Calculations Policy
Addition and Subtraction

Addition

5 Counting Principles (Early Years) :

1. **The one-one principle.**
- Children assign one number name to each object that is being counted.
- Children must ensure that they count each object only once.

1 2 3 4 5

2. **The stable-order principle**
- Children understand that, when counting, the numbers have to be said in a certain order.

3. **The cardinal principle**
- Children understand that the number name assigned to the final object in the group is the total number of objects in that group.

4. **The abstraction principle**
- Children understand that anything can be counted, including things that cannot be touched eg. Sounds and movements

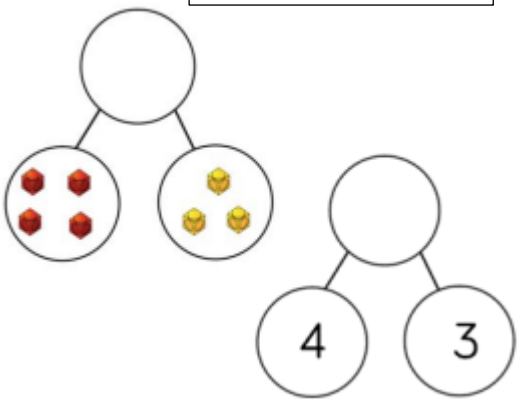
5. **The order-irrelevance principle**
- Children understand that whatever order we count a group of objects in, there will still be the same number.

Add two 1-digit numbers to 10 (Early Years and Year 1)

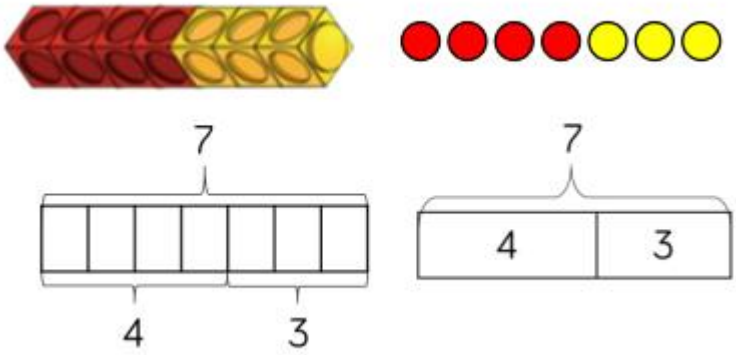
When adding numbers to 10, children can explore both aggregation and augmentation.

Models to support aggregation:

Part-whole model

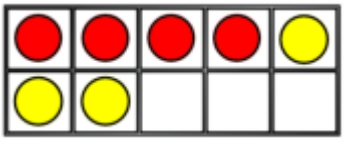


Bar model



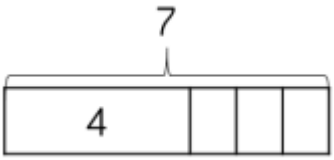
Numicon

Ten frame

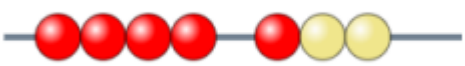


Models to support augmentation:

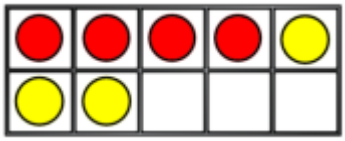
Combination bar model



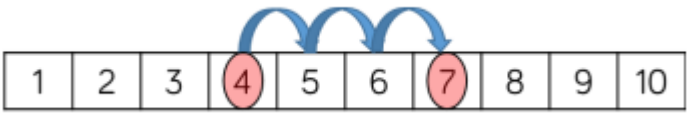
Bead string



Ten frame



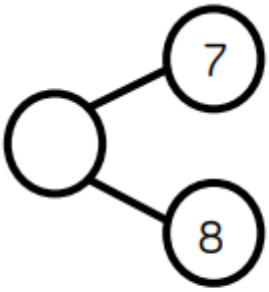
Number track



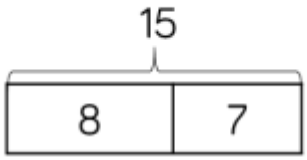
Add 1 and 2-digit numbers to 20 (Year 1 and 2)

The knowledge that 10 ones equal 1 ten supports children in adding 1-digit numbers that cross 10.

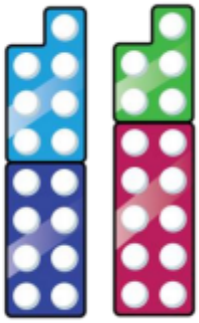
In Year 1 this is done by counting on using the following models to support:



Part-whole model

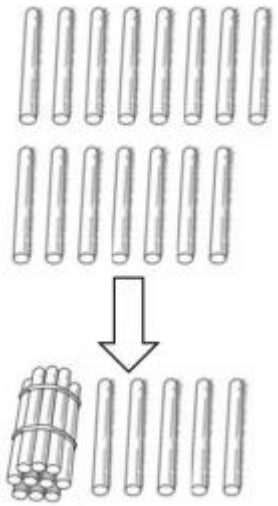


Bar model

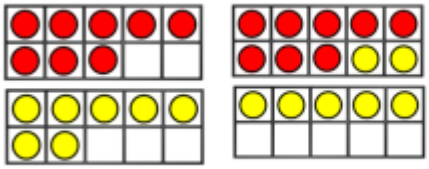


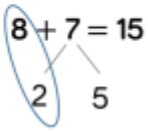
Numicon

In Year 2, different manipulatives can be used to represent the exchanging of ten 1s for one 10 alongside number lines to support children in understanding how to partition their jumps:

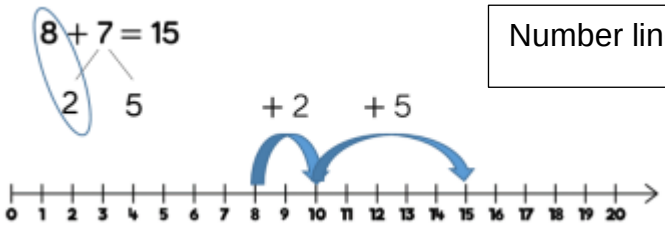


Straws bundles to make 10





Ten frame filled to make 10

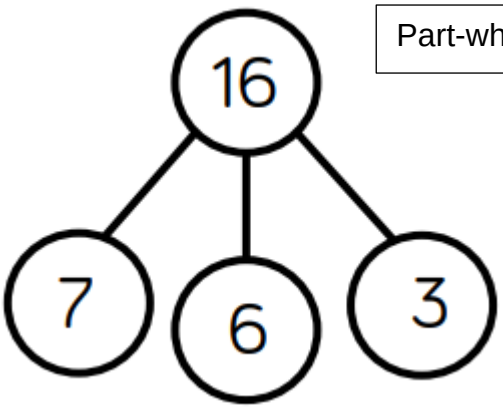


Number line

Add three 1-digit numbers (Year 2)

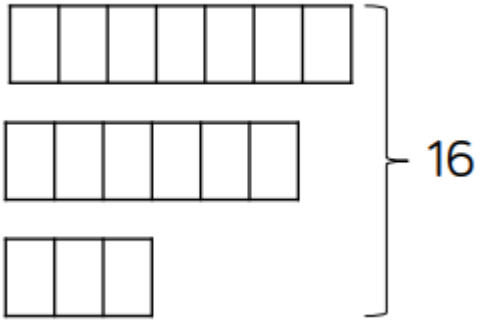
When adding three 1-digit numbers, children should be encouraged to look for number bonds to 10 or doubles to add more efficiently. This also supports their understanding of commutativity.

The following representations may be used:



Part-whole model

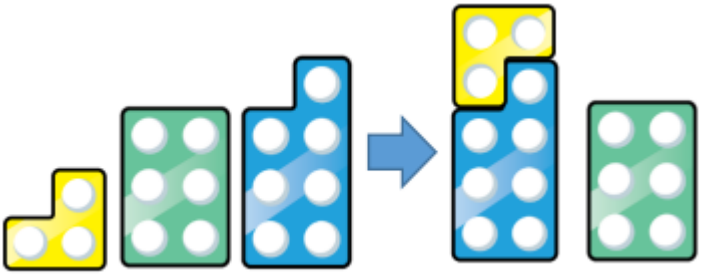
Bar model



$7 + 6 + 3 = 16$

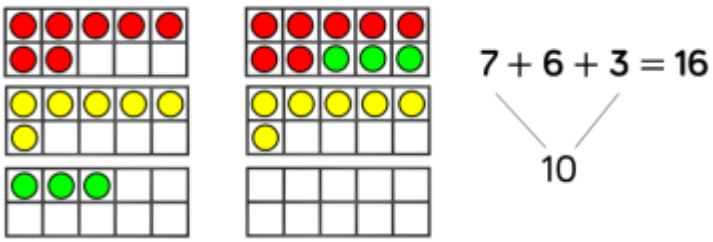
Abstract

Representations that highlight number bonds to 10 are effective when adding three 1-digit numbers:



Numicon

Ten frame



Add 1-digit and 2-digit numbers to 100 (Year 2 and 3)

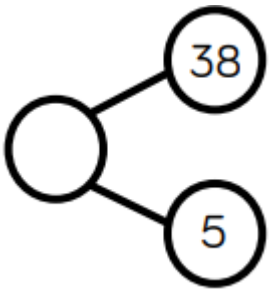
When adding 1-digit to a 2-digit number, children should be encouraged to count on from the larger number.

They should apply their knowledge of number bonds to add more efficiently

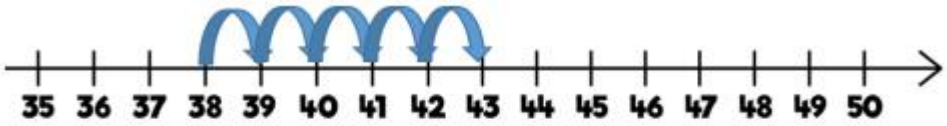
eg. 8 + 5 = 13 so 38 + 5 = 43

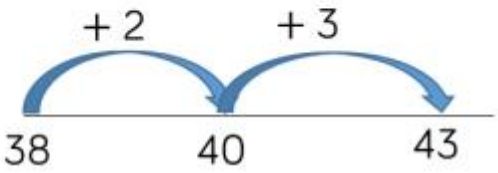
The following representations may be used (hundred squares and straws help children to find the number bond to 10):

Part-whole model

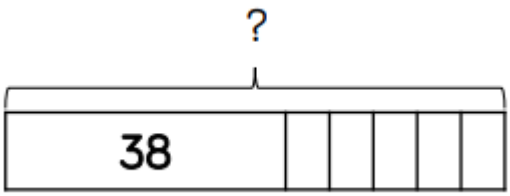


Numberlines



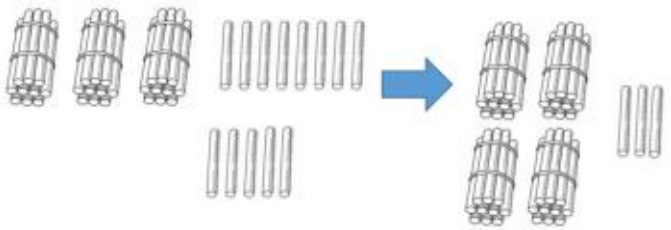


Bar model



$38 + 5 = 43$

Abstract



Straws

Hundred square

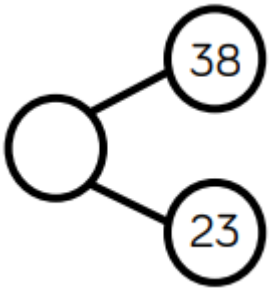
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

Add 2-digit numbers to 100 (Year 2 and 3)

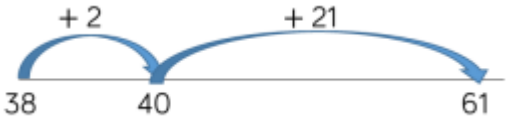
Children can count on to find the total. They should be encouraged to jump to multiples of 10 to be more efficient.

The following representations may be used:

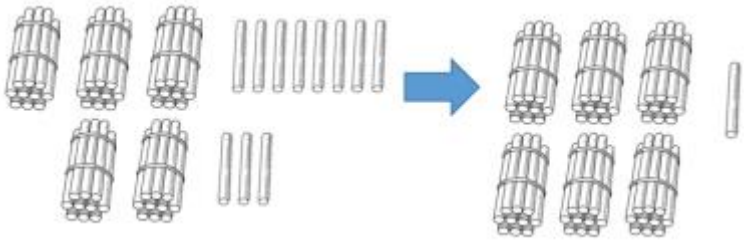
Part-whole model



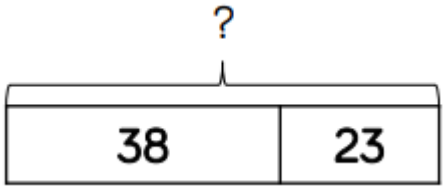
Numberline



Straws



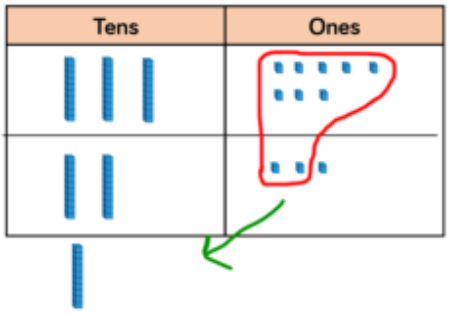
Bar model



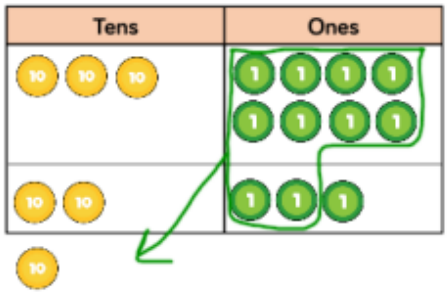
Abstract

$$38 + 23 = 61$$

From year 3, children should be encouraged to use the formal column method, firstly calculating alongside base ten or place value counters:



$$\begin{array}{r} 38 \\ +\ 23 \\ \hline 61 \\ \hline 1 \end{array}$$

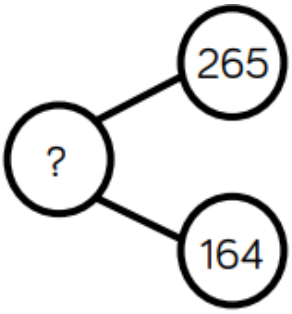


Add numbers with up to 3 digits (year 3)

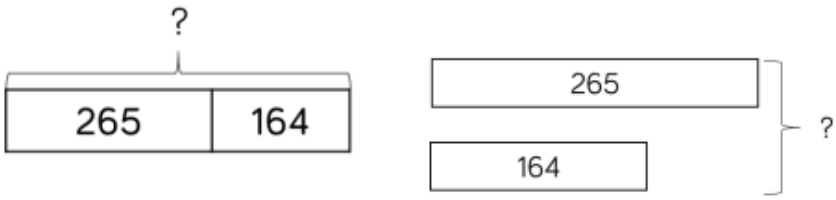
Children should write their calculation alongside any concrete resources so that they can make links to the written column method.

The following representations may be used to support:

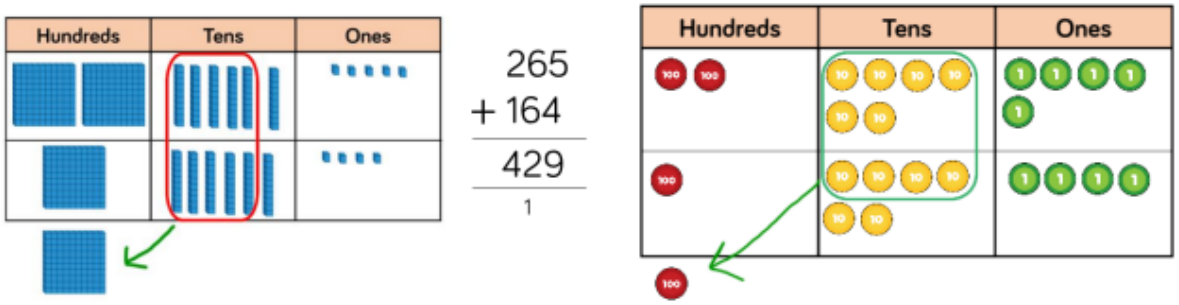
Part-whole model



Bar models



Base ten and place value counters alongside formal column method

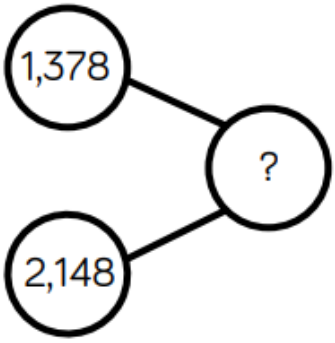


Add numbers with up to 4 digits (Year 4)

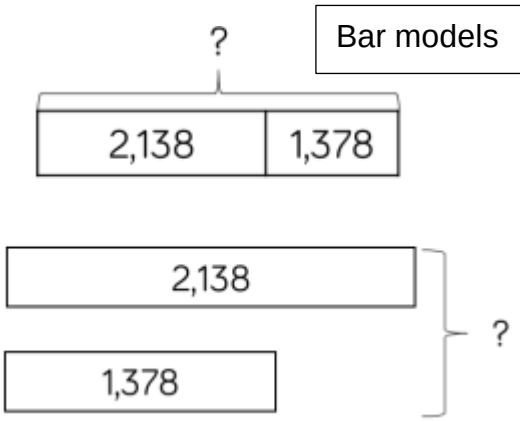
Children should write their calculation alongside any concrete resources so that they can make links to the written column method.

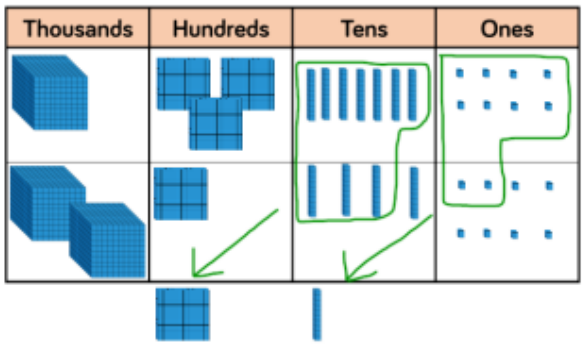
The following representations may be used to support:

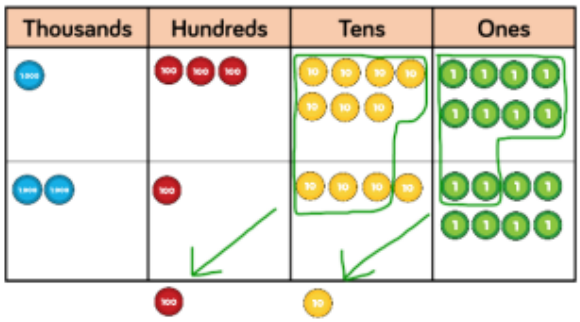
Part-whole model



Bar models







Base ten and place value counters alongside formal column method

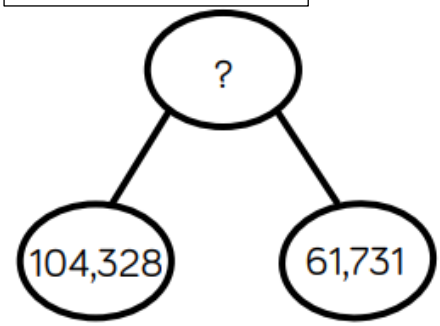
	1	3	7	8
+	2	1	4	8
	3	5	2	6
		1	1	

Add numbers with more than 4 digits (Year 5 and 6)

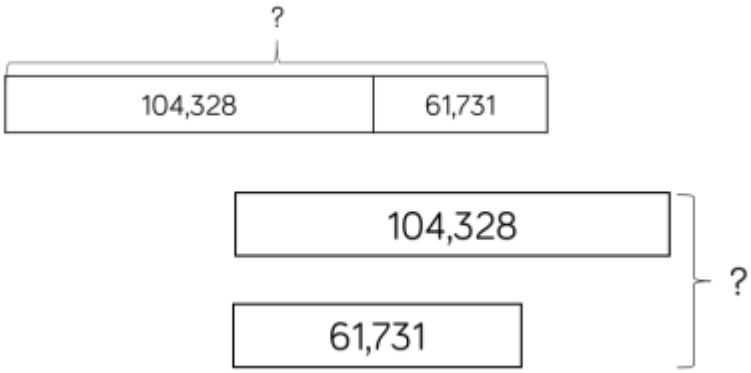
Children should be encouraged to work in the abstract, using the column method to add larger numbers efficiently. However, place value counters on a place value grid may support understanding.

The following representations may be used:

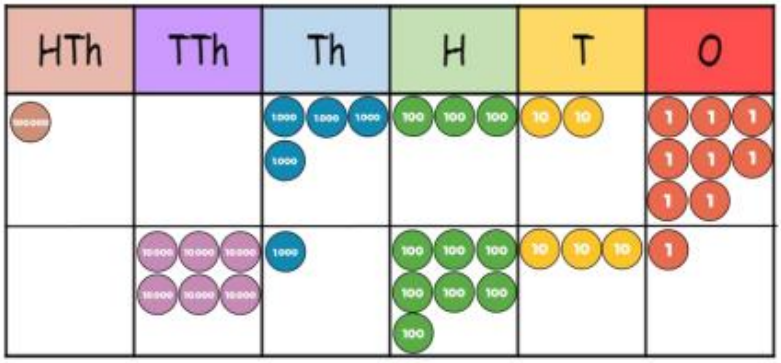
Part-whole model



Bar models



Place value counters on a place value chart alongside formal column method



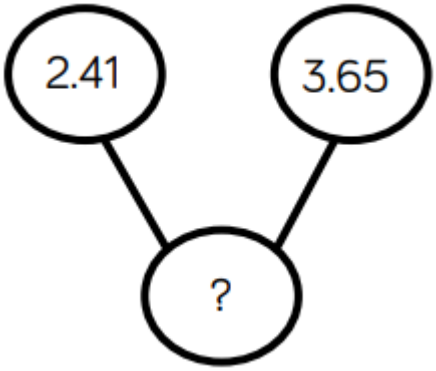
1	0	4	3	2	8
+	6	1	7	3	1
1	6	6	0	5	9
		1			

Add numbers with up to 3 decimal places (Year 5)

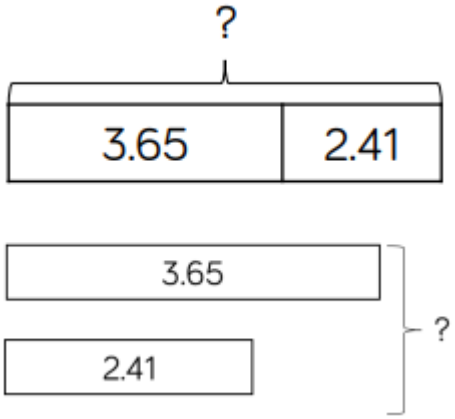
Children should have experience of adding decimals with a variety of decimal places. This should also be put into context when adding money and other measures.

The following representations may be used:

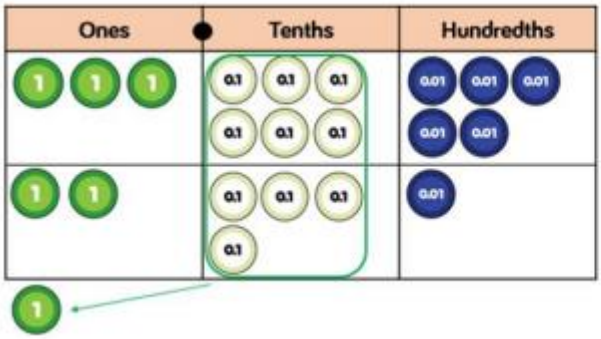
Part-whole model

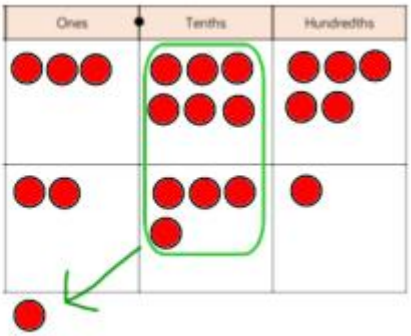


Bar models



Place value counters or plain counters on a place value chart





$$\begin{array}{r} 3.65 \\ +\ 2.41 \\ \hline 6.06 \\ \hline \end{array}$$

1

Abstract

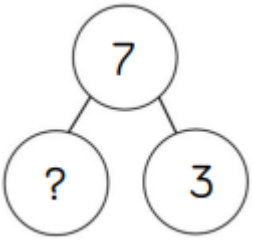
Subtraction

Subtract 1-digit numbers within 10 (Year 1)

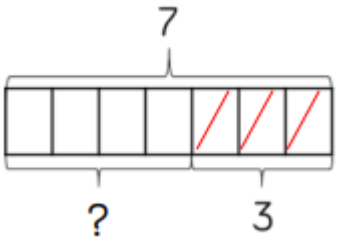
1-digit numbers within 10 can be subtracted using partitioning, reduction and finding the difference.

The following representations support partitioning:

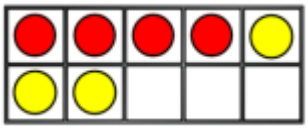
Part-whole model



Bar models

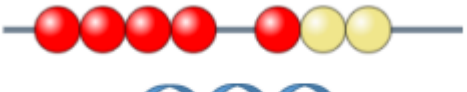


Ten frame

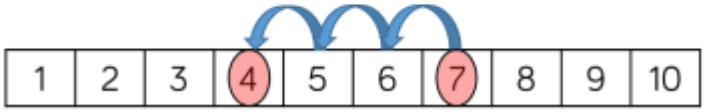


Numicon

The following representations support reduction:

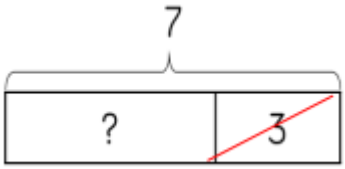


Bead strings

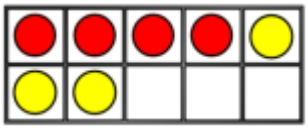


Number tracks

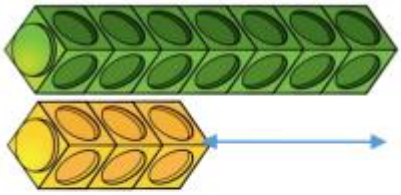
Single bar models



Ten frame



The following representations support finding the difference:



Cubes

Bar models with two bars

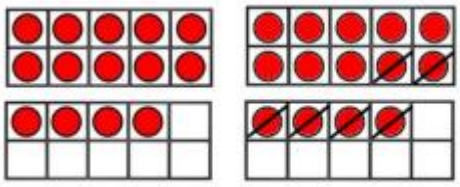
Subtract 1 and 2-digit numbers to 20 (year 1 and 2)

When subtracting 1-digit numbers that cross 10, it is important to highlight the importance of ten 1s equalling one 10.

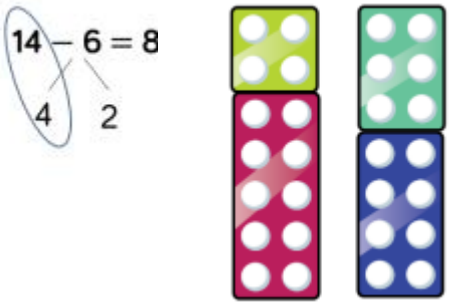
Children should be encouraged to find the number bond to 10 when partitioning the subtracted number.

The following representations are particularly useful for this alongside the abstract:

Ten frames



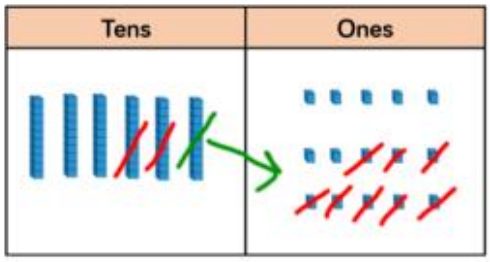
Numicon



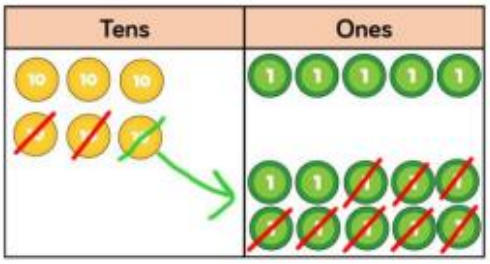
Number lines

Subtract 1 and 2 digit numbers to 100 (year 2)

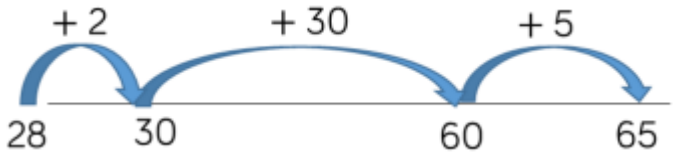
At this stage, children should be encouraged to use the formal column method alongside base ten and place value counters.



$$\begin{array}{r} {}^{5}\not{6}\,{}^{1}\not{5} \\ -\ 2\ 8 \\ \hline 3\ 7 \end{array}$$

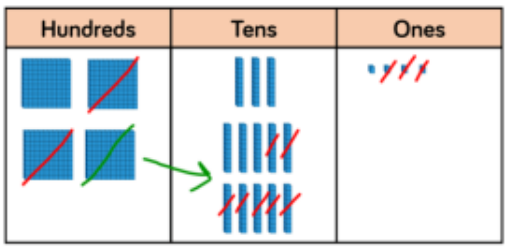


Children can also use a blank number line to count on to find the difference. They should be encouraged to jump to multiples of 10 to work efficiently.

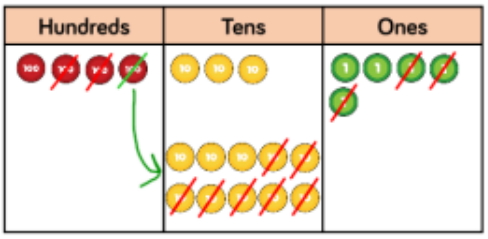


Subtract numbers with up to 3 digits (year 3)

Children should be encouraged to write out any calculations in a formal column method alongside the use of manipulatives so that they can make links between the two.

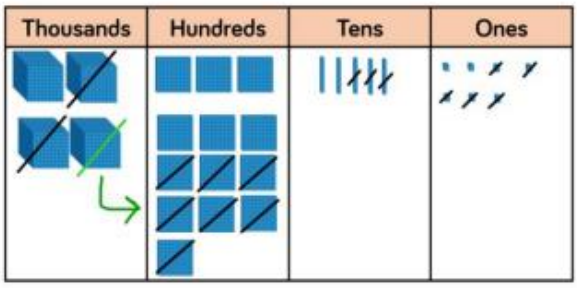


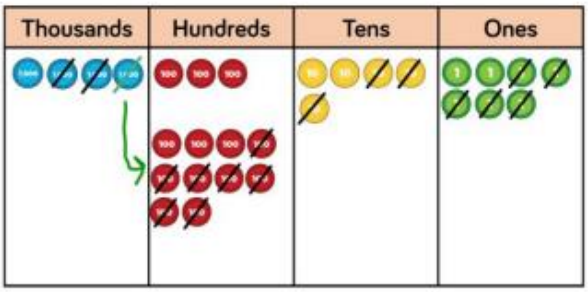
$$\begin{array}{r} {}^{3}\not{4}\,{}^{1}\not{3}\not{5} \\ -\ 2\ 7\ 3 \\ \hline 2\ 6\ 2 \end{array}$$



Subtract numbers with up to 4 digits (year 4)

Children should be encouraged to write out any calculations in a formal column method alongside the use of manipulatives so that they can make links between the two.

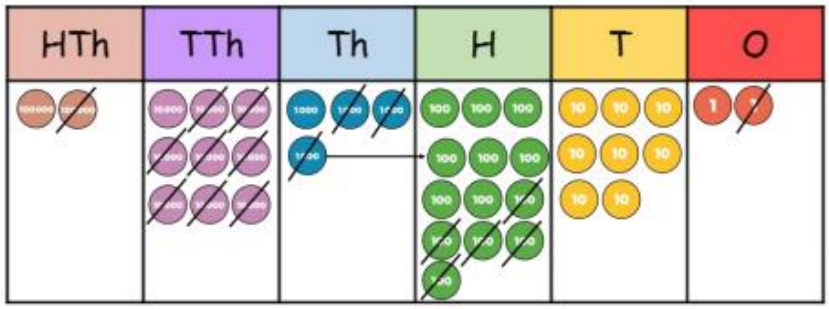




$$\begin{array}{r} {}^{3}\cancel{4}\,{}^{1}357 \\ -\ 2735 \\ \hline 1622 \\ \hline \end{array}$$

Subtract numbers with more than 4 digits (year 5 and 6)

At this stage, children should be encouraged to work in the abstract, using column method to subtract larger numbers efficiently. However, place value counters and place value charts may be used to support learning.



	2	9	$^{3}\cancel{4}$	$^{1}3$	8	2
−	1	8	2	5	0	1
	1	1	1	8	8	1

Subtract with up to 3 decimal places (year 5)

Children should have experience of subtracting decimals with a variety of decimal places. This includes putting into context when subtracting money or other measures.

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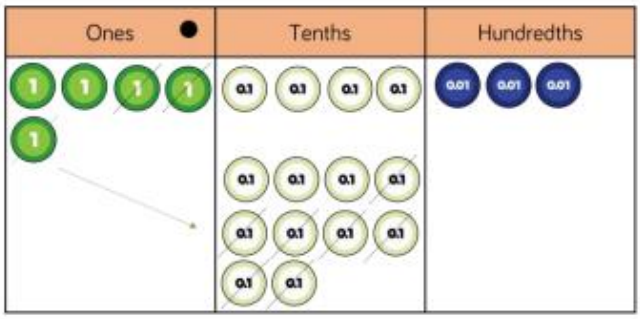
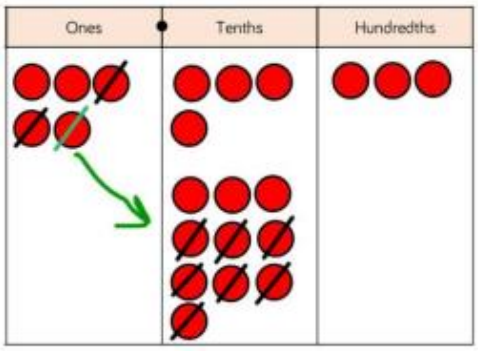
Place value counters or plain counters on a place value chart may support a written column method.





$$\begin{array}{r} {}^{4}\cancel{5}{}^{1}.43 \\ -\ 2.7 \\ \hline 2.73 \end{array}$$

Glossary:

Addend: A number to be added to another

Aggregation: Combining two or more quantities or measures to find a total

Augmentation: Increasing a quantity or measure by another quantity

Commutative: Numbers can be added in any order

Complement: In addition, a number and its complement make a total eg.300 is the complement to 700 to make 1000

Difference: The numerical difference between two numbers is found by comparing the quantity of each group

Exchange: Change a number or expression for another of an equal value

Minuend: A quantity or number from which another is subtracted

Partitioning: Splitting a number into its component parts

Reduction: Subtraction as take away

Subitise: Instantly recognise the number of objects in a small group, without needing to count

Subtrahend: A number to be subtracted from another

Sum: The result of an addition

Total: The aggregate or the sum found by addition