	3	$^{3}7$	$^{1}5$	$^{3}2$

Short division with a remainder

4724 ÷ 3 = 1574 $\frac{2}{3}$

	1	5	7	4	
3	4	$^{1}7$	$^{2}2$	$^{1}4$	2/3

Coin method to divide

7824 ÷ 37 =

1x 37 = 37
2x 37 = 74
5x 37 = 185
10x37= 370
20x37=740
50x37=1850
100x37=3700
200x37=7400

3 7	7	8	2	4	
-	7	4	0	0	(x200)
	0	$^{3}4$	$^{1}2$	4	
-	3	7	0		(x10)
	0	$^{4}\cancel{5}$	$^{1}4$		
-	3	7			(x1)
	1	7			

= 211 $^{17}/_{37}$

Fractions

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

Adding fractions with different denominators.

$\frac{3}{4} + \frac{2}{5} =$

x5

$\frac{3}{4} = \frac{15}{20}$

x5

x4

$\frac{2}{5} = \frac{8}{20}$

x4

$\frac{15}{20} + \frac{8}{20} = \frac{23}{20} = 1\frac{3}{20}$

Subtracting fractions with different denominators and mixed numbers.

$2\frac{2}{3} - \frac{1}{5} =$

$\frac{8}{3} - \frac{1}{5} =$

x5

$\frac{8}{3} = \frac{40}{15}$

x5

x3

$\frac{1}{5} = \frac{3}{15}$

x3

$\frac{40}{15} - \frac{3}{15} = \frac{37}{15} = 2\frac{7}{15}$

Adding fractions with different denominators and mixed numbers.

$1\frac{2}{3} + 2\frac{2}{5} =$

$1 + 2 = 3$

$\frac{2}{3} + \frac{2}{5} =$

x5

$\frac{2}{3} = \frac{10}{15}$

x5

x3

$\frac{2}{5} = \frac{6}{15}$

x3

$\frac{10}{15} + \frac{6}{15} = \frac{16}{15} = 1\frac{1}{15}$

$3 + 1\frac{1}{15} = 4\frac{1}{15}$

Multiply simple pairs of proper fractions

$\frac{3}{4} \times \frac{3}{5} = \frac{9}{20}$

Multiply a fraction by a whole number

$\frac{2}{5}$ x $240 = \frac{9}{20}$

of

240 ÷ 5 = 48

48 x 2 = 96

Multiply mixed numbers by a fraction

$6\frac{2}{3} \times 4 =$

6 x 4 = 24

$\frac{2}{3} \times \frac{4}{1} = \frac{8}{3} = 2\frac{2}{3}$

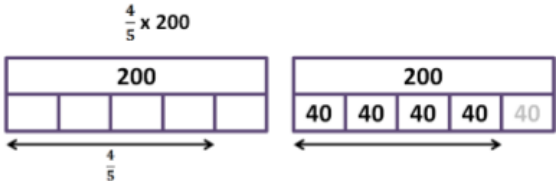
$24 + 2\frac{2}{3} = 26\frac{2}{3}$

Divide proper fractions by whole numbers

$\frac{2}{3} \div 6 = \frac{2}{18}$

(x)

(Children still use bar models and part-part-whole models within problem solving questions to show different representations of numbers.)



Algebra

See-saw method

Children are taught that the meaning of equals within number sentences and calculations is 'equivalent to' or 'of equal value to'.

12X 8 = _ - 8