

Numbers Early Learning Goal

Count reliably with numbers from 1 to 20, place them in order and say which number is **one less** than a given number.

Using quantities and objects, add and **subtract two single-digit numbers** and count on or count back to find the answer.

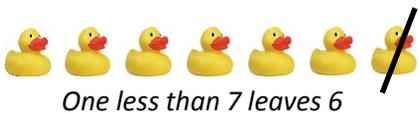
Solve problems, including doubling and **halving**.

Models and Strategies

Where possible, concepts should be taught in the context of real life.

Subtraction by 'taking away' concrete apparatus and counting how many are left.

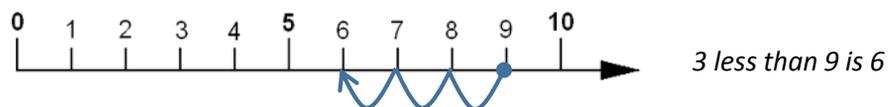
Use pictorial representations alongside concrete apparatus.



Introduce number tracks alongside concrete apparatus to count back and to find one less.



Number lines can then be used alongside number tracks and concrete apparatus.

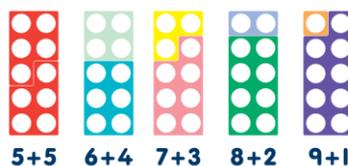


Use of Numicon to find the difference between two numbers.

The difference between 8 and 6 is 2



Number bonds to 10.



$$8 + 2 = 10$$

$$10 - 2 = 8$$

Vocabulary of subtraction.

Through a variety of activities promote the language of subtraction: *take away, one less, two less* etc, *count back, difference, subtract*.

- Singing '10 green bottles', '10 currant buns' etc
- Playing counting backwards games such as 'Rockets'
- Quality texts such as 'Handa's Surprise'.
- Role play / real-life experiences

E.g. *How many more children are having school dinners today? If we wanted to calculate the difference between school dinners and packed lunches, how would we do this? How many more children chose bananas than apples today?*

Recording.

Pupils make a record in pictures, words or symbols of the subtraction activities that have been carried out. Begin to record subtraction calculations using – and = signs.

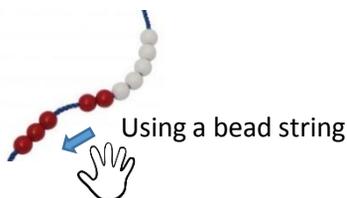
Objectives

Represent and use number bonds and related subtraction facts within 20.
 Subtract one-digit and two-digit numbers to 20, including zero.
 Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs.
 Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square - 9$.

Models and Strategies

Counting backwards using concrete objects and pictorial representations.

Understand subtraction as 'take away'.

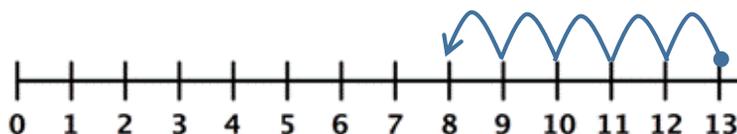


Using Numicon
 3 less than 11 equals 8

Taking away using a number track and number line.



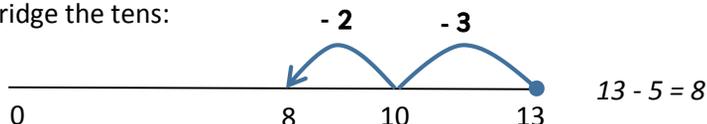
Start at 13 and **count back** 5



13 take away 5 leaves 8

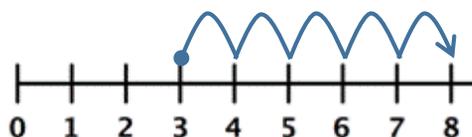
13 subtract 5 equals 8

Begin to bridge the tens:



Understanding subtraction as finding the difference by counting on.

Using a number line and Numicon, for example.



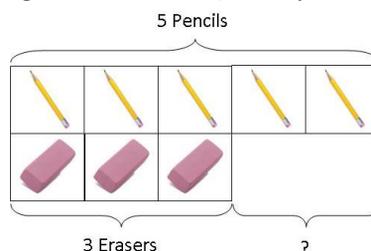
Start at 3 and **count on** 5

The difference between 8 and 3 equals 5.

$$8 - 3 = 5$$



The bar model can be used to illustrate finding the difference (initially with concrete apparatus, before progressing to a pictorial representation).



Recording.

Record subtraction calculations using - and = signs and solve missing number problems. E.g. $15 - 9 = \square$; $12 - \square = 7$; $\square - 6 = 5$; $\square - \square = 11$.

Vocabulary of subtraction.

Through a variety of activities (e.g. role play, songs, rhymes) continue to promote the language of subtraction: *take away; one less, two less...ten less; subtract; minus; difference; count back; count on; fewer.*

Objectives

Recall and use subtraction facts to 20 fluently, and derive and use related facts up to 100.

Subtract numbers using concrete objects, pictorial representations, and mentally, including:

- a two-digit number and ones
- a two-digit number and tens
- two two-digit numbers

Show that subtraction of one number from another cannot be done in any order (non-commutative).

Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

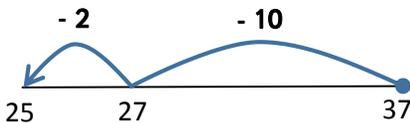
Solve subtraction problems using concrete objects and pictorial representations, and apply their increasing knowledge of mental and written methods.

Solve simple problems in a practical context involving addition and subtraction of money of the same unit, including giving change (from *Measurement*).

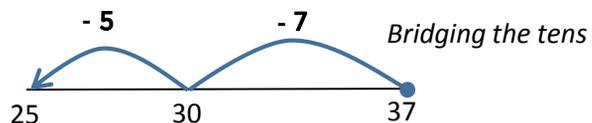
Models, Strategies and Methods

Continue to use a range of representations (see Year 1).

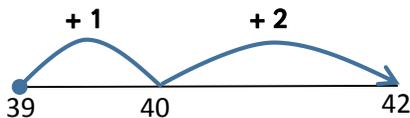
Using a number line to model 'take away'. E.g. $37 - 12 = 25$



or

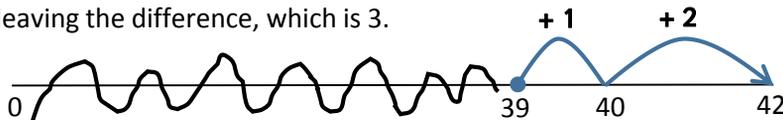


Using a number line to model 'find the difference'. E.g. $42 - 39 = 3$



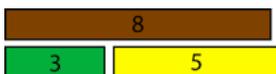
Counting on to find the difference – useful when the two numbers are close together.

The link between the two models of subtraction may be supported by physically removing 39 from 42 on a strip of paper, leaving the difference, which is 3.



Subtracting near multiples of 10. E.g. Subtract 9 by subtracting 10 and adding one back.

Using Numicon, Cuisenaire rods or bars to model finding the difference.

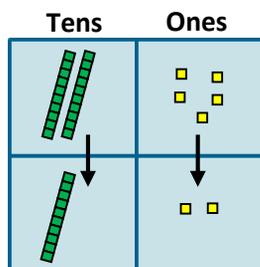


The difference between 8 and 3 equals 5.
 $8 - 3 = 5$



Working towards a written method - partitioning when no exchange is required.

E.g. $37 - 12 = 25$



37 subtract 12 leaves 25

Vocabulary of subtraction.

Through a variety of activities continue to promote the language of subtraction: *subtract, take away, minus, difference, less, count back, count on, fewer.*

Objectives

Subtract numbers mentally, including:

- a three-digit number and ones
- a three-digit number and tens
- a three-digit number and hundreds

Subtract numbers with up to three digits, using formal written method of column subtraction.

Estimate the answer to a calculation and use inverse operations to check answers.

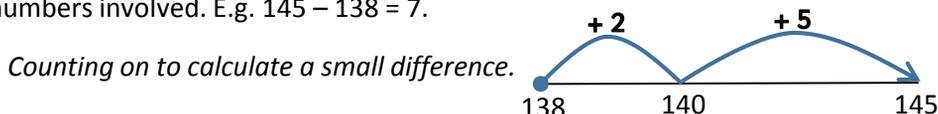
Solve problems, including missing number problems, using number facts, place value, and more complex addition and subtraction.

Subtract fractions with the same denominator within one whole.

Models, Strategies and Methods

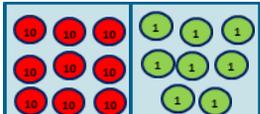
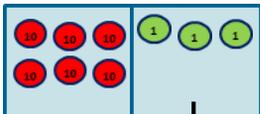
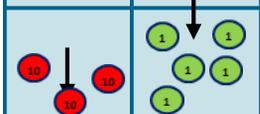
Mental strategies: pupils should continue to develop fluency in mental strategies of subtraction, using a range of models and images, including the number line (see Year 2). E.g. partitioning the smaller number ($76 - 34 = 76 - 30 - 4$), patterns of similar calculations (e.g. $15 - 8 = 7$, therefore $150 - 80 = 70$), subtracting near multiples of 10 (e.g. subtracting 19 by subtracting 20 and adding 1 back).

Pupils should make choices about whether to solve subtraction problems by counting back or counting on, depending on the numbers involved. E.g. $145 - 138 = 7$.



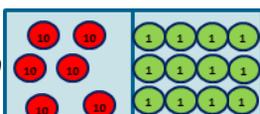
Introducing a formal written method.

Introduce column subtraction with no decomposition, modelled with place value counters (Dienes apparatus could be used for those who need a less abstract representation). Use with whole numbers up to three digits.

Tens	Ones		
		→	$\begin{array}{r} 98 \\ - 35 \\ \hline 63 \end{array}$
			<p><i>Record the standard algorithm alongside the visual representation.</i></p>

For most children this will lead to **exchanging**, modelled using place value counters (or Dienes).

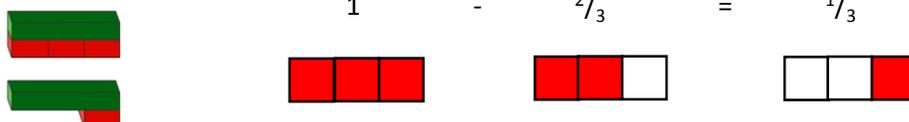
E.g. $72 - 47$

	<p><i>Exchange one 10 for ten ones</i></p> 	→	<p style="text-align: center;">$60 - 40 \quad 12 - 7$</p> 
			$\begin{array}{r} 6\cancel{7}^12 \\ - 47 \\ \hline 25 \end{array}$

Missing number/digit problems using a range of equations as in Year 1 and 2 but with appropriate, larger numbers, including the formal algorithm.

Using Cuisenaire rods or bar model to support subtraction of fractions.

E.g. $1 - \frac{2}{3} = \frac{1}{3}$



Objectives

Subtract numbers with up to 4 digits using the formal written method of column subtraction where appropriate.

Estimate and use inverse operations to check answers to a calculation.

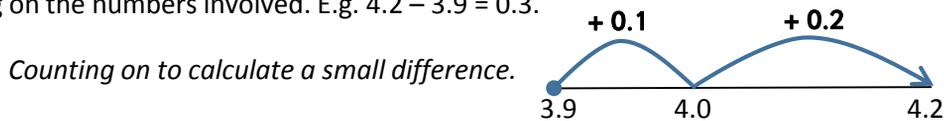
Solve addition and subtraction two-step problems in context, deciding which operations and methods to use and why.

Subtract fractions with the same denominator.

Models, Strategies and Methods

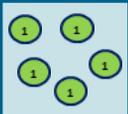
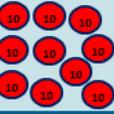
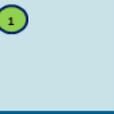
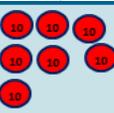
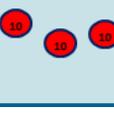
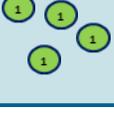
Mental strategies: pupils should continue to develop fluency in mental strategies of subtraction, using a range of models and images, including the number line. E.g. partitioning the smaller number (e.g. $156 - 34 = 156 - 30 - 4$), patterns of similar calculations (e.g. $15 - 8 = 7$, therefore $150 - 80 = 70$ and $1500 - 800 = 700$), subtracting near multiples of 10 (e.g. subtracting 29 by subtracting 30 and adding 1 back).

Pupils should make choices about whether to solve subtraction problems by counting back or counting on, depending on the numbers involved. E.g. $4.2 - 3.9 = 0.3$.



Formal written method.

Revise formal column method using **visual representations** (place value counters or Dienes), as modelled in Year 3. Progress from calculations which require one exchange to those which require 2 exchanges. Include examples which deal with zeros. E.g. $305 - 134$.

100s	10s	1s
		
$5 - 4 = 1$		
		
<i>Exchange one hundred for ten 10s</i>		
		
$200 - 100 = 100$	$100 - 30 = 70$	
		
		

Record the standard algorithm alongside the visual representation.

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

Extend to subtracting four-digit numbers. Begin to subtract decimal numbers with the same number of decimal places (up to two) in the context of money and measures.

E.g. £5.60 - £3.25

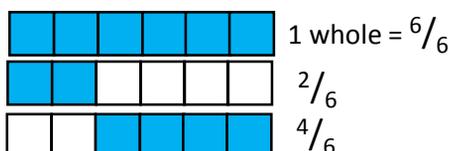
$$\begin{array}{r} 5 \overset{5}{\cancel{6}} 0 \\ - 3.2 5 \\ \hline 2.3 5 \end{array}$$

Exchange one tenth for ten hundredths

Solve missing number problems, including use of inverse of operations. E.g. $\square - 25 = 67$; $125 - \square = 90$.

Using Cuisenaire rods or bar model to support subtraction of fractions.

E.g. $1 - \frac{2}{6} = \frac{4}{6} = \frac{2}{3}$



Objectives

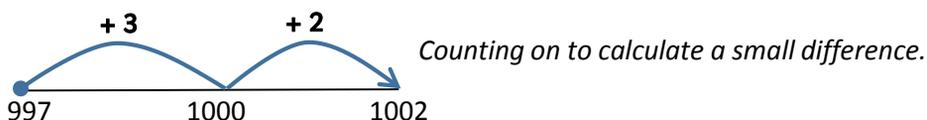
- Subtract mentally with increasingly large numbers.
- Subtract whole numbers with more than 4 digits, including use of a formal written method (column subtraction).
- Use rounding to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
- Subtract fractions with the same denominator, and denominators that are multiples of the same number.

Models, Strategies and Methods

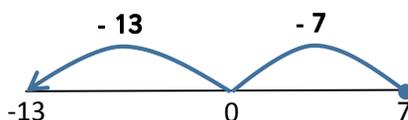
Pupils should make choices about whether to solve subtraction problems mentally, using jottings (informal methods) or using a formal written method, depending on the numbers involved.

Mental strategies: pupils should continue to develop fluency in mental strategies of subtraction, using a range of models and images, including the number line.
 E.g. partitioning the smaller number (e.g. $15.6 - 3.4 = 15.6 - 3 - 0.4$), patterns of similar calculations (e.g. $15 - 8 = 7$, so $1.5 - 0.8 = 0.7$), compensating (e.g. subtracting 0.9 by subtracting 1 and adding 0.1 back).

Informal methods: pupils should be encouraged to record their number lines, if required.
 E.g. $1002 - 997 = 5$.



Use a number line to solve problems involving time (e.g. calculating time intervals), money (e.g. calculating change) and negative numbers.
 E.g. What is 20°C lower than 7°C?



Formal written method.

Revise formal column method, using place value counters to support understanding, as modelled in Year 4. Progress to numbers which contain more than four digits. Include calculations which require more than one exchange and those which deal with zeros.

E.g. $5902 - 2457$.

$$\begin{array}{r}
 \overset{8}{5} \overset{9}{9} \overset{10}{0} \overset{11}{1} \overset{12}{2} \\
 - \quad \underline{2457} \\
 \underline{3445}
 \end{array}$$

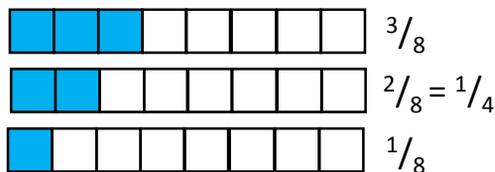
Subtract numbers with different numbers of decimal places (and up to three decimal places). Empty decimal places can be filled with a zero. E.g. $5.7 - 2.38$.

$$\begin{array}{r}
 \overset{6}{5} \overset{7}{.} \overset{8}{0} \\
 - \quad \underline{2.38} \\
 \underline{3.32}
 \end{array}$$

Solve missing number problems, including use of inverse of operations. E.g. $\square - 183 = 375$; $119 - \square = 86$.

Using bar model to support subtraction of fractions.

e.g. $\frac{3}{8} - \frac{1}{4} = \frac{3}{8} - \frac{2}{8} = \frac{1}{8}$



Objectives

Perform mental calculations, including with mixed operations and large numbers.
 Use their knowledge of the order of operations to carry out calculations involving the four operations.
 Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
 Solve addition and subtraction multi-step problems in context, deciding which operations and methods to use and why.
 Solve problems involving addition, subtraction, multiplication and division.
 Add and subtract fractions with different denominators and mixed numbers, using the concept of equivalent fractions.

Models, Strategies and Methods

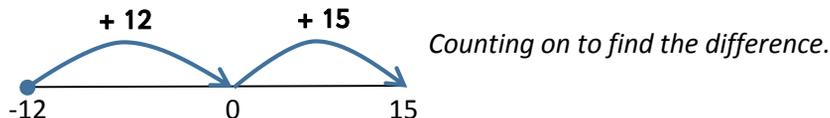
Pupils should make choices about whether to solve subtraction problems mentally, using jottings (informal methods) or using a formal written method, depending on the numbers involved.

Mental strategies: pupils should continue to develop fluency in mental strategies of subtraction, using a range of models and images, including the number line.

E.g. partitioning the smaller number (e.g. $15.6 - 3.4 = 15.6 - 3 - 0.4$), patterns of similar calculations (e.g. $15 - 8 = 7$, so $1.5 - 0.8 = 0.7$), compensating (e.g. subtracting 0.9 by subtracting 1 and adding 0.1 back), finding a small difference by counting on from the smaller number (e.g. $4003 - 3995$).

Informal methods: use a number line to solve problems involving time (e.g. calculating time intervals), money (e.g. calculating change) and negative numbers.

E.g. Find the difference between -12°C and 15°C .



Formal written method.

Revise formal column method, including numbers with more than 4 digits. Aim for both conceptual understanding and procedural fluency with decomposition to be secured. Include calculations which require several exchanges and those which deal with zeros.

E.g. $234,897 - 45,996$

$$\begin{array}{r}
 \begin{array}{ccccccc}
 & 1 & 12 & 13 & & & \\
 & \cancel{2} & \cancel{3} & \cancel{4} & 18 & 9 & 7 \\
 - & & 4 & 5 & 9 & 9 & 6 \\
 \hline
 1 & 8 & 8 & 9 & 0 & 1 &
 \end{array}
 \end{array}$$

Subtract numbers with different numbers of decimal places (and up to three decimal places). Empty decimal places can be filled with a zero. E.g. $15.4 - 7.88$ becomes $15.40 - 7.88$.

Solve missing number problems, including use of inverse operations.

E.g. $\square + 0.07 = 1$; $1\,000\,000 - \square = 999\,000$.

Subtraction of fractions.

Convert mixed numbers to improper fractions.

e.g. $1\frac{1}{7} - \frac{3}{7} = \frac{8}{7} - \frac{3}{7} = \frac{5}{7}$