Subtraction

For each of the following progressive stages of subtraction calculation it is recommended to use concrete, pictorial and abstract to aid understanding.

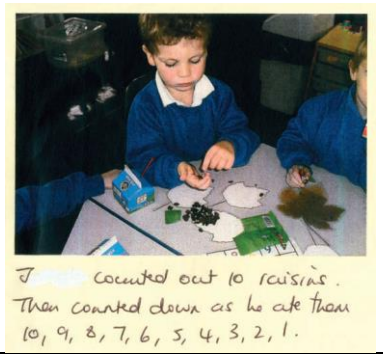
Reception pupils should be taught to:

- count reliably with numbers from 1 to 20,
- place numbers in order and say which number is one more or one less than a give number.
- subtract two single-digit numbers, using quantities and objects
- count back to find the answer.

Vocabulary:

take (away), leave
how many are left/left over?
how many have gone?
one less, two less...ten less...
how many fewer is... than..?
difference between
how many more to make..?, how

Children will take part in lots of practical activities, and an adult will record their verbal explanations of their use of numbers.

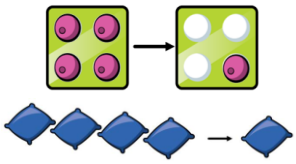


Today, whilst playing a game he added up a 6 on one dice and a 5 on another, and got the total 11.

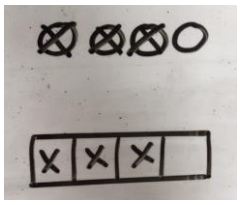
"I know I have got to move 11 because 5 add 6 makes 11."

Concrete	Pictorial	Abstract

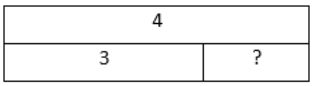
Physically taking away and removing objects from a whole (ten frames, Numicon, cubes and other items such as beanbags could be used).
4-3 = 1

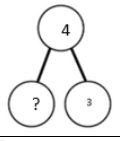


Children to draw the concrete resources they are using and cross out the correct amount. The bar model can also be used.



4 - 3 = ?
= 4 - 3





Year One pupils should be taught to:

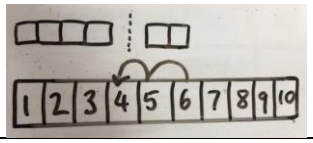
- read and write numbers from 1 to 20 in numerals and words
- identify and represent numbers using objects and pictorial representations including the number line, and use the language of: equal to, more than, less than (fewer), most, least
- read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs
- represent and use number bonds within 20
- subtract one-digit and two-digit numbers to 20, including 0
- solve one-step problems that involve subtraction, using concrete objects and pictorial representations, and missing number problems such as 9 = 7 + ?

New vocabulary:

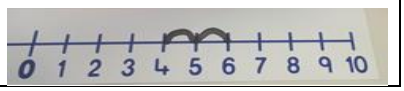
-, subtract, minus, takeaway
how much less is...?
=, equals, sign,

Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 - 2 = (single digit)
Use concrete objects and pictorial representations.

Children to represent what they see pictorially.
.

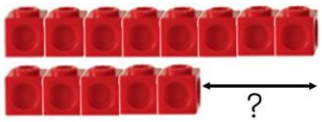


The abstract number line:
What is 2 less than 6?
What is the difference between 2 and 6?
6 - 2 =

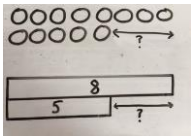


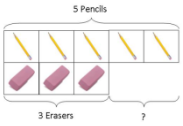
Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used).

Calculate the difference between 8 and 5.



Children to draw the cubes/other concrete objects which they have used, A bar model can be used; this helps to develop understanding of relationships between operations.

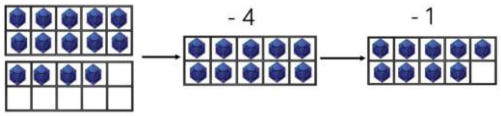




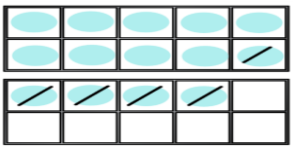
Children to develop their understanding of similar calculations.

Explore why similar calculations have the same difference.
9 - 6
8 - 5
7 - 4

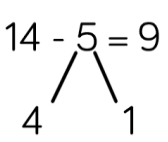
Making ten, using ten frames.
14 - 5 =



Children to present the ten frame pictorially and discuss what they did to make 10.



Children to show how they can make 10 by partitioning the subtrahend.



14 - 4 = 10
10 - 1 = 9

Year Two pupils should be taught to:

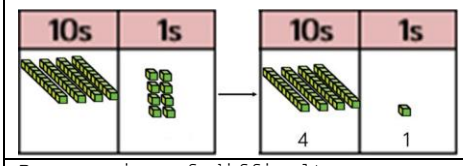
- count in steps of 2, 3, and 5 from 0, and in 10s from any number, forward and backward
- recognise the place value of each digit in a two-digit number (10s, 1s)
- subtract numbers using concrete objects, pictorial representations, and mentally, including:
  - a two-digit number and 1s
  - a two-digit number and 10s
  - 2 two-digit numbers
  - adding 3 one-digit numbers
- recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problem

New vocabulary:

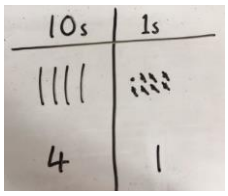
one or two digit number
place, place value
stands for, represents
twenty first, twenty second...
addition
exchange
ten less
tens boundary

TO - O using base 10 or Numicon. Continue to develop understanding of partitioning and place value:

48 - 7 =



Children to represent the base 10 eg. use lines for tens and dots / crosses for ones.

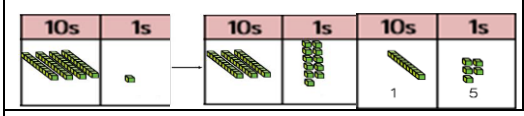


Moving onto the **expanded column method**:

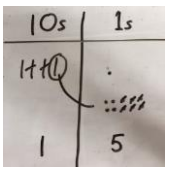
48 = 40 and 8
\- 7 = 7
41 = 40 and 1

Use money representations too.

Progression of difficulty:
16- 4 = (single digit no bridging)
14 - 5 (single digit bridging)
18 - 12 (two digits)
Use concrete objects and pictorial representations. Progress onto TO + TO using base 10 or Numicon.



Children to then represent in a place value chart, remembering to show the exchange.



Moving to the **expanded column method.** Children must understand that when they have exchanged the 10 they still have 41 because 41 = 30 + 11.

41 = 30 and 1 1
-26 = 20 and 6
15 = 10 and 5

Year Three pupils should be taught to:

- recognise the place value of each digit in a three digit number
- subtract numbers with up to 3 digits, using formal written methods of columnar addition
- estimate the answer to a calculation and use inverse operations to check answers
- solve problems, including missing number problems, using number

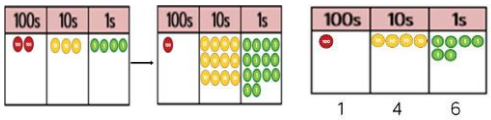
New vocabulary:

three digit number
hundreds
one hundred less
hundreds boundary
exchange

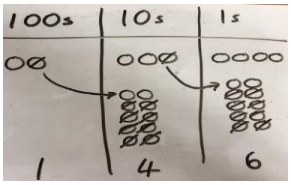
facts, place value, and more complex addition

Use of place vale counters to add HTO - TO, HTO - HTO etc...
When there are ten ones in the 1s column, we exchange for 1 ten; when there are 10 tens in the 10s column, we exchange for 1 hundred.

234 - 88 = 146

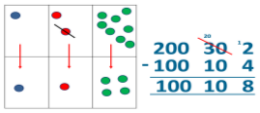


Children to represent the counters in a place value chart, circling when they make an exchange.



Moving to the **expanded column method**, then the **formal.**

```
      200   130
 341 = 300 and 40 and 1 1
-276 = 200 and 70 and 6
  55 = 000 and 50 and 5
```



Year Four pupils should be taught to:

- recognise the place value of each digit in a four digit number
- subtract numbers with up to 4 digits, using formal written methods of columnar addition
- estimate and use inverse operations to check answers to a calculation
- solve two-step problems in contexts, deciding which operations and methods to use and why

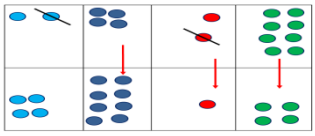
New vocabulary:
thousands one thousand less
thousands boundary
exchange decrease
< or >
integer, positive, negative
above/below zero, minus

Expanded column subtraction with place value counters, in preparation to progress to calculations with 4-digit numbers.

```
      2000          40
 3456 = 3000 and 400 and 50 and 6
-1628 = 1000 and 600 and 20 and 8
 1828 = 1000 and 800 and 20 and 8
```

Formal column method

Extend to numbers with at least four digits.



```
  5 1 2 1
  6232
- 4814
  1418
```

Extend to decimals (same number of decimal places).

```
    1
  272.18
- 230.9
  240.1
```

Year Five pupils should be taught to:

- recognise the place value of each digit in a seven digit number (up to 1,000,000)
- subtract whole numbers with more than 4 digits, using formal written methods of columnar addition
- solve multi-step problems in contexts, deciding which operations and methods to use and why

Formal column method
As year 4, progressing when understanding of the expanded method is secure, children will move on to the formal columnar method for whole numbers and decimal numbers, extending to numbers with more than four digits.

```
    4     6
 45116,8715
-237,329
   1 19,546
```

Extend to decimals (different number of decimal places).

```
       6     7
  1712.8100
-   54.68
    118.12
```

New Vocabulary
ascending , descending
units boundary, tenths boundary

Year Six pupils should be taught to:

- recognise the place value of each digit in an eight digit number
- subtract whole numbers, of increasing size, using formal written methods of columnar addition
- solve multi-step problems in contexts, deciding which operations and methods to use and why

Written methods
As year 5, progressing to larger numbers, up to 8 digit numbers, aiming for both conceptual understanding and procedural fluency with columnar method to be secured. Continue calculating with decimals, including those with different numbers of decimal places.

Continue with decimal calculations with varied amounts of digits,

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