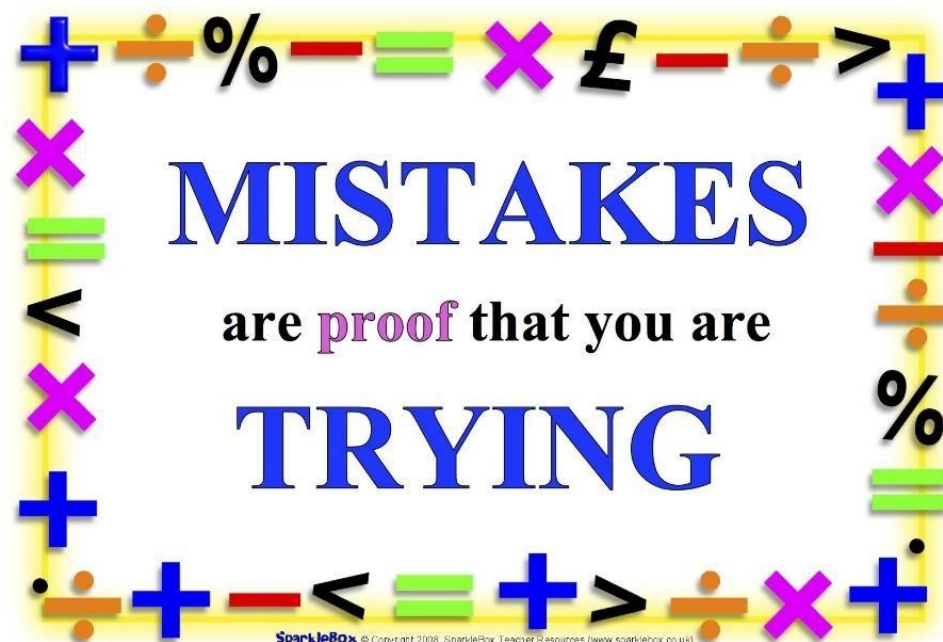
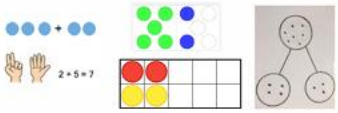
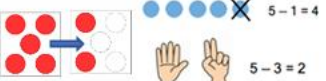
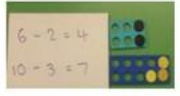
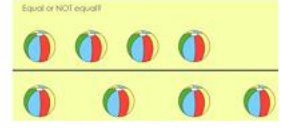
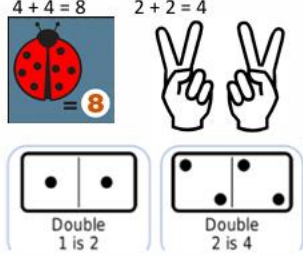
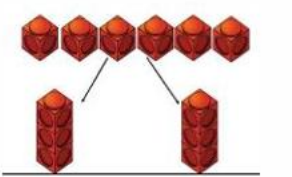
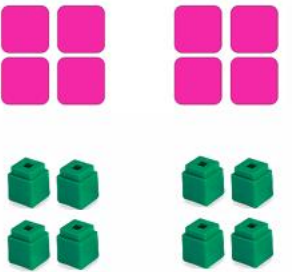


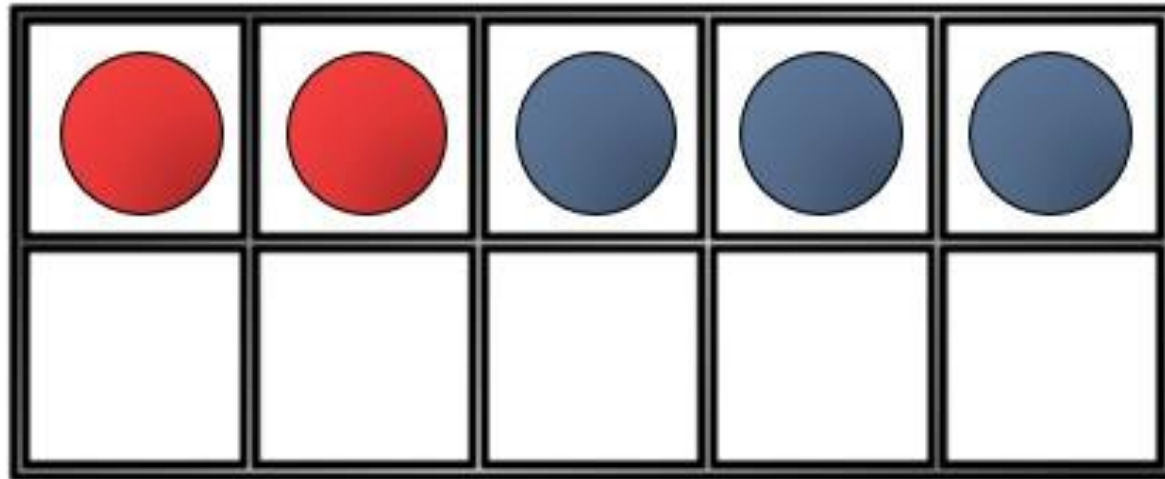
Crosshall Infant School Calculation Policy



Parts of this policy have been snipped from the White Rose Calculation policies. [CPD Training](#) | [Free maths resources](#) | [White Rose Maths](#)

Addition	Subtraction	Multiplication	Division
<u>Combining two parts to make a whole using different representations:</u>  <u>Exploring composition of numbers</u> using physical and visual representations and songs to support children in developing automatic recall of number bond facts.  <u>Children are encouraged to read number sentences aloud in different ways e.g. "3 add 2 equals 5" "5 is made of 3 and 2."</u> 3+2=5 5=3+2  <u>Using Rekenreks, children further explore composition of numbers and number bond facts.</u> 	<u>Taking away ones :</u> Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left.  <u>Exploring subtraction</u> using physical and visual representations and songs to support children in applying their knowledge of number bond facts.  <u>Children are encouraged to read sentences aloud in different ways "5 subtract 1 leaves four" "4 is equal to 5 take away 1."</u> 5-1=4 4=5-1  <u>Using Rekenreks, children further explore subtraction.</u> 	<u>Recognising and making equal groups.</u>  These are equal groups. There are 4 blocks in each group.  <u>Doubling:</u> Children explore doubles using different manipulatives and representations. 4 + 4 = 8 2 + 2 = 4  "6 is made of 3 and 3." "3 and 3 make 6." 	<u>Sharing objects into equal groups :</u>   

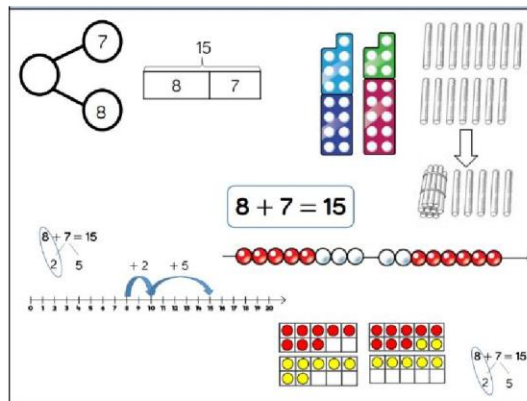
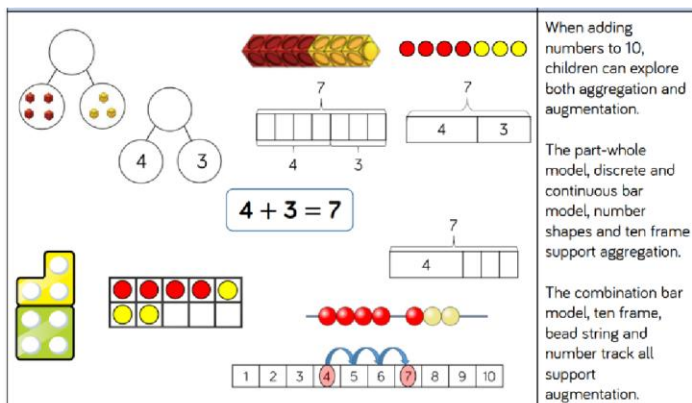
Addition



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

Year 1

Key representations and resources:



Aggregation - combining two or more quantities or measures to find a total.

Augmentation - increasing a quantity or measure by another quantity (counting on)



Rekenreks- bonds to/ within 10 and 20, doubling/halving

Mental methods: children should learn to:

Count on from one part (the greatest part) for example; $7+2=6+3=$

Use known facts- number bonds to 5, 10 and 20

Concrete and Pictorial representations:

Part whole models, bar models and tens frames can be used to show how the parts combine (can be added together) to make the whole- *physical resources such as counters can be used before using numerals.*

Tens frame, bar models, bead strings can be used to show how numbers can be increased by adding on. Children should be encouraged to subitise smaller numbers (rather than count every object) and count on from the greater number.

Adding by making 10- **use of 10 frames** will encourage children to visually make the 10 and counting on before moving onto using number lines.

Rekenreks can be used to teach number bonds, doubles and number facts (inverse, commutativity)

Moving to abstract representations:

(Using concrete and pictorial resources alongside abstract representations such as number sentences/calculations and number lines may be needed)

Number tracks and number lines can be used to support augmentation (counting on)

Addition is commutative, this means that two numbers can be added together and the answer will be the same no matter what order they are.

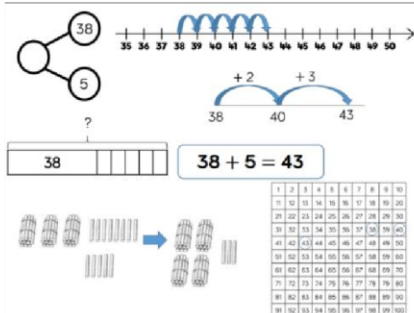
For example $3 + 4 = 7$ and $4 + 3 = 7$.

Inverse is using the opposite operation. $5+2=7$, $7-5=2$ - **part whole models and bar models** show how the parts can be added or subtracted- moving into using numerals to represent the numbers.

Year 2

Children should be continuously reminded that addition is commutative and the inverse (reverse) operation to subtraction.

Key representations and resources:



$$17=12+5 \quad 17=5+12 \quad 12+5=17 \quad 5+12=17$$

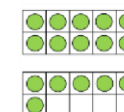
Calculations should be shown and written in a variety of ways as above including missing
 $___ + 12 = 17$ $12 + ___ = 17$



Rekenreks- bonds to/ within 10 and 20, doubling/halving



Diennes-
children know
10 ones = 1 ten
number calculations:



Tens frames

Mental methods: children should learn to:

Count on from one part (the greatest part) for example; $17+2=26+3=$

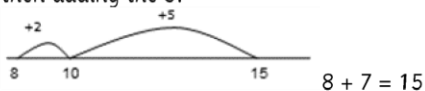
Use known facts- number bonds to 5, 10, 20 and 100

Count in 2s, 3s, 5s, 10s when adding multiples

Partitioning and bridging through 10.

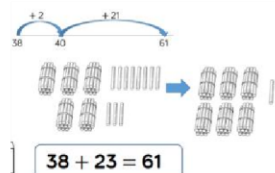
It is an essential prerequisite that children are confident in the number bonds of all numbers to 10 as emphasised in Year 1.

Children should be taught to bridge through a multiple of 10,
e.g. children should be able to partition the 8 to relate adding
the 2 to reach a multiple of 10 and
then adding the 5.



Counting on in tens and ones:

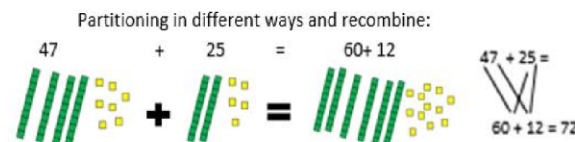
Practically: add the ones then add the 10s.



Moving onto:

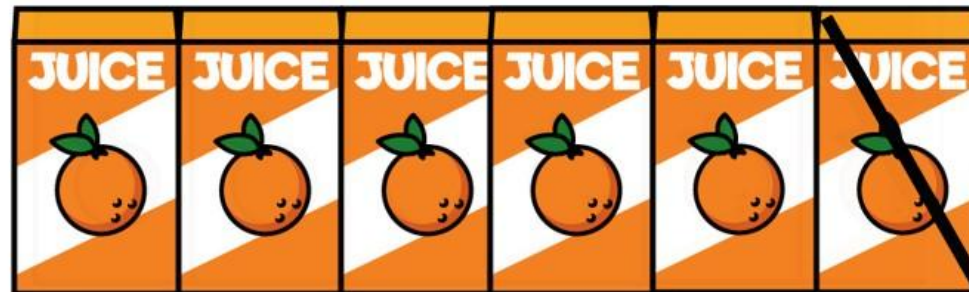
$$\begin{aligned} 23 + 12 &= 23 + 10 + 2 \\ &= 33 + 2 \\ &= 35 \end{aligned}$$

Towards a Written Method:



Subtraction

Subtraction - Taking away



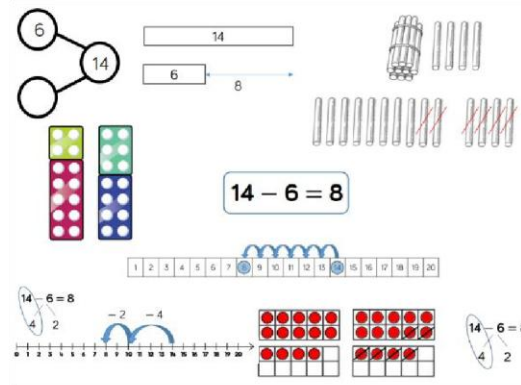
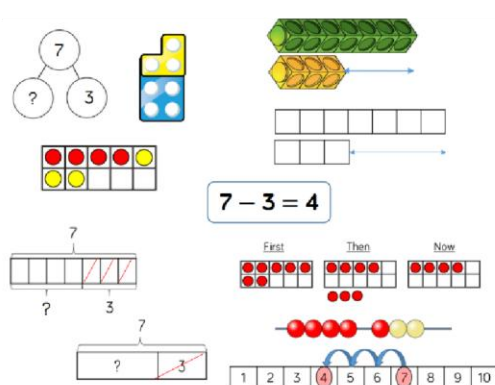
First there were 6 juice boxes.

Then Amir drank 1 juice box.

Now there are 5 juice boxes.

Year 1

Key representations and resources:



Subtraction as partitioning- splitting a whole into parts and taking a part away
Subtraction as reduction- starting with the whole and counting back/taking away
Subtraction as difference- the difference between 2 numbers

Children should be taught:

Subtraction is the inverse of addition, but it is not commutative.



Rekenreks- bonds to/ within 10 and 20 and inverse, doubling/halving

Mental methods: children should learn to:

Count back using knowledge of one/two less e.g. $12-1=$ $8-3=$
 Use knowledge of numbers bonds- to 5, 10 and 20

Concrete and pictorial representations:

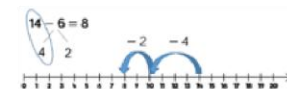
Part whole models, bar models and tens frames will support subtraction as partitioning.
 Tens frames, number tacks, single bar models and bead strings can support subtraction as reduction.
 Cubes and bar models can support subtraction as finding the difference.

Moving to abstract representations:

Using concrete and pictorial resources alongside abstract representations such as number sentences/calculations and number lines may be needed)

Number lines and number tracks can be used to support subtraction as reduction and

Children should be taught to partition by counting back to 10 then continuing to count



partitioning.

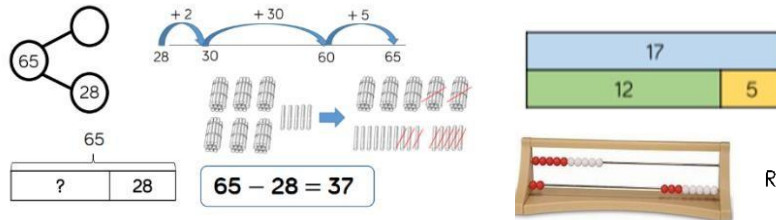
back.

Year 2

It is essential that the children come to understand that subtraction is the inverse of addition but is not commutative.

Subtraction as **partitioning**- splitting a whole into parts and taking a part away
 Subtraction as **reduction**- starting with the whole and counting back/taking away
 Subtraction as **difference**- the difference between 2 numbers

Key representations and resources:



$$17-12=5 \quad 17-5=12 \quad 12+5=17 \quad 5+12=17$$

The bar model shows clearly the relationship between addition and subtraction and difference.

Rekenreks- bonds to/ within 10 and 20 and inverse, doubling/halving

Mental methods: children should learn to:

Count back using knowledge of one/two/ten less e.g. $72-10=$ $80-30=$
 Use knowledge of numbers bonds- to 5, 10, 20 and 100
 Count back in 2s, 3s, 5s and 10s

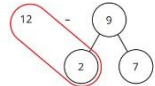
Recall and use subtraction facts to 20 and derive and use related facts to 100

Bar models and part whole models show the relationship between addition and subtraction.

Children should use the inverse of number bonds to find subtraction facts- tens frames and Rekenreks can support this practically.

Subtracting a one digit number from a 2 digit number: partitioning

Children use their knowledge of bonds within 10 to partition and then subtract to 10. Tens frames will help children work practically then moving to the more abstract representation below:



Subtracting 2 two- digit numbers:

Subtracting ones then 10s (not crossing 10) Subtracting ones then 10s-
 (crossing 10) and exchanging

$$36 - 12 = 24$$

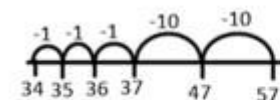


$$36-19=$$

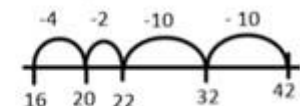


Then moving onto using an empty number line:

$$57 - 23 = 34$$



$$42 - 26 = 16$$



Multiplication



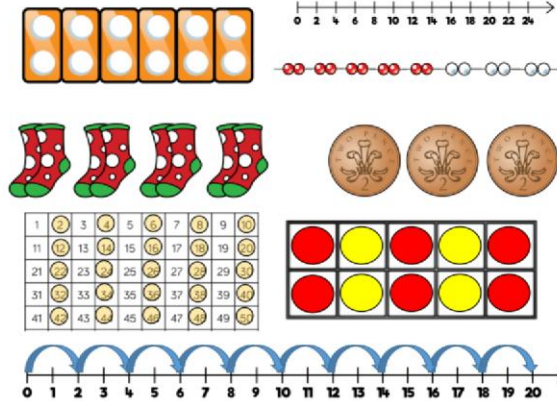
There are 3 equal groups with
4 in each group.

$$\boxed{4} + \boxed{4} + \boxed{4} = 12$$

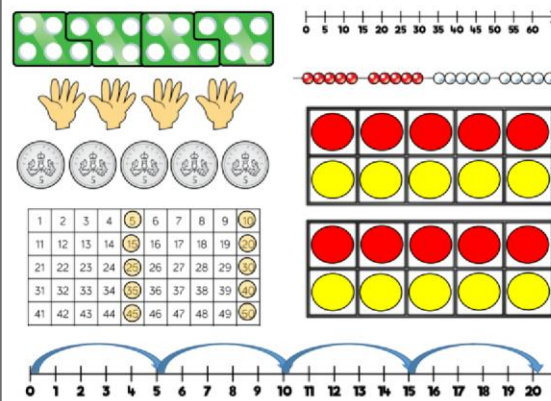
$$\boxed{3} \times \boxed{4} = 12$$

Year 1 and Year 2

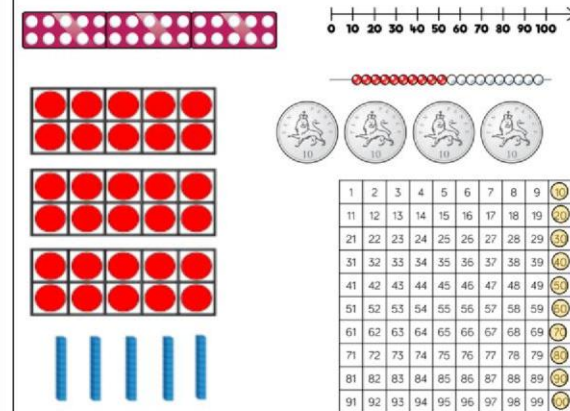
Skill: 2 times table



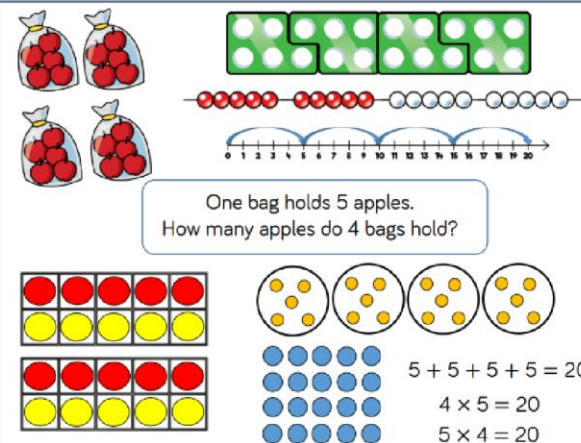
Skill: 5 times table



Skill: 10 times table



Skill: Solve 1-step problems using multiplication



Year: 1/2

Children represent multiplication as repeated addition in many different ways.

In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record multiplication formally.

In Year 2, children are introduced to the multiplication symbol.

Repeated addition- recognising equal groups and encouraging to count in multiples of 2s, 5s, 10s (3s-Year 2)

Year 2 move onto recording repeated addition as multiplication number sentences using the X symbol,

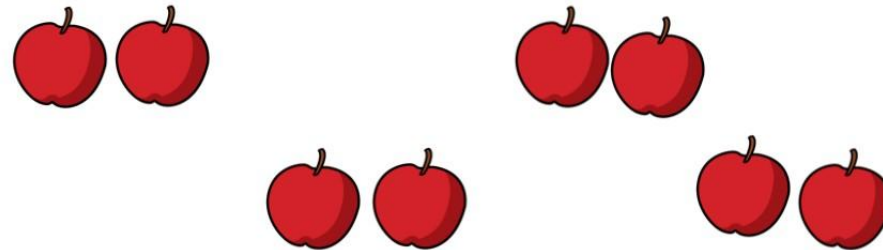
Counting- in 2s, 5s 10s (3s in Year 2) Forwards and back, missing numbers on number track or number line

Pattern spotting- seeing equal groups, using arrays for commutativity

Doubling and doubling patterns. (linked to halving in division)

Division

The apples are put into bags with
2 apples in each bag.



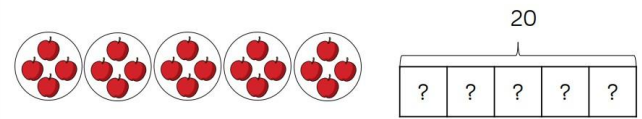
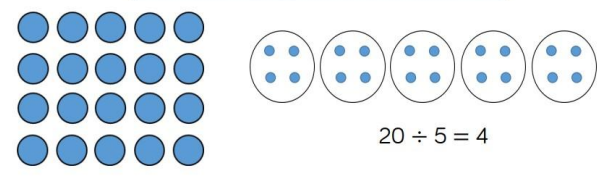
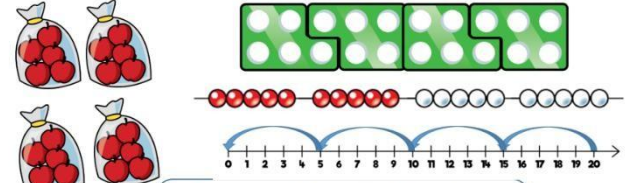
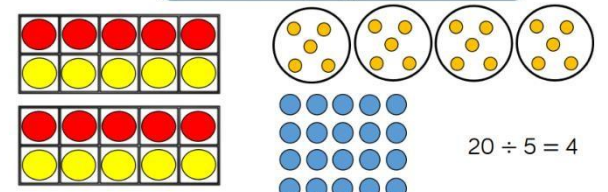
There are 8 apples altogether.

There are 2 in each group.

There are 4 groups.

$$\boxed{8} \div \boxed{2} = \boxed{4}$$

Year 1 and Year 2

 There are 20 apples altogether. They are shared equally between 5 bags. How many apples are in each bag?  $20 \div 5 = 4$	Children solve problems by sharing amounts into equal groups. In Year 1, children use concrete and pictorial representations to solve problems. They are not expected to record division formally. In Year 2, children are introduced to the division symbol.	 There are 20 apples altogether. They are put in bags of 5. How many bags are there?  $20 \div 5 = 4$	Children solve problems by grouping and counting the number of groups. Grouping encourages children to count in multiples and links to repeated subtraction on a number line. They can use concrete representations in fixed groups such as number shapes which helps to show the link between multiplication and division.
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Division as grouping and sharing- grouping/seeing equal groups from a whole or sharing into groups form a whole.

Halving and halving patterns (linked to doubling)

Inverse: children make connection between multiplication and division (using arrays can show this)

Odd and even numbers: working out if a number is odd or even by exploring if it can be shared by 2. identify even numbers as multiples of 2

Fractions, Decimals and Percentages

What fraction is shaded?



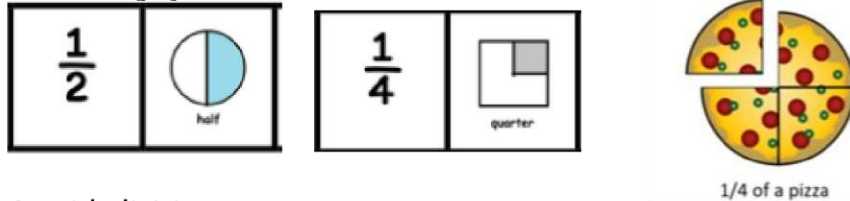
There are equal parts.

There are parts shaded.

is shaded.

Year 1

Children should be able to find equal and unequal parts of everyday objects- the leg is part of a table, my arm is part of my body. Children should then be taught that a fraction is 'an equal' part of a whole. The vocabulary of 'equal' may need to be revisited. Recognise, find and name a half as one of two equal parts of an object, shape or quantity and a quarter as one of four equal parts of an object or quantity. Representations should be shown using a variety of shapes/objects and in a variety of orientations.



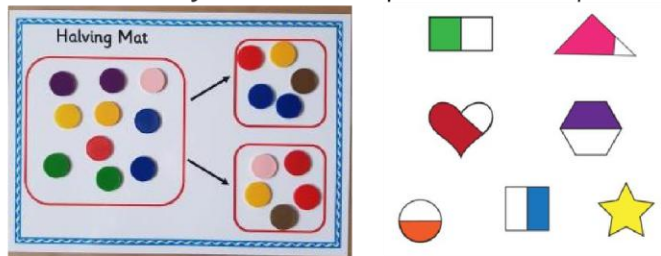
As with division:

Children find $\frac{1}{2}$ of a number of concrete objects by splitting them into 2 equal groups.

They find $\frac{1}{4}$ by splitting a number of concrete objects into 4 equal groups and draw connections between halving and quartering.

Children should also be able to tell you what is and what is not a half or quarter:

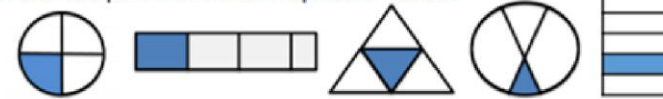
"It is not a half because the 2 parts are not equal."



Year 2

Children still need to be aware of equal and unequal groups.

Circle the shapes that have a quarter shaded!



Which shapes do not have a quarter shaded? How do you know?

Children extend their knowledge of whole and half to find quarters, thirds and then three quarters of shapes and quantities. The links between the concrete, pictorial and abstract representation should be made explicit.

Numerator number of parts being used

Denominator number of equal parts the whole has been divided into

The children use their understanding of fractional representation to find fractions of numbers:

$\frac{3}{4}$ of 12 =

First draw four squares, because there are 4 equal parts.

Share 12 fairly between them. You have found $\frac{1}{4}$. Now circle 3 squares and count how many in them to find $\frac{3}{4}$.

The children should recognise that $\frac{2}{4}$ is the same as $\frac{1}{2}$.

The children will have come across halving numbers in division (see above) as being the same as dividing by 2 but this should be recapped in the fractions unit.

Circle one quarter of the cars.



One quarter of ____ is ____

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

