Progression in calculation- Subtraction

Year Group objectives

Year 2

Counting and understanding number

Read and write two-digit and three-digit numbers in figures and words; describe and extend number sequences and recognise odd and even numbers

Count up to 100 objects by grouping them and counting in tens, fives or twos; explain what each digit in a two-digit number represents, including numbers where 0 is a place holder; partition two-digit numbers in different ways, including into multiples of 10 and 1

Order two-digit numbers and position them on a number line; use the greater than (>) and less than (<) signs

Estimate a number of objects; round two-digit numbers to the nearest 10

Knowing and using number facts

Derive and recall all addition and subtraction facts for each number to at least 10, all pairs with totals to 20 and all pairs of multiples of 10 with totals up to 100

Understand that halving is the inverse of doubling and derive and recall doubles of all numbers to 20, and the corresponding halves

Use knowledge of number facts and operations to estimate and check answers to calculations

Calculating

Add or subtract mentally a one-digit number or a multiple of 10 to or from any two-digit number

Use practical and informal written methods to add and subtract two-digit numbers

Understand that subtraction is the inverse of addition and vice versa; use this to derive and record related addition and subtraction number sentences

Use the symbols +, -, ×, ÷and =to record and interpret number sentences involving all four operations; calculate the value of an unknown in a number sentence (e.g. □÷2 =6, 30- □=24)

Models and images to support teaching

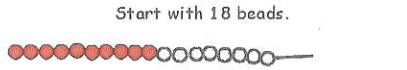
Children need to look at the numbers in a subtraction calculation and decide if it is going to be easier and quicker to 'count on' to find the difference or 'count back' to take away.

To make this decision children need to develop a 'feel' for the relative size of numbers.

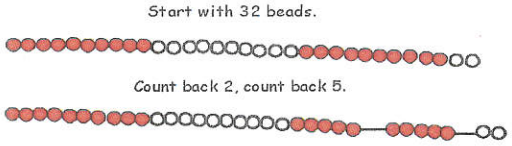
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.

On a bead string/numberlines

23 - 18 = 5 - counting on

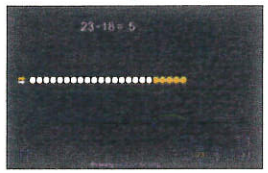


32 - 7 = 25 - counting back



May use Dienes, Cuisenaire, Numicon

To become effective calculators children need to be able to jump in 'chunks' rather than in ones, so it is vital that children learn to use facts such as 7 = 5 + 2, when they are calculating with larger numbers.

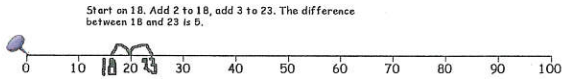


Difference ITP

Use the Counting On and Back ITP to support the imagery of counting on and back in ones and tens

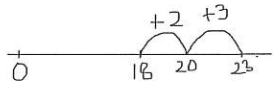
Ways in which children could record

Counting on 23 - 18



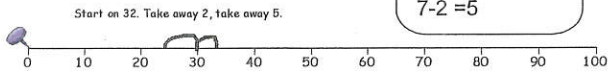
On an empty number line 23 - 18 =5

Start on 18, jump 2 to 20, jump 3 to 23, so 23 is 5 more than 18.



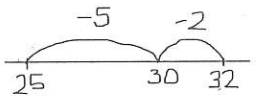
Counting back 32 - 7 = 25

It is important children use partitioning to subtract e.g. 7-2 =5



On an empty number line 32 - 7 = 25

Start on 32, jump back 2 to 30, jump back 5 to 25.



Remember:

- Children may not need to use a number line if they can do the calculation in their heads
- Children should be encouraged to use empty number lines to keep track of calculations they can't complete in their heads

Progression in calculation- Subtraction

Year Group objectives

Year 1

Counting and understanding number

Count reliably at least 20 objects, recognising that when rearranged the number of objects stays the same; estimate a number of objects that can be checked by counting

Compare and order numbers, using the related vocabulary; use the equals (=) sign

Read and write numerals from 0 to 20 then beyond; use knowledge of place value to position these numbers on a number track and number line

Say the number that is 1 more or less than any given number, and 10 more or less for multiples of 10

Knowing and using number facts

Derive and recall all pairs of numbers with a total of 10 and addition facts for totals to at least 5; work out the corresponding subtraction facts – *vital this is explored and explained at this stage of development*

Recall the doubles of all numbers to at least 10

Calculating

Relate addition to counting on; recognise that addition can be done in any order; use practical and informal written methods to support the addition of a one-digit number or a multiple of 10 to a one-digit or two-digit number

Understand subtraction as 'take away' and find a 'difference' by counting up; use practical and informal written methods to support the subtraction of a one-digit number from a one-digit or two-digit number and a multiple of 10 from a two-digit number

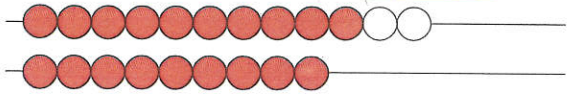
Use the vocabulary related to addition and subtraction and symbols to describe and record addition and subtraction number sentence

Models and Images to support teaching

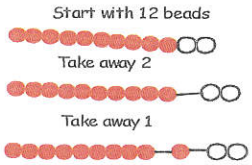
Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.
To make this decision children need to develop a 'feel' for the relative size of numbers.
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.

On a bead string- show two so that children can see the 'difference'

12 - 9 = 3 - counting on

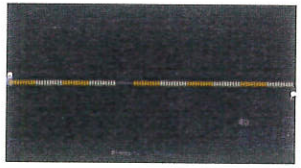


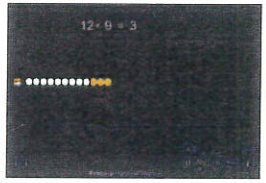
12 - 3 = 9 - counting back (taking away)



Also use Dienes, Cuisenaire, or other counting apparatus e.g. camels

Number line in red and white to show the 10 barrier





Use the Counting On and Back ITP to support the imagery of counting on and back in ones and tens

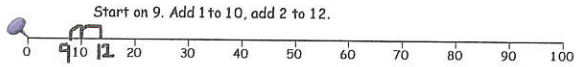
Difference ITP

Ways in which children could record

Counting on 12 - 9 = 3

with objects or a bead string

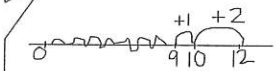
On a marked number line 12 - 9 = 3



On an empty number line 12 - 9 = 3

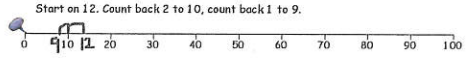
Take the 9 away using the scribbles on a number line to record and then count on to find the difference

Numicon will really illustrate the concept of difference

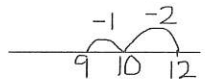


Counting back 12 - 3 = 9

On a marked number line 12 - 3 = 9



On an empty number line 12 - 3 = 9
12 count back 3 is 9
(may jump in one's initially)



Progression in calculation- Subtraction

Year Group objectives

Year 3

Counting and understanding number
Read, write and order whole numbers to at least 1000 and position them on a number line; count on from and back to zero in single-digit steps or multiples of 10

Partition three-digit numbers into multiples of 100, 10 and 1 in different ways

Round two-digit or three-digit numbers to the nearest 10 or 100 and give estimates for their sums and differences

Knowing and using number facts

Derive and recall all addition and subtraction facts for each number to 20, sums and differences of multiples of 10 and number pairs that total 100

Use knowledge of number operations and corresponding inverses, including doubling and halving to estimate and check calculations

Calculating

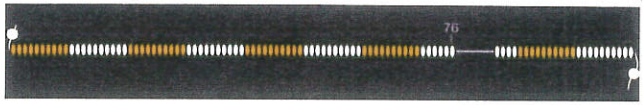
Add or subtract mentally combinations of one-digit and two-digit numbers

Develop and use written methods to record, support or explain addition and subtraction of two-digit and three-digit numbers

Models and images to support teaching

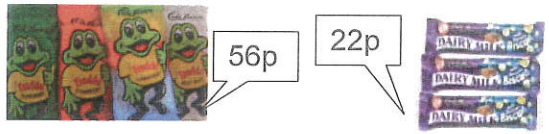
Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.
To make this decision children need to develop a 'feel' for the relative size of numbers.
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.

ITP Counting on and back

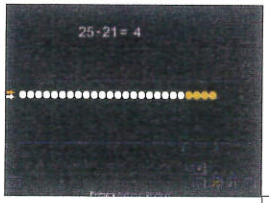


To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones, so it is vital that children learn to use facts such as
: 76 + 4 = 80, 80 + 20 = 100, when they are calculating with larger numbers

Model real life calculations in context.
What is the difference in price?



56p -22p = 34p



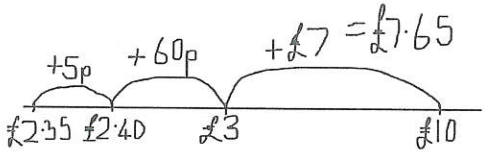
Difference ITP

Use the Counting On and Back ITP to support the imagery of counting on and back in ones and tens

Ways in which children could record

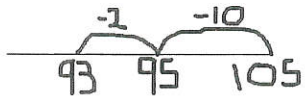
Counting on

Sita had £10. She spent £2.35.
How much money did she have left?

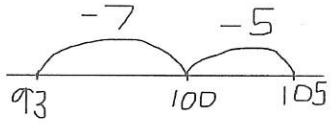


Counting back

105 - 12 = 93

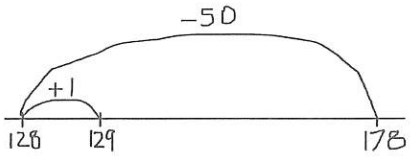


or



At this stage children are taking ownership and making their own choices, the number line records their mental method. This may involve compensation but not taught specifically

178 - 49 = 128



Progression in calculation- Subtraction

Year Group objectives

Year 4

Counting and understanding number

Recognise and continue number sequences formed by counting on or back in steps of constant size

Partition, round and order four-digit whole numbers; use positive and negative numbers in context and position them on a number line; state inequalities using the symbols <and >(e.g. -3 >-5, -1 <+1)

Use decimal notation for tenths and hundredths and partition decimals; relate the notation to money and measurement; position one-place and two-place decimals on a number line

Knowing and using number facts

Use knowledge of addition and subtraction facts and place value to derive sums and differences of pairs of multiples of 10, 100 or 1000

Identify the doubles of two-digit numbers; use these to calculate doubles of multiples of 10 and 100 and derive the corresponding halves

Use knowledge of rounding, number operations and inverses to estimate and check calculations

Calculating

Add or subtract mentally pairs of two-digit whole numbers (e.g. 47+ 58, 91 -35)

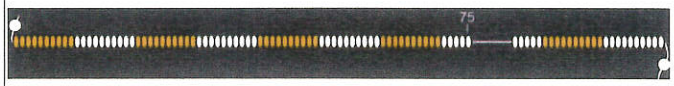
Refine and use efficient written methods to add and subtract two-and three-digit whole numbers and £.p

Use a calculator to carry out one and two step calculations involving all 4 operations, recognise negative numbers on the display, correct mistaken entries and interpret display correctly in the context of money

Models and images to support teaching

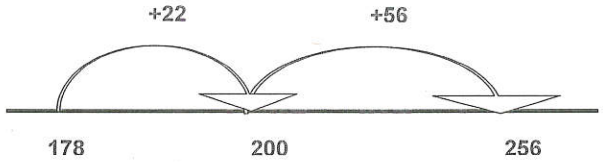
Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.
To make this decision children need to develop a 'feel' for the relative size of numbers.
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.

ITP Counting on and back - 75 + 25 =100, 100 - 25 =75



To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones.
It is vital that children learn to use facts such as:
75 + 25 = 100, when they are calculating with larger numbers.

256-178=78



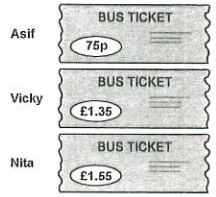
Check by using inverse

Support the continuing development of mental imagery by using a range of ITPs and Spreadsheets:
Difference ITP, Sum, Product, Difference, Quotient, Addition and Subtraction Flash Cards Spreadsheets...

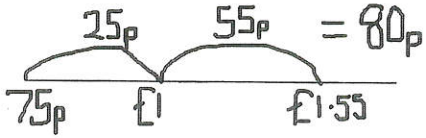
Ways in which children could record

Counting on

Asif, Vicky and Nita go to town by bus.
This is what they pay.

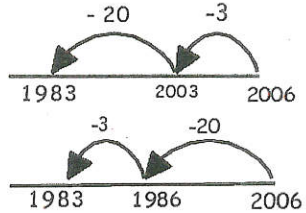


How much more does Nita pay than Asif?



Counting back
- when subtracting a small amount only

200 6 - 23 = 1983



For 3 digit - 3 digit children can make choices on using a number line and when really secure use a column method

5 1
5X6
-249

327

Children could as easily do mentally or on a number line

Progression in calculation- Subtraction

Year Group objectives

Year 5

Counting and understanding number

Count from any given number in whole-number and decimal steps, extending beyond zero when counting backwards; relate the numbers to their position on a number line

Explain what each digit represents in whole numbers and decimals with up to two places, and partition, round and order these numbers

Knowing and using number facts

Use knowledge of place value and addition and subtraction of two-digit numbers to derive sums and differences and doubles and halves of decimals (e.g. 6.5 ±2.7, half of 5.6, double 0.34)

Use knowledge of rounding, place value, number facts and inverse operations to estimate and check calculations

Calculating

Extend mental methods for whole number calculations, for example to subtract one near multiple of 1000 from another (eg. 6070-4097)

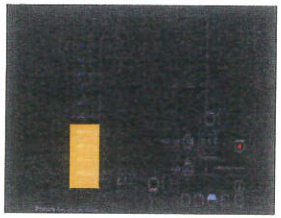
Use efficient written methods to add and subtract whole numbers and decimals with up to two places

Use a calculator to solve problems including those involving decimals and interpret the display correctly in the context of measurement

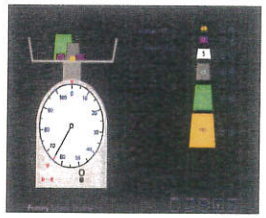
Models and images

Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'. There should be opportunities to 'decide and choose', and discussion around reasons why.
To make this decision children need to develop a 'feel' for the relative size of numbers. So in the calculation 5000-4999 children can recognise what is efficient.
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.
Calculator skills must also be taught so this can be included in the 'decide and choose'

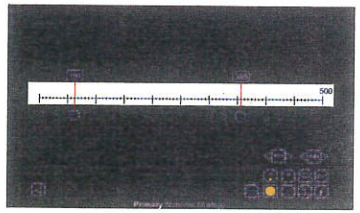
To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones.
It is vital that children learn to use facts such as:
31 + 9 = 40, so 0.31 + 0.09 = 0.4, when they are calculating with larger numbers.



Measuring cylinder ITP



Scales ITP



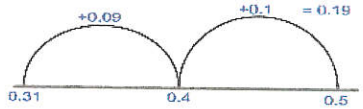
Difference ITP

Ways in which children may record

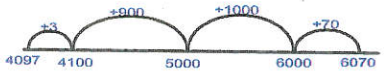
Key message- number lines continue to be used, children are encouraged to make choices appropriate to the calculation- Numberline? Mental? Column? Calculator?

Counting on

0.5 – 0.31 = 0.19

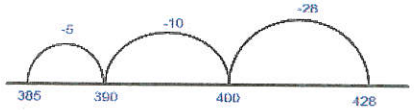


6070 – 4097 = 1063



Counting back only when subtracting a small amount

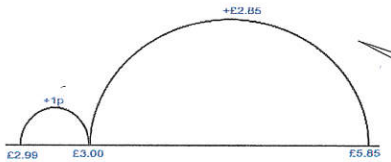
428-43=385



Using Known facts

A shop sells three types of sunglasses.

What is the **difference** in price between the **most** expensive and **least** expensive sunglasses?



Column method may also be used for decimal calculation

Progression in calculation- Subtraction

Year Group objectives

Year 6

Counting and understanding number

Find the difference between a positive and a negative integer, or two negative integers, in context

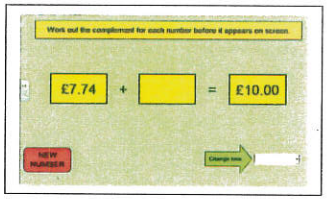
Use decimal notation for tenths, hundredths and thousandths; partition, round and order decimals with up to three places, and position them on the number line

Calculating

Calculate mentally with integers and decimals: U.t ±U.t, *I can add, subtract whole numbers and decimals in my head*

Use efficient written methods to add and subtract integers and decimals.

Use a calculator to solve problems involving multi step calculations

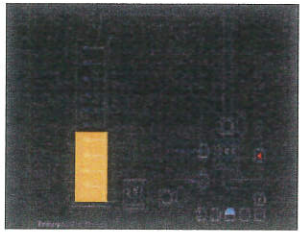


Complements Spreadsheet on the 'complements to £10' tab.

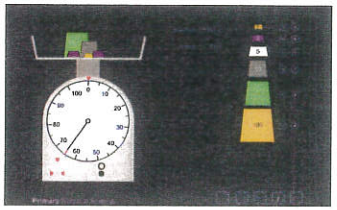
Models and images

Children need to look at the numbers in a calculation and decide if it is going to be easier and quicker to 'count on' or 'count back'.
To make this decision children need to develop a 'feel' for the relative size of numbers.
Most children are more successful when counting on, but when a 'small' number is subtracted from a 'big' number counting back can be the most efficient method.

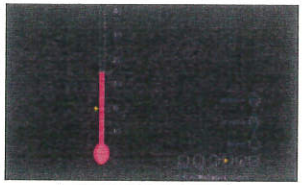
To become effective calculators children need to be able to jump in big 'chunks' rather than in tens and ones.
It is vital that children learn to use facts such as:
31 + 9 = 40, so 0.31 + 0.09 = 0.4, when they are calculating with larger numbers.



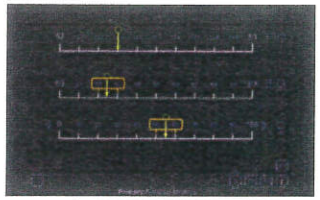
Measuring cylinder ITP



Scales ITP



Thermometer ITP



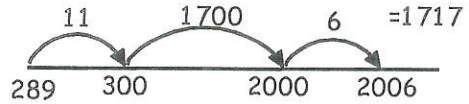
Decimal Number Line ITP

Calculators should be used when the numbers are too large for mental and written methods. Children need to be able to estimate to know whether the calculator answer is reasonable

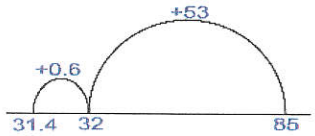
Ways in which children could record

Choose the appropriate method

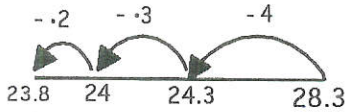
10 Calculate 2006 – 289 = 1717



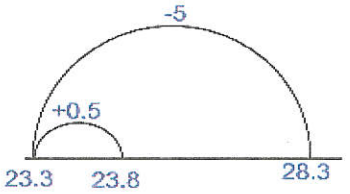
85 - 31.4 = 53.6



28.3 - 4.5 = 23.8



or see it as 28.3 – 5 and then adjust



Children are making increasingly efficient and sophisticated choices for methods to use