WILLIAM BOOTH
PRIMARY & NURSERY SCHOOL

TRANSFORM
Teaching School Alliance
'Together we Achieve'

Calculation policy for addition

Y1

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Revisit	NC objectives
count up to 20 place numbers in order count objects accurately know one more and one less up to 20 add a 1-digit number to a 1-digit number	Pupils should be taught to: • read, write and interpret mathematical statements involving addition (+) and equals (=) signs • represent and use number bonds and related addition facts within 20 • add one-digit and two-digit numbers to 20, including zero • solve one-step problems that involve addition, using concrete objects and pictorial representations, and missing number problems

Resources

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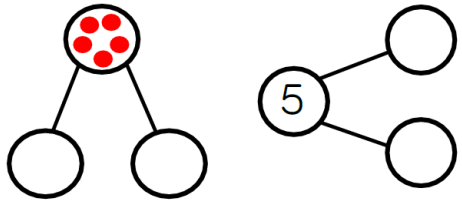
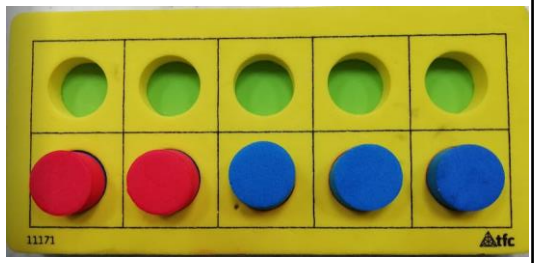
NC Objective: add one-digit and two-digit numbers to 20, including zero	**Small Step:** Combining objects within 10

Vocabulary: add, more, make, sum, total, altogether, one more, two more, ten more… how many more to make… ? how many more is… than…? Plus, how much more

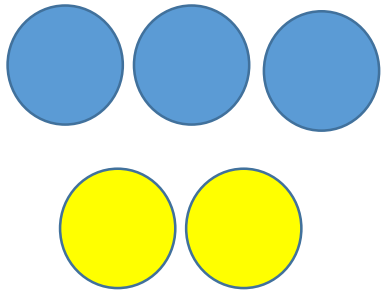
Representations





Abstract

3 + 2 = 5



Counters/cubes/bead string

Misconceptions

Sometimes they are unsure of number order and therefore make mistakes.

Sometimes they count their starting number e.g. when finding the number pair 6 + - = 10 they begin counting with the six and say ‘6,7,8,9,10’ and therefore believe the missing number to be 5

Not being able to ‘hold’ the number that they started with, when adding the second group.

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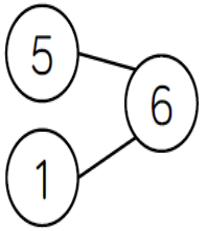
NC Objective: represent and use number bonds and related addition facts within 20	**Small Step:** Fact families for number up to 10

Vocabulary: add, more, and make, sum, total, altogether, one more, two more, ten more… how many more to make… ? how many more is… than…? Plus, how much more



$1 + \square = 6$

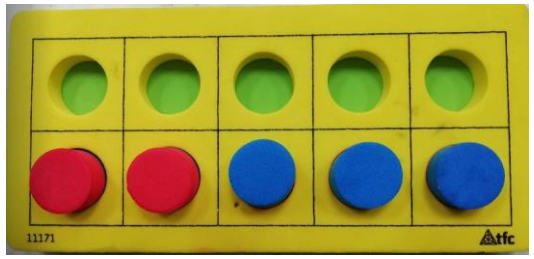
$\square + 1 = 6$

$\square = \square + 1$

$6 = \square + \square$

$\square + \square = 7$ $\quad 7 = \square + \square$

$\square + \square = 7$ $\quad 7 = \square + \square$



$3 + 2 = 5$ $\quad 2 + 3 = 5$ $\quad 5 = 3 + 2$ $\quad 5 = 2 + 3$

Misconceptions

Sometimes they are unsure of number order and therefore make mistakes.

Sometimes they count their starting number e.g. when finding the number pair 6 + - = 10 they begin counting with the six and say '6,7,8,9,10' and therefore believe the missing number to be 5

Not being able to 'hold' the number that they started with, when adding the second group.

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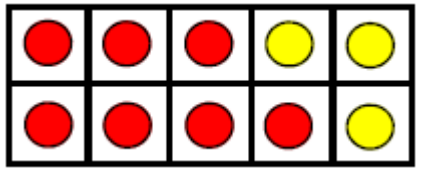
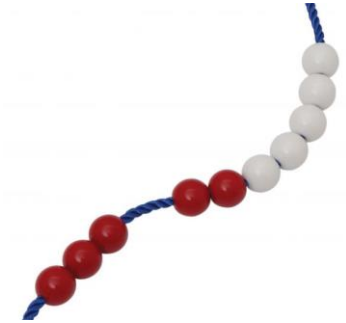
NC Objective: represent and use number bonds and related addition facts within 20	Small Step: Number bonds to 10

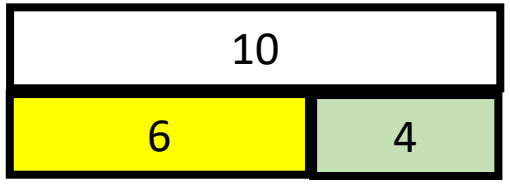
Vocabulary: add, more, and make, sum, total, altogether, one more, two more, ten more… how many more to make… ? how many more is… than…? Plus, how much more



7 + 3 = 10

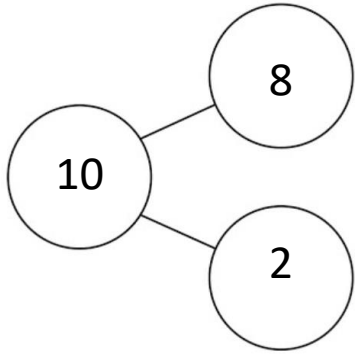


5 + 5 = 10



Abstract

6 + 4 = 10



Misconceptions

Sometimes they are unsure of number order and therefore make mistakes.

Sometimes they count their starting number e.g. when finding the number pair 6 + - = 10 they begin counting with the six and say ‘6,7,8,9,10’ and therefore believe the missing number to be 5.

Not being able to ‘hold’ the number that they started with, when adding the second group.

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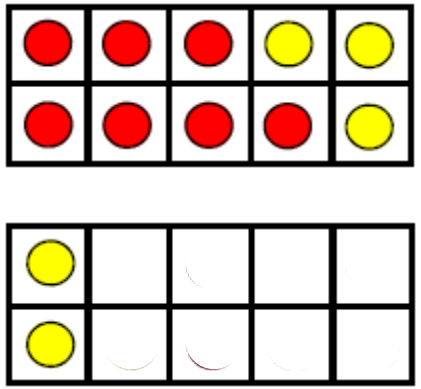
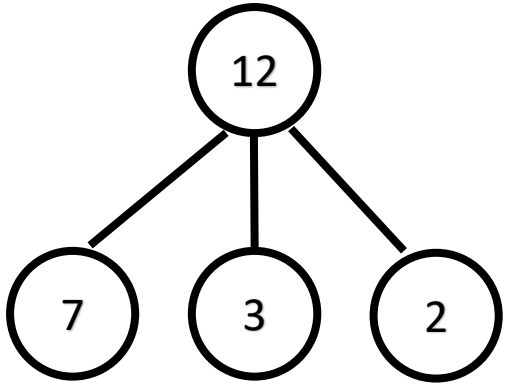
NC Objective: represent and use number bonds and related addition facts within 20

Small Step: Add by making 10

Vocabulary: add, more, and make, sum, total, altogether, one more, two more, ten more… how many more to make… ? how many more is… than…? Plus, how much more

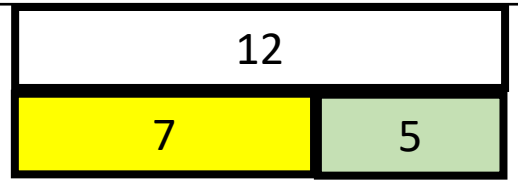


7 + 5 = 12

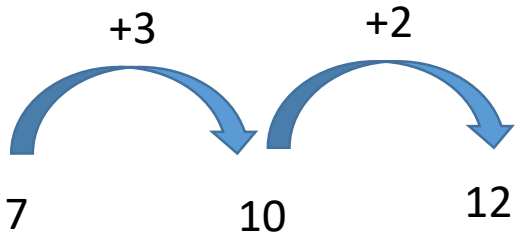


Abstract

7 + 3 + 2 = 12



7 + 5 = 12



Misconceptions

Sometimes they are unsure of number order and therefore make mistakes.
Sometimes they count their starting number e.g. when finding the number pair 6 + - = 10 they begin counting with the six and say ‘6,7,8,9,10’ and therefore believe the missing number to be 5
Not being able to ‘hold’ the number that they started with, when adding the second group.

TRANSFORM
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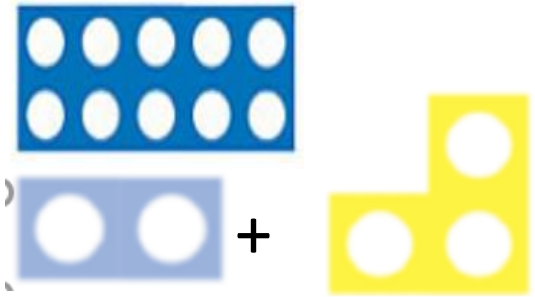
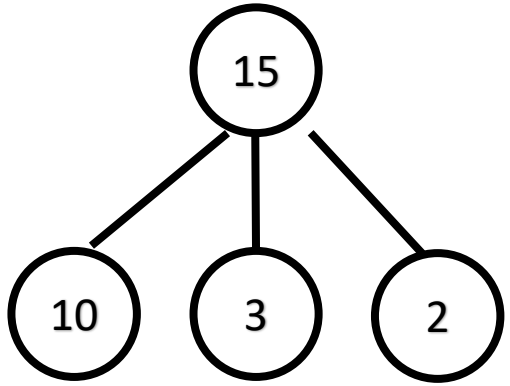
NC Objective: add one-digit and two-digit numbers to 20, including zero	**Small Step:** Combining objects between 10 and 20

Vocabulary: add, more, and make, sum, total, altogether, one more, two more, ten more… how many more to make… ? how many more is… than…? Plus, how much more

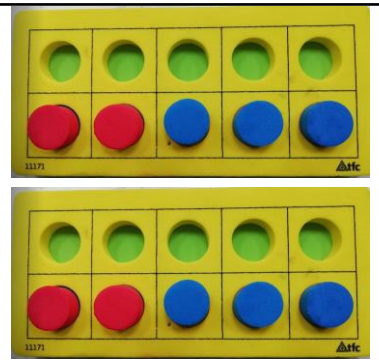
Representations



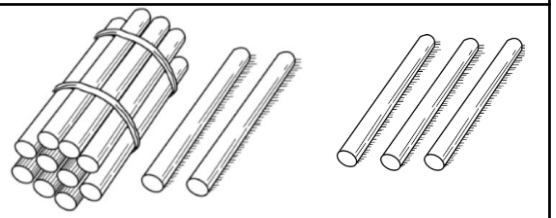


Abstract

10 + 3 + 2 = 15



10 + 5 = 15



12 + 3

Link to 10 + (2+3)

Misconceptions

Sometimes they are unsure of number order and therefore make mistakes.

Sometimes they count their starting number e.g. when finding the number pair 6 + - = 10 they begin counting with the six and say '6,7,8,9,10' and therefore believe the missing number to be 5

Not being able to 'hold' the number that they started with, when adding the second group.

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Y2

TRANSFORM
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Revisit	NC objectives
Represent and use number bonds to 10 and 20 Partition 2-digit numbers Add to next multiple of 10	▪ solve problems with addition and : using concrete objects and pictorial representations, including those involving numbers, quantities and measures applying their increasing knowledge of mental and written methods ▪ recall and use addition facts to 20 fluently, and derive and use related facts up to 100 ▪ add and 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 ▪ show that addition of two numbers can be done in any order (commutative) ▪ recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Resources

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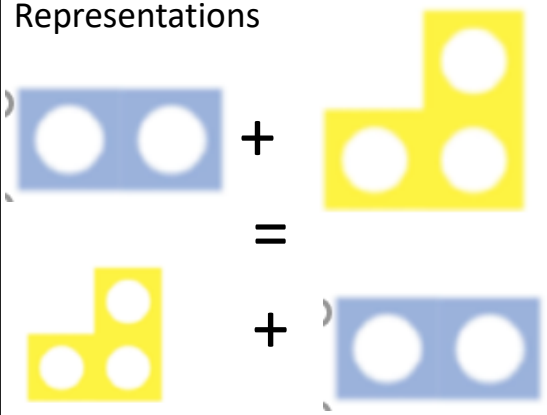
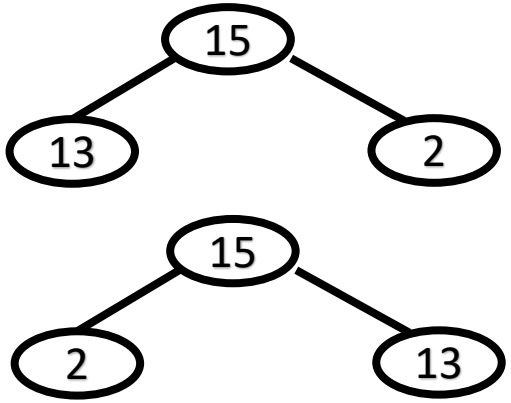
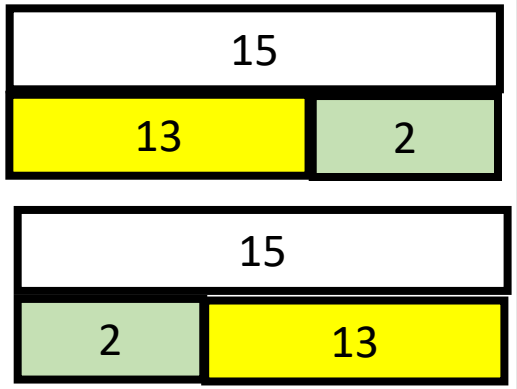
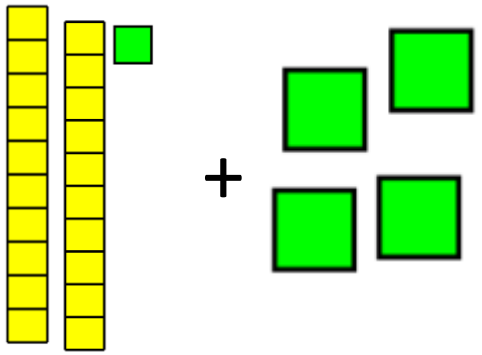
NC Objective: show that addition of two numbers can be done in any order	**Small Step:** Commutative law
Vocabulary: as Year 1 and addition, commutative, order, first	

Representations









21 + 4 = 4 + 21

Misconceptions

Children believe that numbers must be added in the order in which the appear in the question.
Errors from starting with smaller number first.

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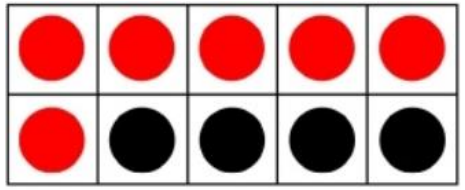
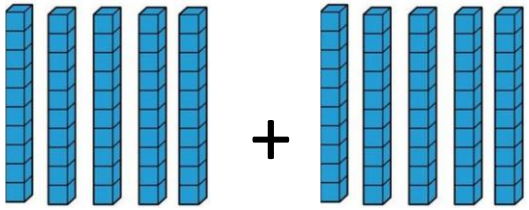
NC Objective: recall and use addition facts to 20 fluently, and derive and use related facts up to 100	Small Step: Number bonds to 100

Vocabulary: as Year 1 and addition, 100 more

Representations

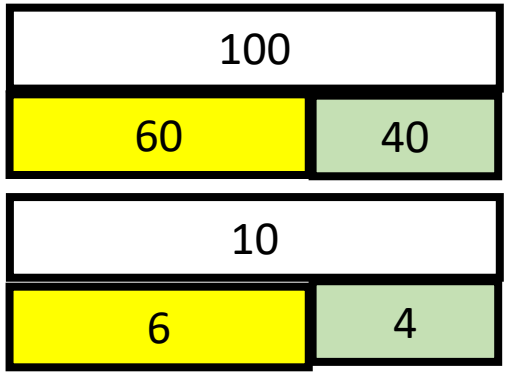


1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100



Abstract

50 + 50 = 100



Misconceptions

Children don't understand the link to place value.

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- NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and ten

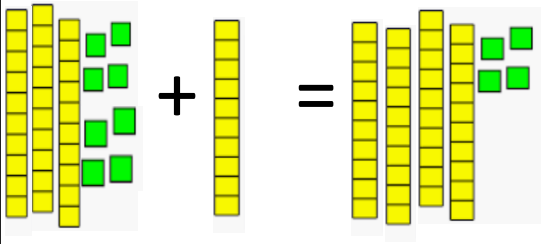
Small Step: Adding 10

Vocabulary: as Year 1 and addition, 100 more

Representations

hundreds	tens	ones
	10 10 10	1 1 1 1
	10 10 10 10	1 1 1 1

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



$$\begin{array}{r} 43 \\ +\ 10 \\ \hline 53 \end{array}$$

Misconceptions

- Children may not be secure with their number bonds to 10
- Children aren't secure in their place value knowledge
- Children count on using the starting number twice, once in their head and once on their fingers.

TRANSFORM
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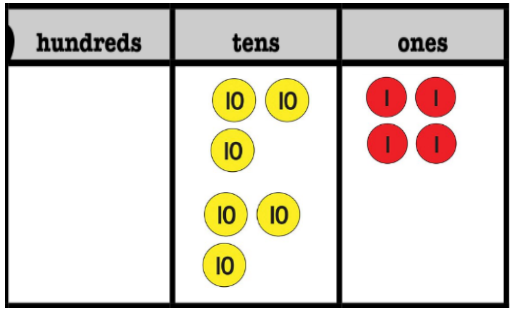
- NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and tens

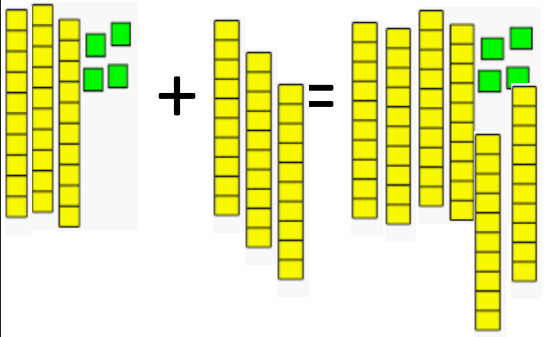
Small Step: Adding multiples of 10

Vocabulary: as Year 1 and addition, 100 more

Representations



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



$$\begin{array}{r} 3\ 4 \\ +\ 3\ 0 \\ \hline 3\ 3 \end{array}$$

Misconceptions

- Children may not be secure with their number bonds to 10
- Children aren't secure in their place value knowledge
- Children count on using the starting number twice, once in their head and once on their fingers.

TRANSFORM
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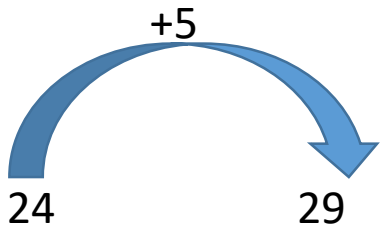
'Together we Achieve'

- NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and ones

Small Step: adding 1s no exchanging

Vocabulary: as Year 1 and addition, 100 more

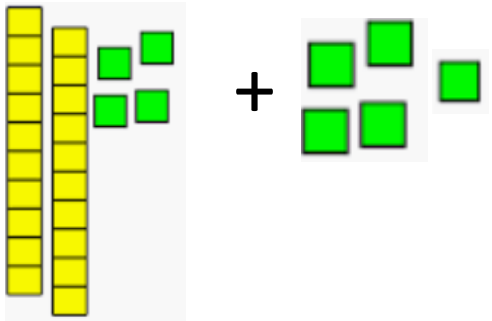
Representations

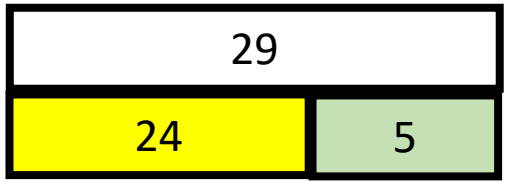


Making link between

4 + 5 and 10 + 5

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





	T	O
	2	4
+		5
	2	9

Misconceptions

- Children count on using the starting number twice, once in their head and once on their fingers.
- Children aren't secure in their place value knowledge

TRANSFORM
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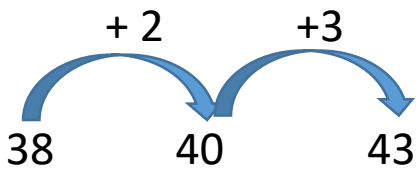
'Together we Achieve'

- NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including a two-digit number and ones

Small Step: adding 1s exchanging

Vocabulary: as Year 1 and addition, 100 more

Representations



1	2	3	4	5	6	7	8	9	10
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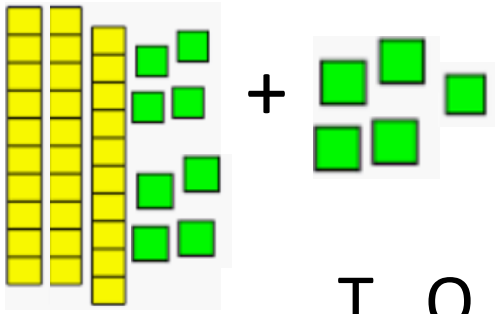
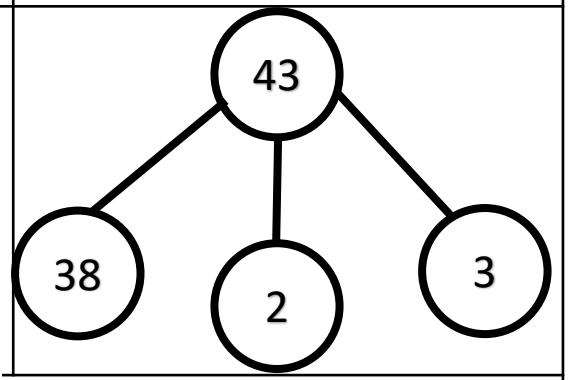
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100





	T	O
	3	8
+		5
	4	3
	1	

Misconceptions

- Children may not be secure with their number bonds to 10
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TRANSFORM
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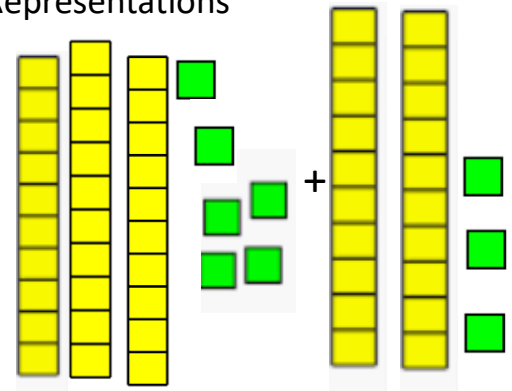
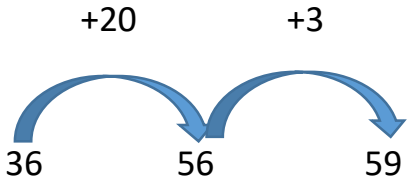
▪ NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including two two-digit numbers	Small Step: Adding TO and TO with no exchanging

Vocabulary: as Year 1 and addition, 100 more

Representations



Both physical and drawn



$$\begin{array}{r} 3\ 6 \\ +\ 2\ 3 \\ \hline 9\ (6+3) \\ 5\ 0\ (30+20) \\ \hline 5\ 9 \end{array}$$

$$\begin{array}{r} 3\ 6 \\ +\ 2\ 3 \\ \hline 5\ 9 \end{array}$$

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TRANSFORM
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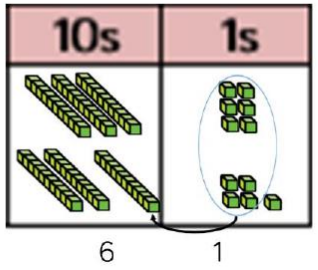
- NC Objective: add and numbers using concrete objects, pictorial representations, and mentally, including two two-digit numbers

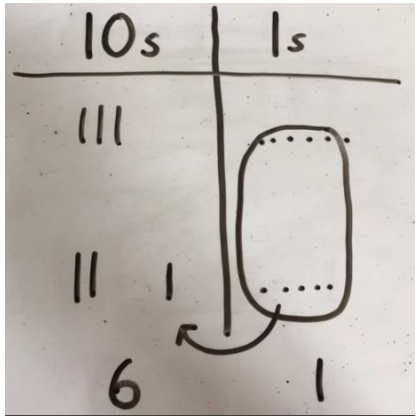
Small Step: Adding TO and TO with exchanging

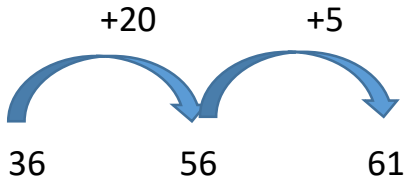
Vocabulary: as Year 1 and addition, 100 more

Representations

TO + TO using base 10. Continue to develop understanding of partitioning and place value.
36 + 25








```
  3 6
+ 2 5
  1 1 (6+5)
  5 0 (30+20)
  6 1
```

```
  3 6
+ 2 5
  6 1
  1
```

Misconceptions

- Children may not be secure with their number bonds to 10
- Children aren't secure in their place value knowledge
- Children count on using the starting number twice, once in their head and once on their fingers.

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Y3

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Revisit	NC objectives
Number bonds to 10 and 20 Partition 2-digit numbers Adding to next multiple of 10 Adding TO and TO using a range of representations	add numbers mentally, including: a three-digit number and ones a three-digit number and tens a three-digit number and hundreds add numbers with up to three 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 facts, place value, and more complex addition.

Resources

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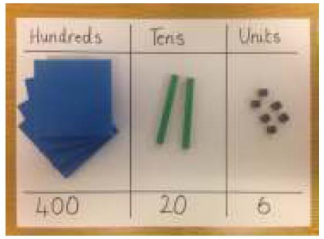
NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding 1, 10 and 100

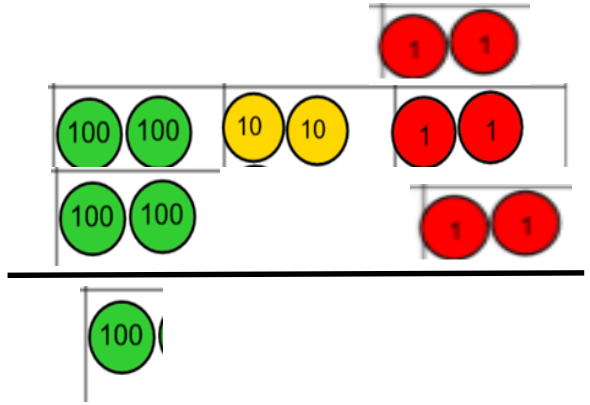
Vocabulary: as year 2

Representations



426

Children to partition numbers to add 1, 10 and 100 mentally



$$\begin{array}{r} 426 \\ +100 \\ \hline 526 \end{array}$$

H	T	O

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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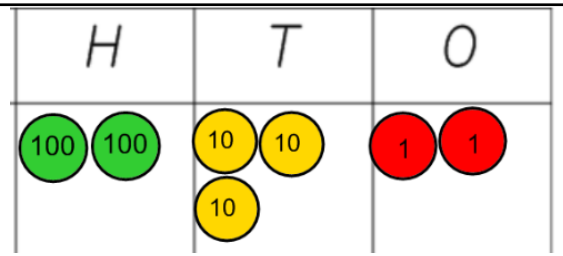
NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding multiples of 1, 10 and 100

Vocabulary: as year 2

Representations

H	T	O
2	3	2
4	2	6



$$\begin{array}{r} 232 \\ +426 \\ \hline 658 \end{array}$$

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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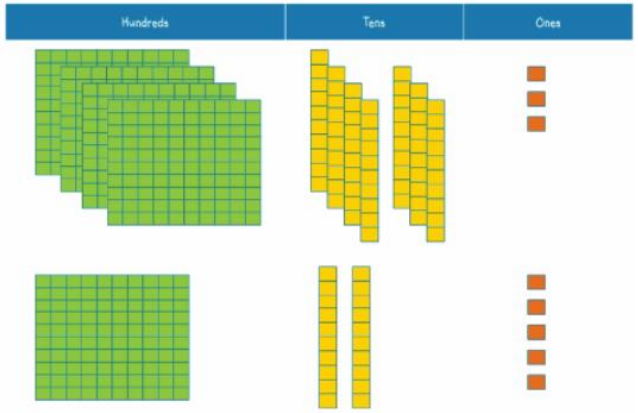
NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding HTO and TO no exchanging

Vocabulary: as year 2



Using Base Ten or place value both practically and as pictures.

473 + 125

3 + 5 = 8

70 + 20 = 90

400 = 400

498

$$\begin{array}{r} 473 \\ +\ 25 \\ \hline 498 \end{array}$$

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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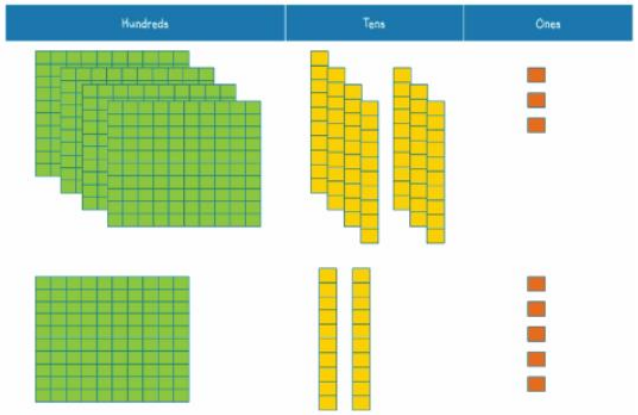
▪ NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding HTO and HTO no exchanging

Vocabulary: as year 2



Using Base Ten or place value both practically and as pictures.

473 + 125

3 + 5 = 8

70 + 20 = 90

400 + 100 = 500

598

473

+125

598

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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- NC Objective: add numbers with up to three digits, using formal written methods of columnar addition

Small Step: Adding HTO and TO one exchange

Vocabulary: as year 2

538 + 247

8 + 7 = 15

30 + 40 = 70

500 = 500

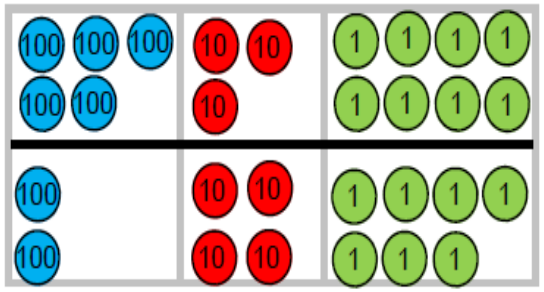
585

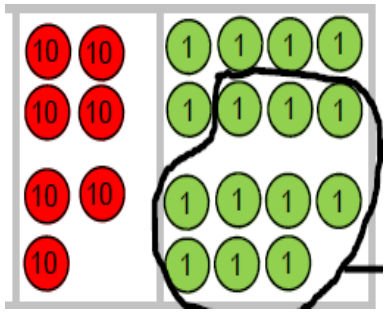
538

+ 47

585

1





With place value or base ten both practically and in pictures

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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- NC Objective: add numbers with up to three digits, using formal written methods of columnar addition

Small Step: Adding HTO and HTO one exchange

Vocabulary: as year 2

538 + 247

8 + 7 = 15

30 + 40 = 70

500 + 200 = 700

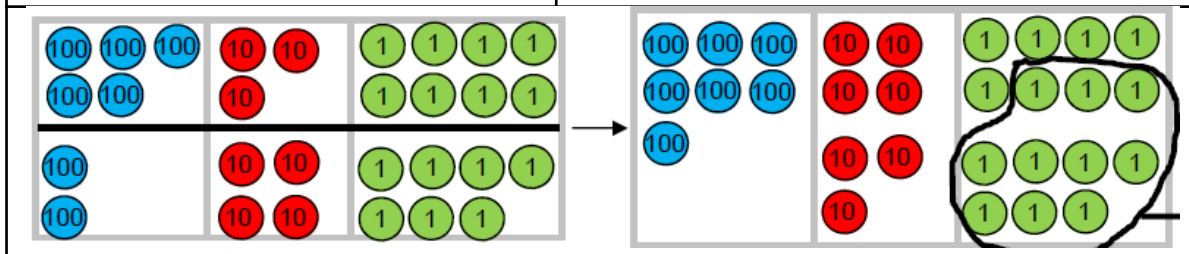
785

538

+247

785

1



With both place value and base ten

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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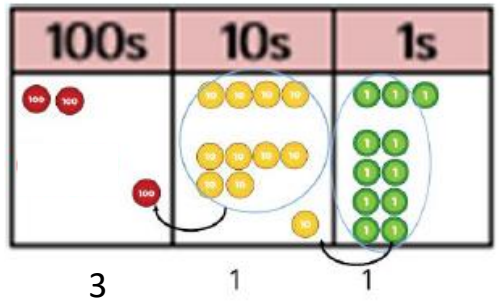
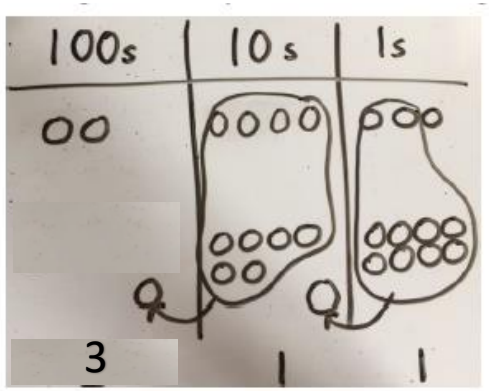
NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding HTO and TO two exchanges

Vocabulary: as year 2





$$\begin{array}{r} 243 \\ +\ 68 \\ \hline 311 \\ 1\ 1 \end{array}$$

$$243 + 68$$

$$3 + 8 = 11$$

$$40 + 60 = 100$$

$$200 \qquad 200$$

$$311$$

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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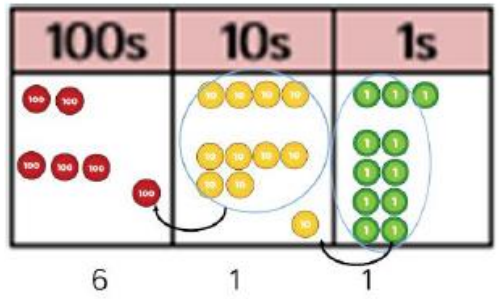
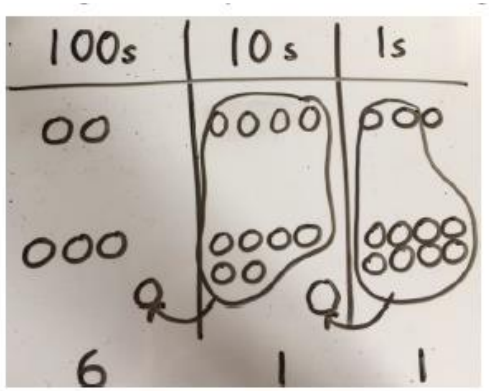
NC Objective: add numbers with up to three digits, using formal written methods of columnar addition	Small Step: Adding HTO and HTO two exchanges

Vocabulary:





$$\begin{array}{r} 243 \\ +368 \\ \hline 611 \\ \hline 1\ 1 \end{array}$$

$$\begin{aligned} 243 + 268 & \\ 3 + 8 &= 11 \\ 40 + 60 &= 100 \\ 200 + 300 &= \underline{500} \\ & \underline{611} \end{aligned}$$

Misconceptions

- Children do not understand place value
- Can not partition the numbers

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Y4-6

Year 4 should follow Year 3 sequence starting at HTO + HTO before progressing.

Children in Year 5 and 6 should continue to develop their mental and written calculation methods for addition. They should progress to larger numbers and continue calculating with decimals, including those with different numbers of decimal places.

Please see the Year 4 (or earlier) calculation policy for more information about the written strategies for subtraction they should use.

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