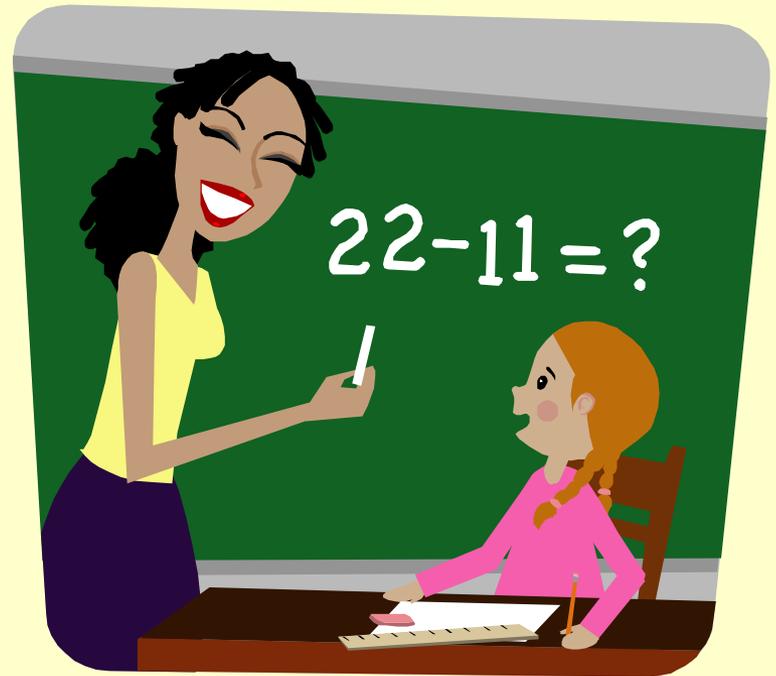


Session 2
Subtraction
and take away



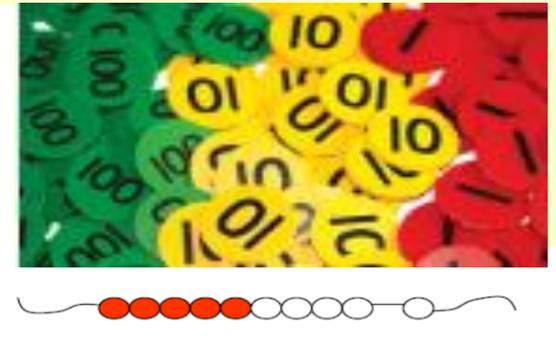
Subtraction

Concrete resources:

- 100 square
- Number lines
- Bead strings
- Straws
- Dienes
- Counting stick
- Place value dice
- Place value cards
- Place value counters



1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



subtract

count on count back

fewer — less

take away minus

 difference

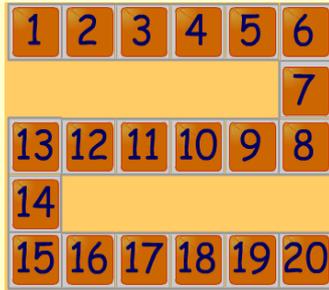


Subtraction: Reception

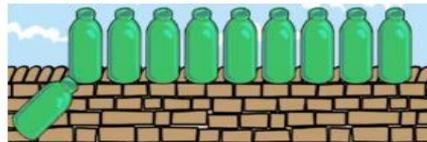
Early learning goals:

- ✓ Say which number is one less than a given number.
- ✓ Using quantities and objects, they subtract two single-digit numbers and count back to find the answer.

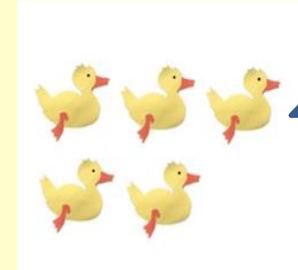
Say which number is one less than a given number using a number line or number track to 20.



Begin to count backwards in familiar contexts such as number rhymes or stories.



10 Green Bottles sitting on the wall
...



5 little ducks went swimming one day...

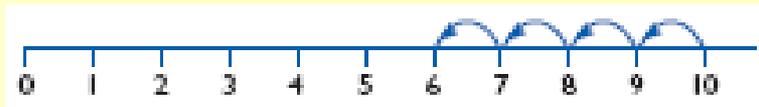
Begin to relate subtraction to 'taking away' using concrete objects and role play.



Three teddies take away two teddies leaves one teddy



If I take away four shells there are six left



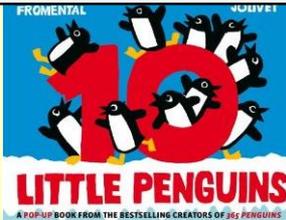
Count backwards along a number line to 'take away'

Subtraction: Year 1

Year 1 statutory requirements:

- ✓ Say which number is one less than a given number.
- ✓ Represent and use number bonds and related subtraction facts within 20.
- ✓ Read, write and interpret mathematical statements involving subtraction (-) and equals (=) signs.
- ✓ Subtract one-digit and two-digit numbers to 20, including zero.
- ✓ Solve one-step problems that involve subtraction using concrete objects and pictorial representations, and missing number problems.

Understand subtraction as take away. Use practical resources, pictorial representations, role play, stories and rhymes.



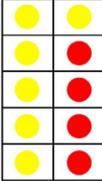
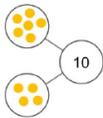
Use number bonds and related subtraction facts within 20.

$$16 - \square = 10$$

$$20 - \square = 15$$

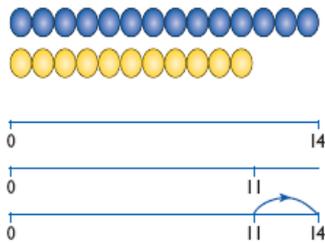

Count back in ones and find one less than a given number.

1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

 $6 + 4 = 10$ $4 + 6 = 10$ $10 - 4 = 6$ $10 - 6 = 4$ <p>Tens Frame</p>	 $6 + 4 = 10$ $4 + 6 = 10$ $10 - 4 = 6$ $10 - 6 = 4$ <p>Part Whole Model</p>	<table border="1" data-bbox="1174 958 1354 1025"> <tbody> <tr><td colspan="2">10</td></tr> <tr><td>6</td><td>4</td></tr> </tbody> </table> $6 + 4 = 10$ $4 + 6 = 10$ $10 - 4 = 6$ $10 - 6 = 4$ <p>Bar Model</p>	10		6	4
10						
6	4					

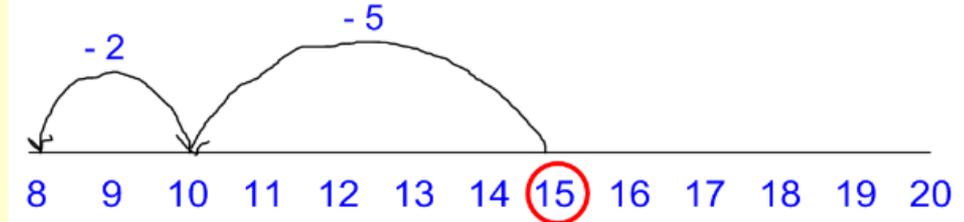
Subtraction: Year 1

Counting on should only be used when the language used is 'find the difference', 'difference between' and 'distance between'.



The difference between 11 and 14 is 3.
 $14 - 11 = 3$
 $11 + \square = 14$

Use number line to support the subtraction of numbers. Know and use strategy of **counting back** to subtract one-digit and two-digit numbers to 20.



Solve one-step problems using concrete objects and pictorial representations.

Dan has 12 football stickers.
He gives 4 to Ben.
How many stickers does he have left?



$$12 - 4 = 8$$

$$15 - 7 = 8$$

Begin to use the - and = signs to write calculations in a number sentence.

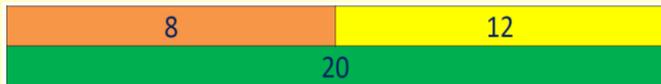
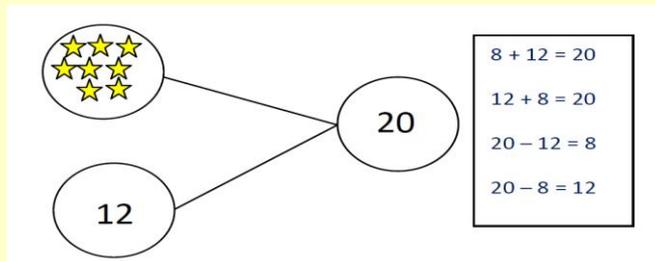
Subtraction: Year 2

Year 2 statutory requirements:

- Recall and use subtraction facts to 20 fluently, and derive and use related facts to 100.
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.
- 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
 - adding three one-digit numbers.

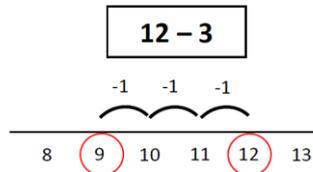
Memorise and reason with number facts to 20 in several forms.

Partition two 2-digit numbers using a variety of models and images.

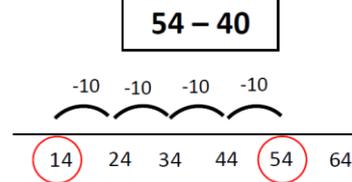


Subtraction: Year 2

Subtract 2 digit and ones



Subtract 2 digit and tens



Use partitioning to subtract two 2-digit numbers using concrete resources and/or a numbered number line and then progressing to an empty number line.

$$36 - 12 = 24$$

Diagram showing the partitioning of 36 into 10 and 2. A blue arrow points from 36 down to 10, and a red arrow points from 36 down to 2.

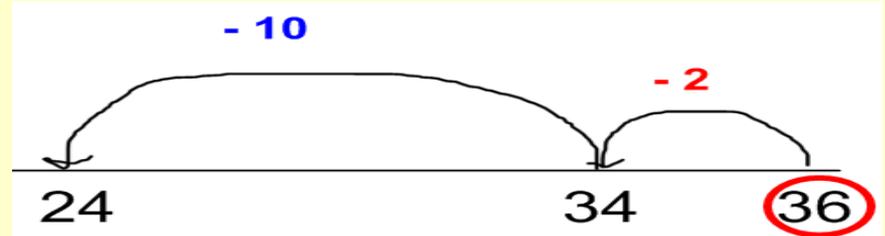


$$36 - 12$$

=

$$24$$

O
R



Subtraction: Year 3

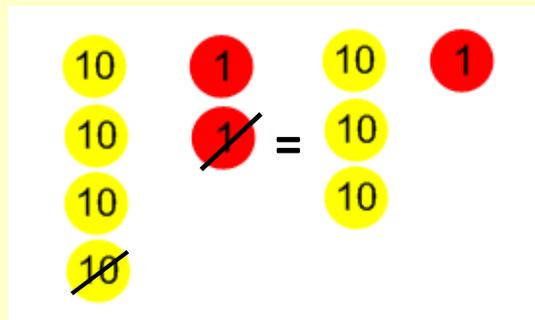
Year 3 statutory requirement:

- Find 10 or 100 less than a given number.
- Recognise the place value of each digit in a three-digit number (hundreds, tens, ones).
- Subtract numbers with up to three digits, using formal written methods of column subtraction.
- Subtract numbers mentally, including:
 - A three-digit number and ones
 - A three-digit number and tens
 - A three-digit number and hundreds.

Use expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits **with no exchanging**.

$$42 - 11 = 31$$

$$\begin{array}{r} 40 + 2 \\ - 10 + 1 \\ \hline 30 + 1 \end{array}$$



OR

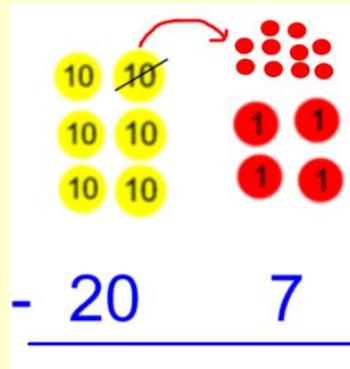
Tens	Ones
- 10	- 1
30	1

Subtraction: Year 3

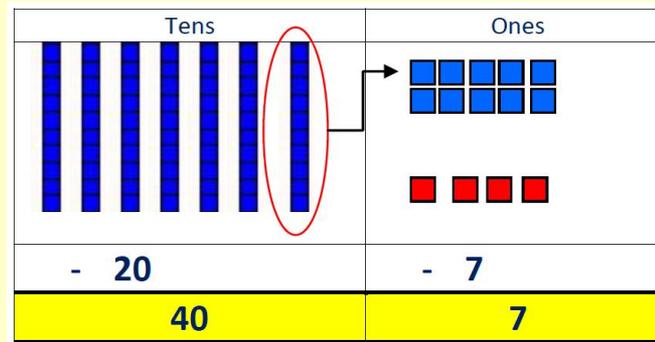
Progress to using the expanded column method with place value resources to support the conceptual understanding of subtracting numbers with up to three digits **with exchanging tens and/or hundreds**.

$$74 - 27 = 47$$

$$\begin{array}{r} 60 + 14 \\ ~~70~~ + ~~4~~ \\ - 20 + 7 \\ \hline 40 + 7 \end{array}$$



OR



In this example to subtract 7 ones from 4 ones we need to **exchange** a ten for ten ones. We now can subtract 7 ones from 14 ones.

Extend to using the expanded column method to subtract three digit numbers from three digit numbers.

$$537 - 254 = 283$$

$$\begin{array}{r} 400 + 130 \\ ~~500~~ + ~~30~~ + 7 \\ - 200 + 50 + 4 \\ \hline 200 + 80 + 3 \end{array}$$

Note: The exchanged ten or hundred is just as important as any other number, therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

Subtraction: Year 5 & 6

Year 5 statutory requirements :

- Subtract whole numbers with more than 4 digits using formal written methods of columnar subtraction.
- Subtract numbers mentally, with increasingly large numbers.
- Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.
- Solve problems involving numbers up to three decimal places.

Year 6 statutory requirements: pupils are expected to solve more complex addition and subtraction problems

In year 5 and 6 pupils should be subtracting numbers using compact column subtraction method. **Note:** The exchanged ten or hundred is just as important as any other number. Therefore, it should be written as clear and as large as any other number, and placed at the **top** of the column which has been adjusted.

$$\begin{array}{r}
 8 \qquad \qquad 7 \\
 \cancel{9}^1 6 7 \cancel{8}^1 3 \\
 - \\
 \hline
 5 \ 8 \ 7 \ 3 \ 5 \\
 3 \ 8 \ 0 \ 4 \ 8
 \end{array}$$

When subtracting decimals, it is essential that the decimal point does not move and kept in line.

Where necessary, a zero should be added as a *place holder*.

$$\begin{array}{r}
 4 \\
 \cancel{5}^1 3 7 \\
 - 2.54 \\
 \hline
 2.83
 \end{array}$$

	1	10	5	.	4	1	9	kg
-			3	6	.	0	8	0 kg
			6	9	.	3	3	9 kg

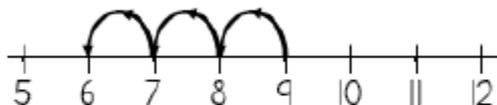
Introducing 'take away'

Begins with practical demonstrations of subtraction relating to 'take away'. Use of number tracks, pictures and songs (10 green bottles, 5 little speckled frogs).

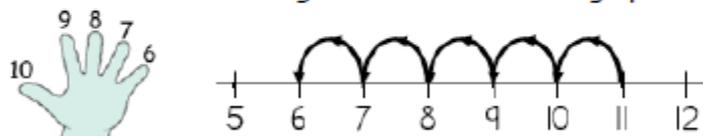
Count out - a child finding $9 - 3$, gets 9 objects and takes away 3, counts how many remain.



Count back from - a child finding $9 - 3$, counts back three numbers from 9: 'eight, seven, six'.



Count back to - a child doing $11 - 6$, counts back from the first number to the second, keeping a tally using fingers of the number of numbers that have been said, 'ten, nine, eight, seven, six', holding up five fingers.



Count up - a child doing $11 - 6$, counts up from 6 to 11, 'seven, eight, nine, ten, eleven', sometimes keeping a count of the spoken numbers using fingers.



Beginning to take away

- Number tracks leading to number lines introduced for recording 'jumps' back.
- $8-3=5$



Mental Strategies for Subtraction

Secure mental subtraction requires the ability to:

- recall key subtraction facts instantly (inverse of number pairs to 10, 20 & 100, halves etc) and to apply these to similar calculations
- mentally subtract combinations of one and two digit numbers
- understand that subtraction is the inverse of addition and recognise that subtraction can't be done in any order (it has to start with the larger number)
- understand the language of subtraction including less, minus, take away, difference between etc)

The problem with subtraction

Typical Questions

- Sam has saved 57p. Her sister has saved 83p

How much *more* money does Sam have than his sister?

- Samir is running a 50 metre potato race. He drops out after 18 metres

How much *further* does he have to go?

- Nisha and Charlie weigh fruit. Nisha's weighs 38g. Charlies weighs 50g.

How much *heavier* is Charlies fruit than Nishas?

- One sunflower is now 38cm high. Another is 83cm high.

What is the *difference* between the heights of the sunflowers?

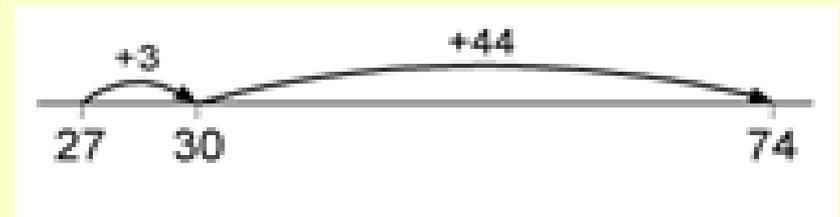
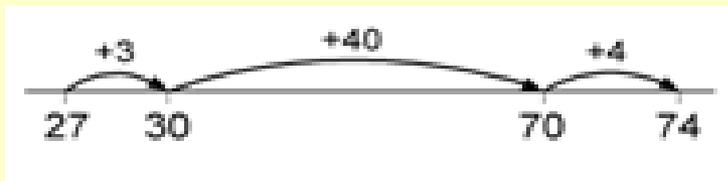
Written methods for Subtraction

Stage 1: The empty number line

The empty number line helps to record the steps in mental subtraction.

- Counting Up - the steps can also be recorded by counting up from the smaller number to find the difference

or



Written methods for Subtraction

Stage 1: The empty number line

With practice, children will need to record less information and decide whether to count back or forward. It is useful to ask children whether counting up or back is the more efficient for calculations such as $57 - 12$, $86 - 77$ or $43 - 28$.

With three-digit numbers the number of steps can again be reduced, provided that children are able to work out answers to calculations such as $178 + ? = 200$ and $200 + ? = 326$ mentally.



Over to you!

When would you use a numberline?

$$59 - 11$$

$$86 - 68$$

$$142 - 35$$

$$92 - 9$$

Written methods for Subtraction

Expanded column method

It can also be applied to three and four digit numbers.

Example: $741 - 367$

$$\begin{array}{r} 700 + 40 + 1 \\ - 300 + 60 + 7 \\ \hline \end{array}$$

$$\begin{array}{r} \overset{600}{700} + \overset{130}{40} + \overset{11}{1} \\ - 300 + 60 + 7 \\ \hline 300 + 70 + 4 \end{array}$$

Written methods for Subtraction

Expanded column method

Depending on the numbers it can get quite complicated and this stage may need a lot of time and perseverance!

$$\begin{array}{r} 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline \end{array}$$

$$\begin{array}{r} \begin{array}{ccc} +00 & +90 & +13 \\ +00 & +00 & +3 \\ \hline \end{array} \\ 500 + 0 + 3 \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array}$$

$$\begin{array}{r} 400 + 90 + 13 \\ - 200 + 70 + 8 \\ \hline 200 + 20 + 5 \end{array}$$

Over to you!

Use the expanded column method to find answers to these sums.

$$73 - 39$$

$$123 - 58$$

$$315 - 177$$

Written methods for Subtraction

Stage 4: Column method

The expanded method is eventually reduced to:

$$\begin{array}{r} \overset{6}{\cancel{7}} \overset{14}{4} \\ - 27 \\ \hline 47 \end{array}$$

$$\begin{array}{r} \overset{6}{\cancel{7}} \overset{13}{\cancel{4}} \overset{11}{1} \\ - 367 \\ \hline 374 \end{array}$$

$$\begin{array}{r} \overset{+}{\cancel{5}} \overset{9}{\cancel{0}} \overset{13}{\cancel{3}} \\ - 278 \\ \hline 225 \end{array}$$

Over to you!

Use the compact column method to find answers to these sums.

$$83 - 58$$

$$166 - 47$$

$$402 - 175$$