In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.

Fou

Addition

Teachers should model addition using a range of physical resources through practical activities.

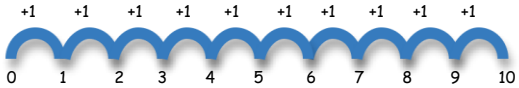
6 is 5 and 1 more
6 = 5 + 1

10 = 7 + 3

Using Numicon to show that 4+3=7

When counting on, the link with calculating must be explicit:

e.g. 0 add 1 equals 1, 1 add 1 equals 2, 2 add 1 equals 3…



First, children should count the objects in one group by pointing with their finger whilst counting out loud. They will then progress to combining 2 sets of objects into 1 group and counting all. Then, they will move on to recording this as a number sentence. Children should understand the = symbol as 'the same as'.

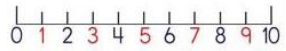
3 + 3 = 6

Bead strings or bead bars will also be used to model addition.

8+2=10

As well as practical objects, children should use number tracks, progressing to number lines when understanding is secure.

Number Track



Number Line

Children are encouraged to develop a mental picture in their heads to use for calculation. They develop ways of recording calculations using pictorial representations, e.g. 3 + 2 = 5

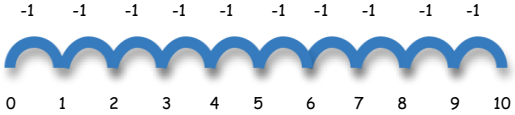
Children should also experience counting in tens, fives and twos. Children should count forwards and backwards from any given number between 0 and 20

Subtraction

Teachers should model subtraction using a range of physical resources through practical activities. Relate subtraction to taking away and counting how many are left.

1 less than 6 is 5

When counting back, the link with calculating must be explicit:



10 subtract 1, 1 less than 10, 10 take away 1

Bead strings or bead bars can be used to illustrate subtraction.

6-2=4

Children should use number lines and practical resources to support calculation.

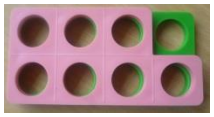
As well as practical objects, children should use number tracks, progressing to number lines when understanding is secure.

Children are encouraged to develop a mental picture in their heads to use for calculation. They develop ways of recording calculations using pictorial representations.

Children should begin to experience the language of 'the difference' using daily routines as a context for learning. For example, comparing the blocks to see how many packed lunches/ school dinners there are on a given day.

There are 4 more people having packed lunch than school dinner.

Packed Lunch **School Dinners**



7 is one less than 8.

Children should also experience counting back in ones from a given number under 20.

Multiplication

Children will experience making and describing equal groups of objects.

They will count in 2s, 10s and 5s. They should be provided with practical opportunities and visual images eg: counting pairs of socks or counting in tens to find out how many fingers five children would have. They could also count Numicon plates alongside.

They will work on practical problem solving activities involving doubling and equal sets or groups for example, getting into equal groups for PE.

Division

Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.

Children should experience halving in context e.g. halving apples, sandwiches etc

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General Vocabulary
Bead string, bead bar, number lines, number track, Numicon, tens and units, equals, the same as

Vocabulary for addition
add
more
count on
altogether

Vocabulary for subtraction
subtract
take away
less
count back

Vocabulary for multiplication
groups
sets of
double
count in 2's,5's, 10's

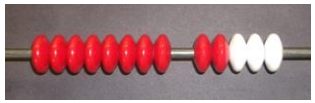
Vocabulary for division
share
half/halving

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.

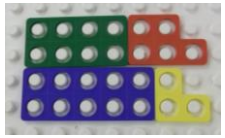
Y1

Children should be encouraged to show pictorial recordings of their calculations including number sentences.

Bead strings or bead bars should be used to illustrate addition including bridging through ten by counting on 2, then 3.e.g. 8 + 5 = 8 + 2 + 3.



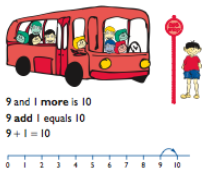
Numicon should also be used to model bridging through 10 by counting on 2 (from 8) then counting on 3.



Children should experience counting to and across 100 forwards and backwards from any number. They should also continue to count in 2's, 10's and 5's. Starting and finishing at different numbers is important as this will help them with addition calculations as they progress. They must identify 1 more and 1 less than a given number.

The children should use number tracks and number lines marked out in jumps of one and practical resources to support calculation. They may begin to use number lines marked out in jumps of five and ten.

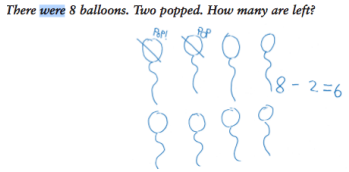
Teachers will model the use of the number line. Children will then begin to use number lines, counting on in ones, to support their own calculations. The link between the bead bar and number line must be made explicit. Use both to begin to illustrate that addition can be done in any order and to recognise that more than two numbers can be added.



Children must have access to a range of counters and resources such as to solve addition calculations. It is important that children are able to explore a range of resources and consider which is most appropriate for a given calculation.
Children should also be able to work out the missing number in a sum
3 + ☐ = 10 or 12 = ☐ + 9

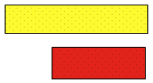
Children will need to be exposed to a range of mathematical vocabulary (verbal and written): add, together, plus, more than.

Children need practical activities of 'taking away' i.e. finding how many are left from a collection of objects when some are removed.



Children also need practical activities of 'finding the difference', which involve making a comparison between the numbers in two groups of objects.

Using counters

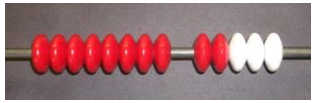


Using Cuisenaire

Using Numicon

The difference between 8 and 5 is 3

Bead strings or bead bars can be used to illustrate subtraction including bridging through ten by counting back 3, then counting back 2.

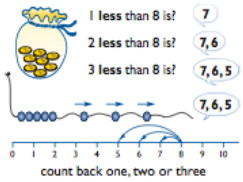


13-5=8

The bead bar and the number line can also be used to show that 13 – 5 means the 'difference between 13 and 5' or 'the difference between 5 and 13' and how many jumps they are apart.

Begin to show how to add or subtract 9 by adding or subtracting 10 and adjusting by 1.

Children should then begin to use number lines to support their own calculations, counting back in ones.

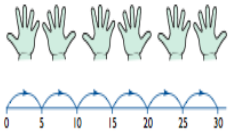


Represent and use number bonds and related subtraction facts within 20
e.g 20-8=12 15-8=7

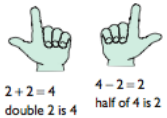
Children will experience making equal groups of objects.

They will count in 2s, 10s and 5s.

They will work on practical problem solving activities involving equal sets or groups.



Children should experience doubling numbers in a range of contexts.



They should begin to understand multiplication as repeated addition and as an array in context e.g. eggs in a box.

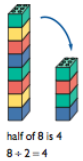
3 x 2 = 3 multiplied by 2 = 2 groups of 3 = 3 + 3

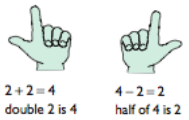
Or

2 x 3 = 2 multiplied by 3 = 3 groups of 2 = 2 + 2 + 2

Children will understand equal groups and share items out in play and problem solving. They will count in 2s and 10s and later in 5s.

Children should experience halving numbers in a range of contexts.





Vocabulary for addition
add
more than
plus
jumps forwards
total
altogether

Vocabulary for subtraction
take away
count back
subtract
minus
less than
difference

Vocabulary for multiplication
double
groups of
sets of
repeated addition
count in 2's/5's/10's

Vocabulary for division
half
share
equal sets/groups

In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.

Y2

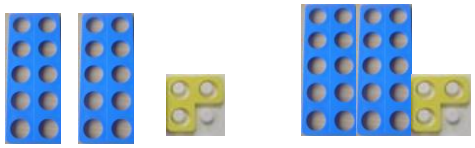
Children should count forwards and back in steps of 2,3and 5 from 0 and in 10's from any number.

Children should recall and use addition facts to 20 fluently and derive and use related facts up to 100 e.g. 2+3= 5 so 20+30=50

Children should use number lines that are marked out in jumps of one and ten and learn which would be most appropriate for a given calculation. They can estimate the position of numbers on a number line.

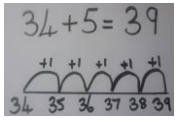
Children will begin to use 'empty number lines' themselves starting with the larger number and counting on, keeping the first number whole.

Numicon and Base Ten should be used to support this. It is important that the visual image of these resources is related to the number line.
Encourage children to use the language of partitioning and bridging when explaining their strategies.
Children should also be able to partition 2 and 3 digit numbers into 10's and ones using Base 10 equipment

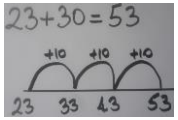


20 and 3 = 23

Counting on.



First counting on in ones from a 2 digit number.

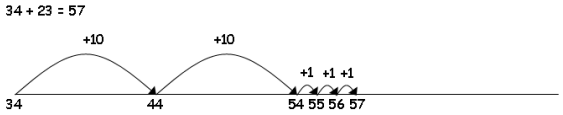


Then counting on in 10's from a 2 digit number.

Then adding two 2 digit numbers.

35 + 28 = 63

34 + 23 = 57

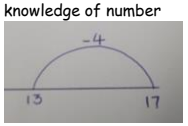


Then helping children to become more efficient by adding the units in one jump (by using the known fact 4 + 3 = 7).

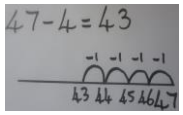
Counting back:

Children should recall and use subtraction facts to 20 fluently and derive and use related facts up to 100 e.g. 5-3= 2 so 50-30=20

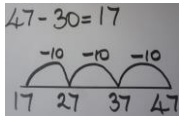
Children need to be able to use the number line to subtract single digit numbers from 2 digit numbers applying their knowledge of number facts. I know that 7 – 4 = 3 so 17 -4 = 13



Children will use bead strings and numbered number lines to support calculations. They should begin to use empty number lines. When subtracting, children should be taught to only partition the second number.



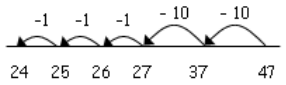
First counting back in ones from a 2 digit number.



Then counting back in tens from a 2 digit number.

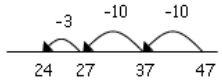
Then counting back in tens and ones from a 2 digit number.

47 – 23 = 24



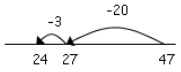
Then helping children to become more efficient by subtracting the units in one jump (by using the known fact 7 – 3 = 4).

47 – 23 = 24



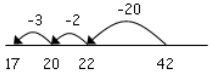
Subtracting the tens in one jump and the units in one jump.

47 – 23 = 24



Bridging through ten can help children become more efficient.

42 – 25 = 17

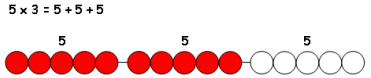


Repeated addition

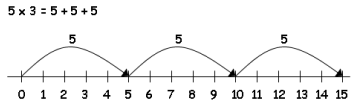
Children should count forwards and back in steps of 2,3and 5 from 0 and in 10's from any number.

5 times 3 is 5 + 5 + 5 = 15 or 3 lots of 5 or 5 x3

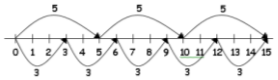
Repeated addition can be shown easily on a bead bar:



and on a number line:

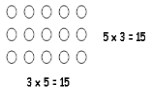


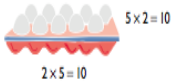
Children should know that 3 x 5 has the same answer as 5 x 3. This can also be shown on the number line.



Arrays

Children should be able to model a multiplication calculation using an array. This knowledge will support with the development of the grid method. Children will need to be taught the language of 'rows' and 'columns'.

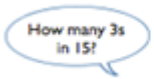




They should explore them in the environment and using ICT

It is important to connect the array model to repeated addition using resources such as magnetic counters to show the link.

Children will develop their understanding of multiplication and use jottings to support calculation:

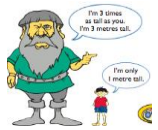


15 ÷ 3 = 5

Children should recall and use multiplication facts for the 2,5 and 10 times tables

Scaling.

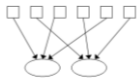
Children should have experience of scaling. Exploring concepts such as 'This is twice as long as/ half as long as/ 3 times as tall as.



Children will develop their understanding of division and use jottings to support calculation. They should make the link between counting in equal steps and grouping.

Sharing

6 sweets shared between 2 people, how many do they each get?



Relate fractions to the sharing aspect of division and model the recording. E.g. 8 ÷ 2 = half of 8.

Grouping

There are 6 sweets, how many people can have 2 sweets each?

Crisps come in packs of 5,. I have 20 children and each needs a packet. How many packs do I need to buy?

Children should be encouraged to use their known multiplication facts to work out division calculations (2,5,and 10).
The bead bar will help children with interpreting calculations such as 12 ÷ 3 = as 'How many 3's equal 12?

They should also begin to link division to an array.

Children should be able to solve calculations using symbols to stand for unknown numbers and complete equations using inverse operations.

□ ÷ 2 = 4

20 ÷ △ = 4

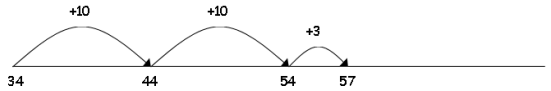
□ ÷ △ = 4

Scaling down

e.g. Sam ran 6km on Saturday. On Sunday he ran half as far. How far did he run on Sunday?

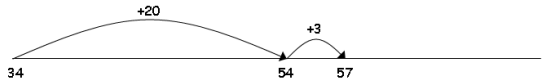
In order to encourage children to work mentally, calculations should always be presented horizontally so children can make decisions about how to tackle them.

34 + 23 = 57



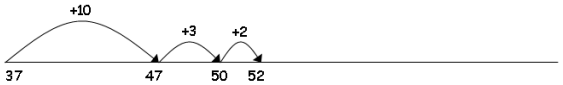
Followed by adding the tens in one jump and the units in one jump.

34 + 23 = 57



Bridging through ten can help children become more efficient.

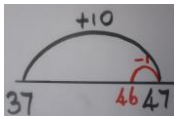
37 + 15 = 52



Children should be able to add three 1 digit numbers.

Compensation/Overjumping

Children should be taught compensation, for example, when adding 9, it is easier to add 10 then subtract 1, modelling on a bead bar. (overjumping 10).



37 + 9 =??
37 + 10 = 47
47 -1 = 46

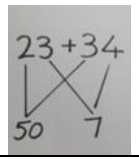
Complementary addition.

Children should understand complementary addition, for example, solving word problems, such as 'you need 20 marbles, but you only have 6, how many more do you need?' Model on bead bar and number line… 'how to find the missing number' e.g. 20 = 6 + __

Partitioning

Children should learn to partition 2 digit numbers to support their calculations.

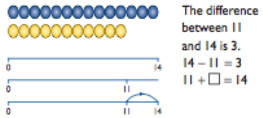
23 + 34 = 57
20 + 30 = 50
3 + 4 = 7
50 + 7 = 57



They should know that addition is commutative and can be done in any order.

Counting on:

It is important that children experience finding the difference between 2 numbers by counting on. The difference ITP is a good visual image.



It is important that this is modelled using two bead strings, as shown in the picture above, or two sets of Numicon plates. Children should experience finding the difference in a range of contexts including height e.g. growth of two seedlings.

Recognise that a symbol can stand for unknown numbers

□ X 2 = 4
10 x □ = 20
□ X □ = 25

Vocabulary for addition
number bonds
more than >
calculation
addition
count on
plus
bridging
tens boundary
operation
partition

Vocabulary for subtraction
less than <
subtraction
partition
take away
count back

Vocabulary for multiplication
array
number line
grouping in
multiply
repeated addition
row column
scale up

Vocabulary for division
sharing
division
divide
grouping