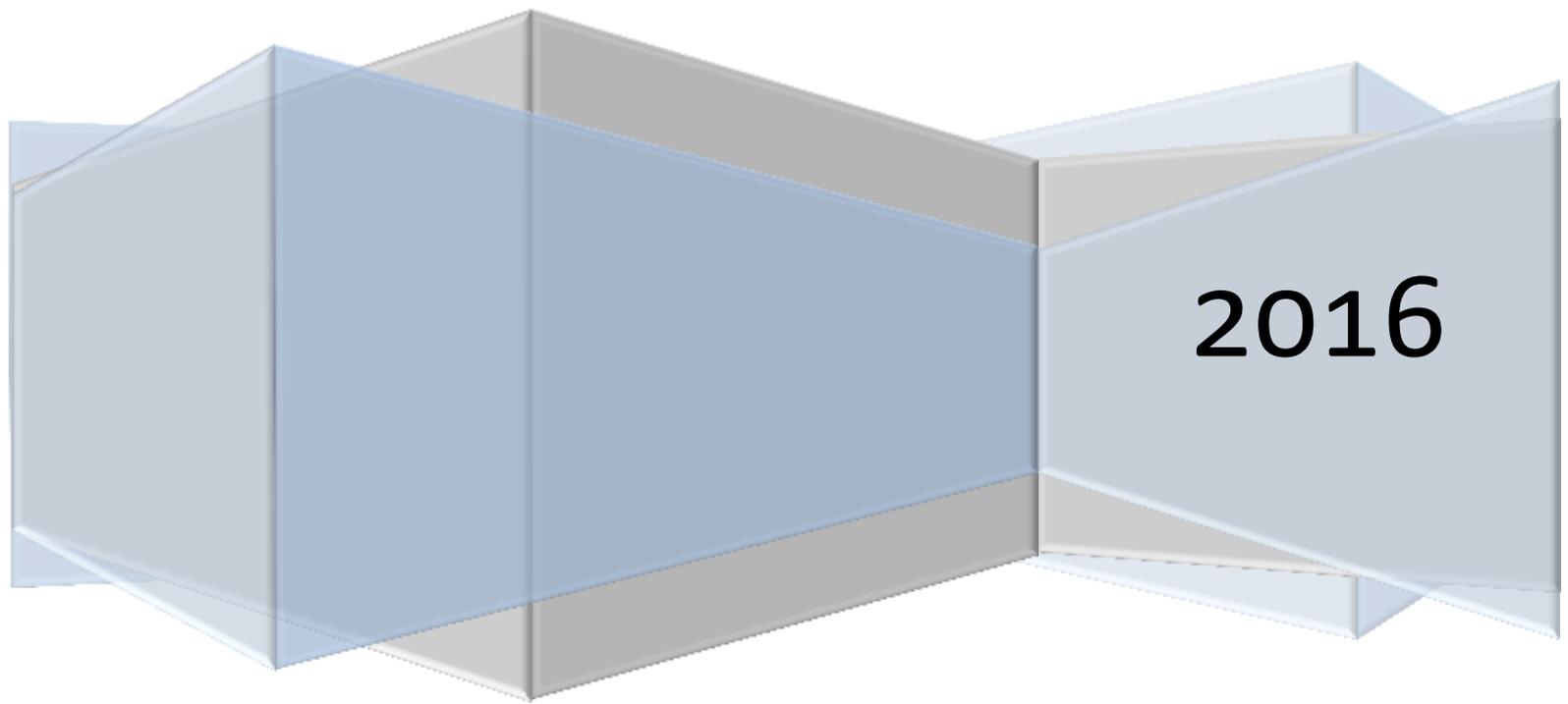


Whimble Primary School

Maths Calculation Policy

Addition

Carole Shilston



2016

Stages in Addition

Early Stages (EYFS)

Children will engage in a wide variety of songs and rhymes, games and activities. They will begin to relate addition to **combining two groups** of objects, first by **counting all** and then by **counting on** from the largest number.

They will find one more than a given number.

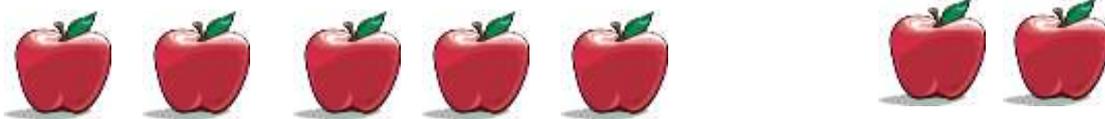
In practical activities and through discussion children will begin to use the vocabulary involved in addition.

Aggregation structure

A situation in which two (or more) **quantities are combined** into a single quantity; the operation of addition is used to determine the total.

For example:

❖ Using objects:

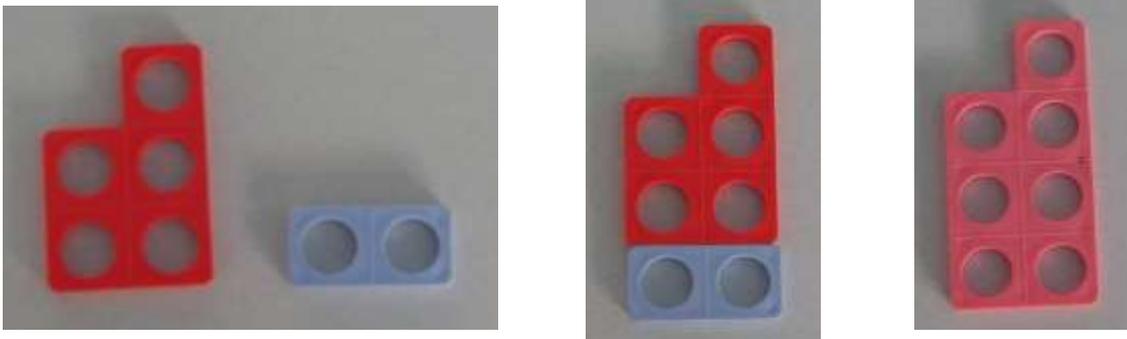


'You have five apples and I have two apples. How many apples altogether?'



'You have five pennies and I have two pennies. How many pennies altogether?'

❖ Using images of number: for example Numicon



Lots of work with objects and images to ensure children get to the point where they understand that 5 and 2 always makes 7.

Stages in Addition

Life contexts: (not just Reception examples)

There are 8 boys and 7 girls in the class. How many in the class altogether?

I buy a pen for 26p and a notebook for 47p. What is the total cost?

It is 36 miles to Cardiff and a further 25 miles to Swansea. How far does the car travel?

Augmentation structure (D Laycock term)

Where a quantity is increased by some amount; often referred to as **counting on** or increasing.

❖ Using a number track

For example:

I start with 11 pencils and I am given 3 more.



❖ Using two dice

One die with numerals and the other with dots so counting on occurs from the number die.



Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

Early Years Foundation Stage - Early Learning Goal:

- Children count reliably with numbers from one to 20, place them in order and say which number is one more or one less than a given number.
- Using quantities and objects, they add and subtract two single-digit numbers and count on or back to find the answer.
- They solve problems, including doubling, halving and sharing.

Key skills for addition at Reception:

- Say a number one more than a number to 20.
- Use quantities or objects to add to single digit numbers.
- Solve problems including doubling.

Stages in Addition

Year One

Children will have access to a wide range of counting equipment, everyday objects, number tracks and number lines, and be shown numbers in different contexts (including pictorial representations).

A move towards the 'Augmentation structure'; where a quantity is increased by some amount, often referred to as **counting on** or increasing.

Children move on from using a number track, to a number line to support their own calculations; continuing to develop counting on mentally.

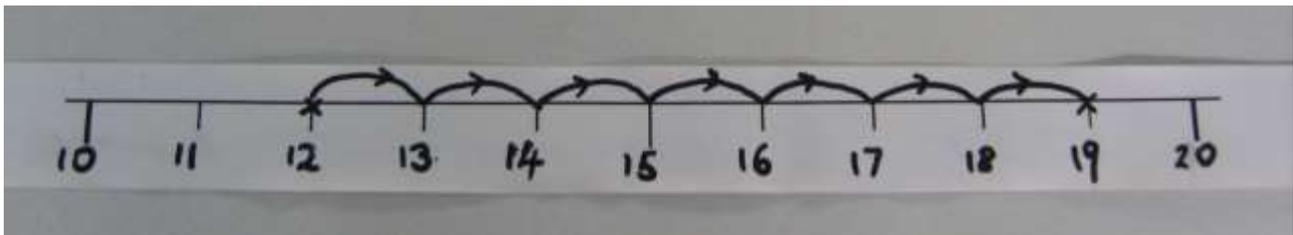
Counting on

For example: $12 + 7$

In your head:

Hold up 7 fingers, tap your head saying 12 then count on using your fingers for support; say "12(Head tap), 13, 14, 15, 16, 17, 18, 19".

❖ Using a number line

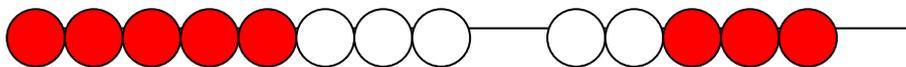


Ensure children are confident with using a marked number line before moving on to an empty number line (see year two guidance).

❖ Using a bead bar or bead strings

Bead strings or bead bars can be used to illustrate addition including bridging through ten by counting on 2 then counting on 3.

$$8 + 5 =$$



❖ Using place value

1	2	3	4	5	6	7	8
11	12	13	14	15	16	17	18
21	22	23	24	25	26	27	
31	32	33	34	35	36	37	

Counting on in tens, e.g.
 $23 + 10 = 33$

Children use and understand the layout of a hundred square in order to add 10 more.

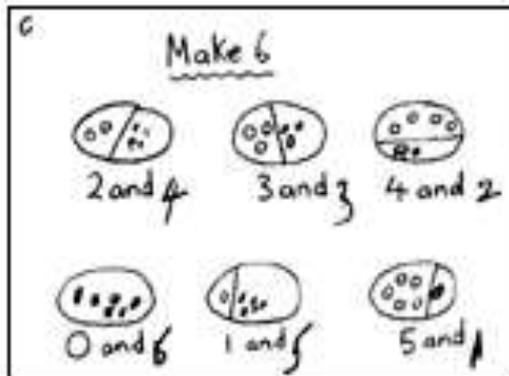
Stages in Addition

Using number facts

Objects and images are manipulated to understand the differing combinations to make a given total before the introduction of formal notation. Developing instant recall alongside conceptual understanding of number bonds to 10 is important. This is supported by the use of many different images.

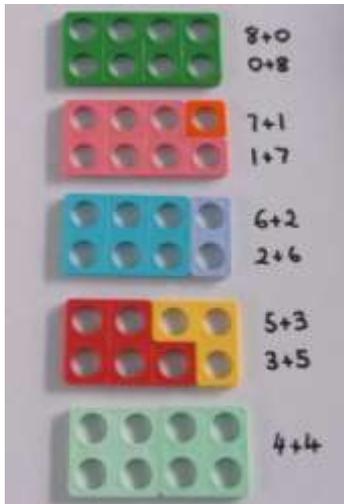
These bonds are often referred to as the 'story' of 4,5,6,7,8,9.

❖ Using 6 counters

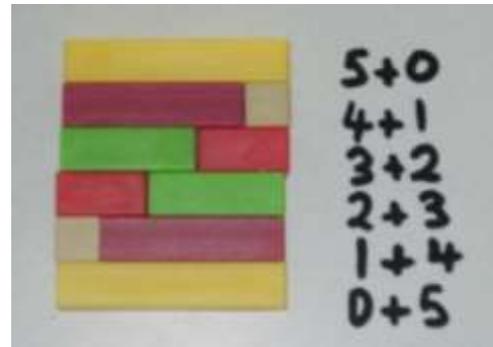


❖ Using other apparatus

Numicon



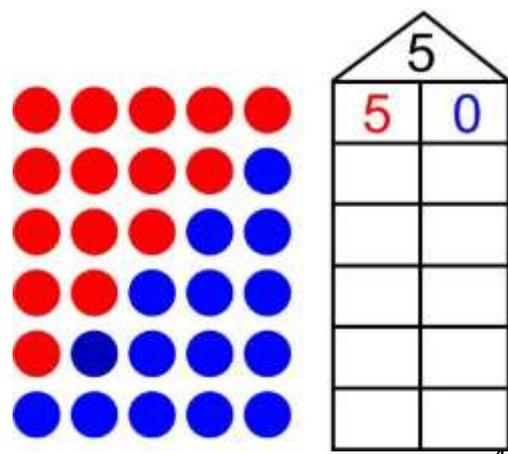
Cuisinaire



Ensure facts are written with the total at either end,

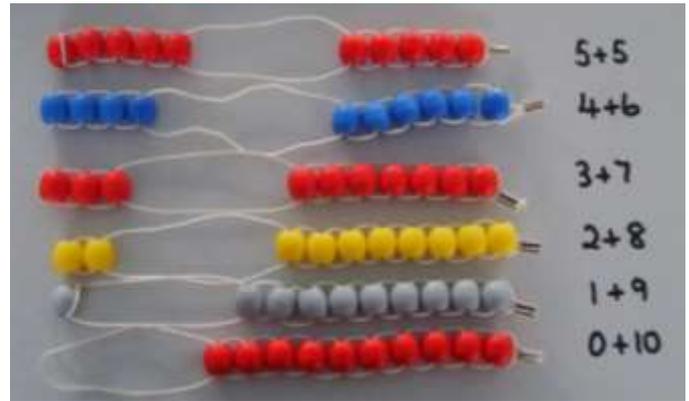
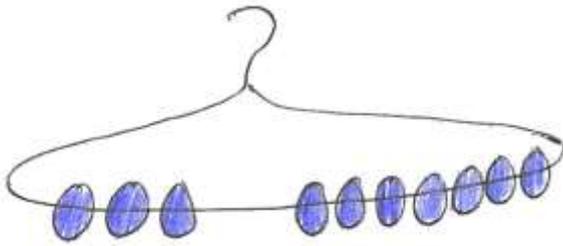
e.g. $4 + 1 = 5$ $5 = 4 + 1$
 $1 + 4 = 5$ $5 = 1 + 4$

Images need to lend themselves to see the pattern and working systematically to enable connections to be made from one number fact to another.

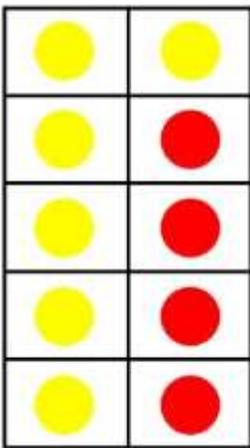


Stages in Addition

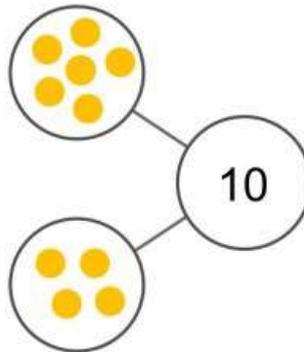
Number bonds to 10



Tens Frame



Part Whole Model



Bar Model

10	
6	4

$$6 + 4 = 10$$

$$4 + 6 = 10$$

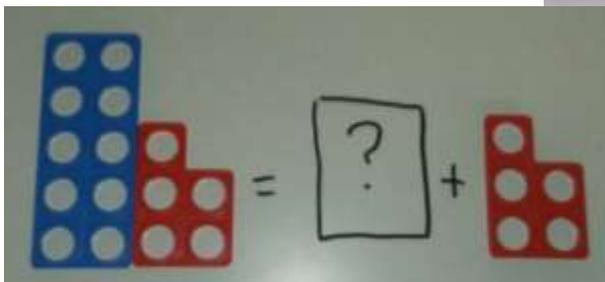
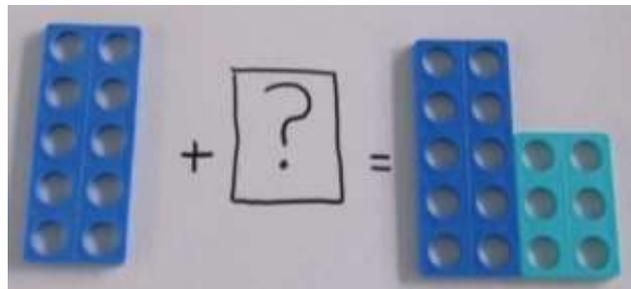
$$10 - 6 = 4$$

$$10 - 4 = 6$$

Connections between these models should be made, so that children understand the same mathematics is represented in different ways. Asking the question "What is the same what's different?" has the potential for children to draw out the connections.

Solve missing number problems/empty box problems

$$\text{eg } 10 + \square = 16$$



$$\text{Or } 15 = \square + 5$$

Stages in Addition

Empty box problems are a powerful way to help children develop a strong sense of number through intelligent practice. They provide the opportunity for reasoning and finding easy ways to calculate. They enable children to practise procedures, whilst at the same time thinking about conceptual connections.

A sequence of examples such as:

$$3 + \square = 8$$

$$3 + \square = 9$$

$$3 + \square = 10$$

$$3 + \square = 11$$

helps children develop their understanding that the = symbol is an assertion of equivalence, and invites children to spot the pattern and use this to work out the answers.

Develop children's understanding of the = symbol

The symbol = is an assertion of equivalence.

If we write: $3 + 4 = 6 + 1$

then we are saying that what is on the left of the = symbol is necessarily equivalent to what is on the right of the symbol.

But this is often interpreted = as being simply an instruction to evaluate a calculation, as a result of always seeing it used thus: $3 + 4 =$ or $16 - 9 =$

If children only think of = as meaning "work out the answer to this calculation" then they are likely to get confused by empty box questions such as: $3 + \square = 8$

One way to model equivalence such as $2 + 3 = 5$ is to use balance scales.

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line

National Curriculum 2014 statements:

- Read, write and interpret mathematical statements involving addition (+), subtraction (-) and equals (=) signs.
- Represent and use number bonds and related subtraction facts within 20.
- Add and subtract one-digit and two-digit numbers to 20, including zero.
- Solve one-step problems that involve addition and subtraction, using concrete objects and pictorial representations, and missing number problems such as $7 = \square + 3$.

Key skills for addition at Year 1:

- Read and write numbers to 100 in numerals, including 1 to 20 in words.
- Recall bonds to 10 and 20, and addition facts within 20.
- Count to and across 100.
- Count in multiples of 1, 2, 5 and 10.
- Solve simple 1-step problems involving addition, using objects, number lines and pictorial representations.

Stages in Addition

Year Two

Children will begin to use 'empty number lines' themselves starting with the larger number and counting on. They will also use a wider range of equipment (models and images) to develop their mathematical understanding of number and addition.

Counting on

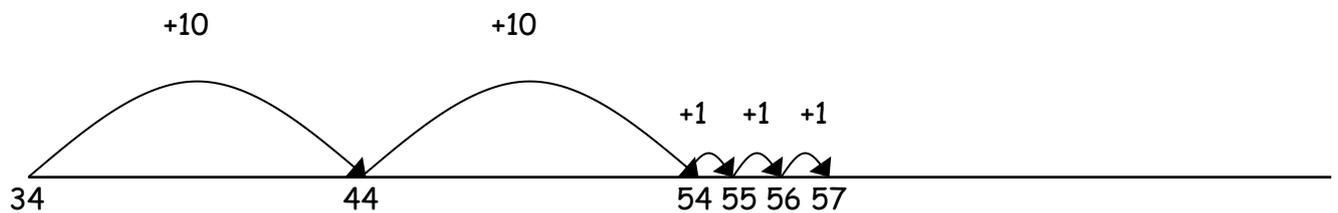
First counting on in tens and ones: $34 + 23 = 57$

In your head:

Count on in tens first; 34, 44, 54 and then ones 55, 56, 57.

❖ Using an empty number line

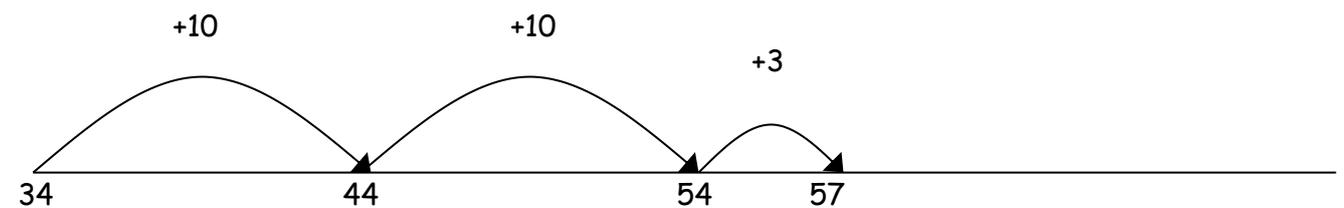
$$34 + 23 = 57$$



❖ Using an empty number line and number facts

Then helping children to become more efficient by adding the units in one jump (by using the known fact $4 + 3 = 7$).

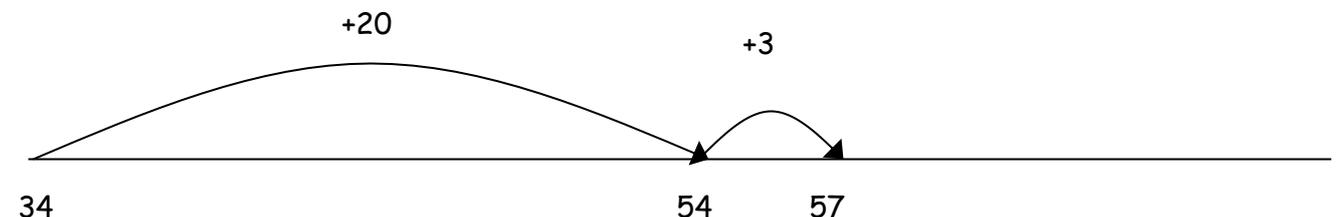
$$34 + 23 = 57$$



❖ Using an empty number line and place value

Followed by adding the tens in one jump and the units in one jump.

$$34 + 23 = 57$$



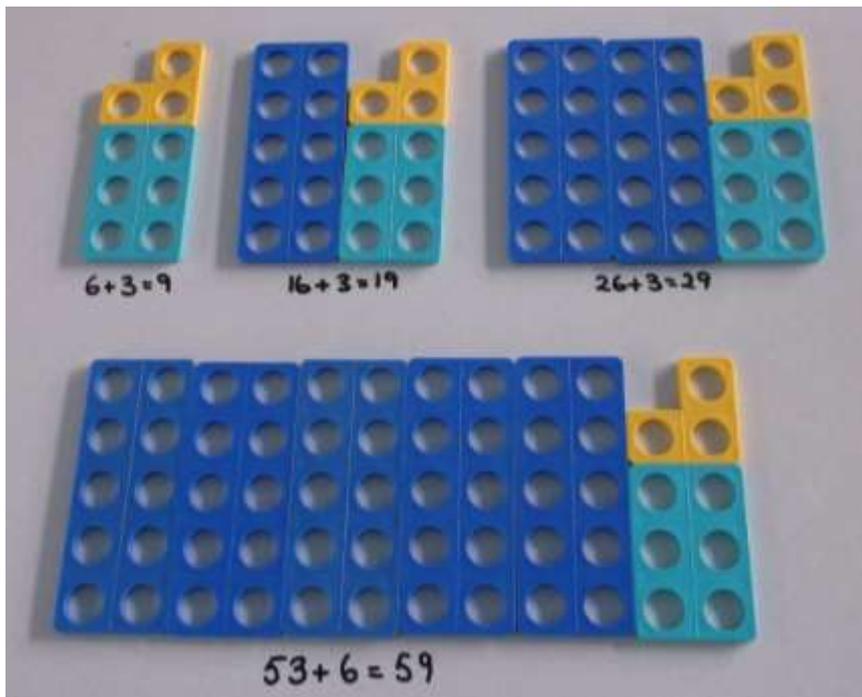
Stages in Addition

Using number facts

❖ Know pairs of numbers which make the numbers up to and including 20, e.g. 12 = 11 and 1, 10 and 2, 9 and 3, 8 and 4, 7 and 5, 6 and 6. Number bonds to 20 are best learnt by spending a short time every day in order to be fluent.

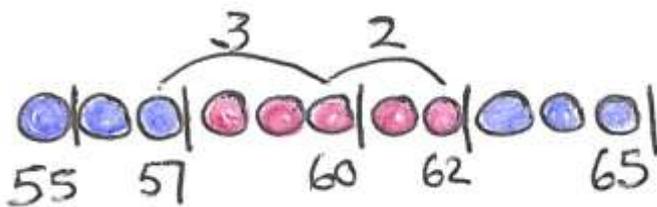
❖ Patterns of known facts,

e.g. $6 + 3 = 9$, so we know $16 + 3 = 19$, $26 + 3 = 29$, $36 + 3 = 39$, $66 + 3 = 69$, $53 + 6 = 59$



❖ Bridging ten, using a bead bar or bead strings

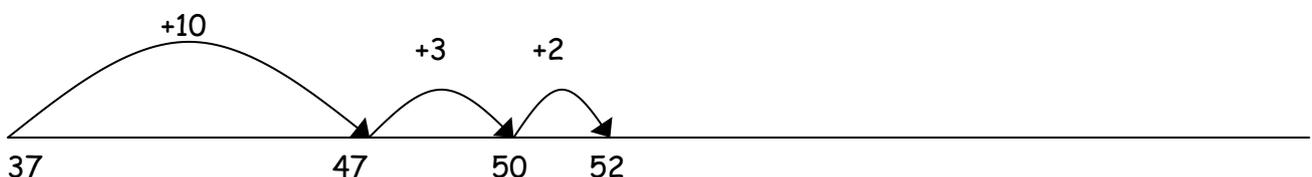
e.g. $57 + 5 = 62$ as 57 add 3 then add 2 more



❖ Bridging ten, using an empty number line

Bridging through ten can help children become more efficient.

$$37 + 15 = 52$$

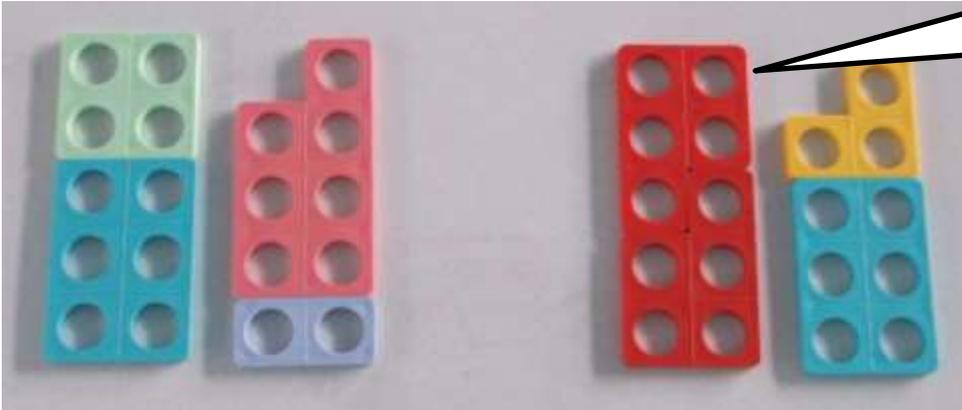


Stages in Addition

- ❖ Adding three or more single-digit numbers, spotting bonds to 10 or doubles.

e.g. $6 + 7 + 4 + 2$ as $10 + 7 + 2 = 19$
 or $5 + 6 + 3 + 5$ as $10 + 6 + 3 = 19$

We add 5 and 5 because we know they make 10 so then we calculate $10 + 6 + 3$



- ❖ Adding single-digit numbers, partitioning numbers to bridge through 10.

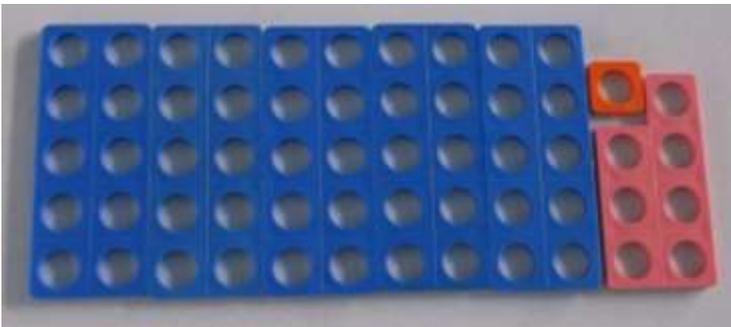
e.g. $9 + 6 = 9 + 1 + 5 = 10 + 5 = 15$

Often referred to as 'magic 10'. It is helpful to make a 10 as this makes the calculation easier.

Using place value

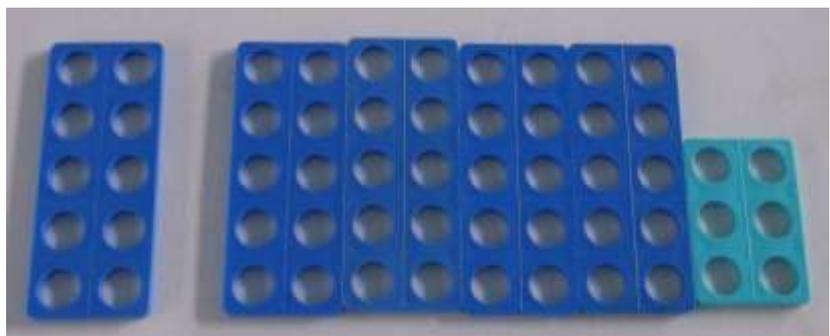
- ❖ Know 1 more or 10 more than any number

e.g. 1 more than 57 is 58 or 10 more than 46 is 56



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

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



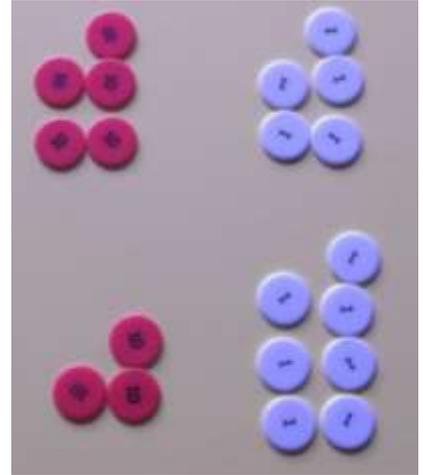
Stages in Addition

❖ Partitioning

e.g. $55 + 37$ as $50 + 30$ and $5 + 7$ finally combining the two totals.

Arrow cards

$$\begin{array}{r} \boxed{50} \triangle + \boxed{30} \triangle = 80 \\ \boxed{5} \triangle + \boxed{7} \triangle = 12 \\ 80 + 12 = 92 \end{array}$$



Counting on in tens, e.g. $23 + 10 = 33$

$$33 + 10 = 43$$

$$43 + 10 = 53$$

$$53 + 10 = 63$$

$$63 + 10 = 73$$

$$73 + 10 = 83$$

$$83 + 10 = 93$$



Children use and understand the layout of a hundred square in order to add 10 more.

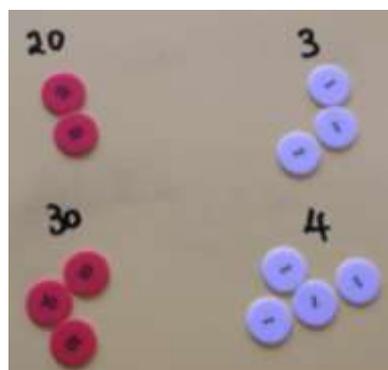
❖ Partitioning - Farmers field

Children partition both 2-digit numbers into tens and units; the brackets are the farmer's field and tens can only go in the first field and ones (or units) in the second field.

e.g. $23 + 34$

$$\begin{array}{r} 23 \\ \swarrow \searrow \\ 20 + 3 \end{array} + \begin{array}{r} 34 \\ \swarrow \searrow \\ 30 + 4 \end{array}$$

$$(20 + 30) + (4 + 3) = 50 + 7 = 57$$



Stages in Addition

Children **MUST** be confident in adding mentally before using a written method. Add pairs of 2-digit numbers, moving to the partitioned column method when secure adding tens and units: Use a blank numberline (as examples shown on page 7).

❖ Partitioning - column method

Step 1: Only provide examples that do NOT cross the tens boundary until they are secure with the method itself.

$$23 + 34:$$

2	0	+	3		
+	3	0	+	4	
<hr/>					
5	0	+	7		
<hr/>					
		=	5	7	

Step 2: Once children can add a multiple of ten to a 2-digit number mentally (e.g. 80 + 11), they are ready for adding pairs of 2-digit numbers that DO cross the tens boundary (e.g. 58 + 43)

$$58 + 43:$$

5	0	+	8		
4	0	+	3		
<hr/>					
9	0	+	1	1	
<hr/>					
		=	1	0	1

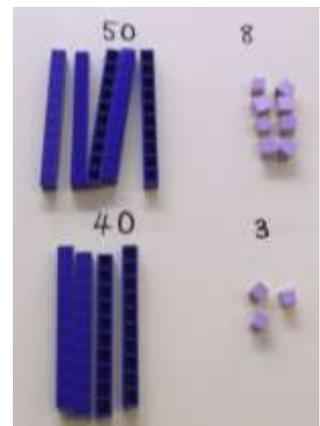
❖ Partitioning - Farmers field crossing the tens boundary

Children continue to partition both 2-digit numbers into tens and units; always remembering the brackets are the farmer's field and tens can only go in the first field and ones (or units) in the second field.

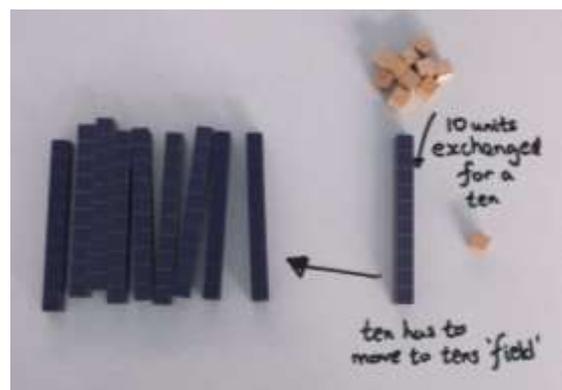
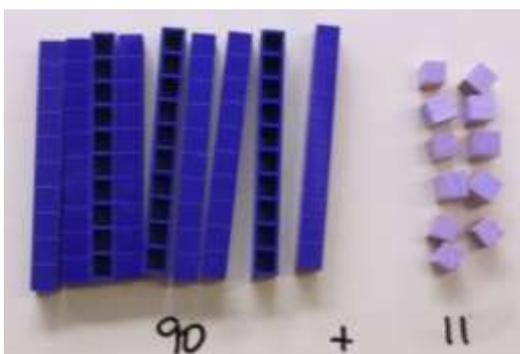
e.g. $58 + 43 = 101$

$$\begin{array}{r}
 58 \\
 \swarrow \searrow \\
 50 + 8
 \end{array}
 +
 \begin{array}{r}
 43 \\
 \swarrow \searrow \\
 40 + 3
 \end{array}$$

$$\begin{array}{r}
 (50 + 40) + (8 + 3) \\
 90 + 11 \\
 (90 + 10) + (1) \\
 100 + 1 = 101
 \end{array}$$



Not allowed to have more than 9 in the ones field so one ten is transferred to the tens field.



Stages in Addition

To support understanding of the structure of the mathematics presented in the algorithms, pupils may physically make and carry out the calculation with Dienes base 10 apparatus or place value counters, then compare their practical version to the written form, to help them to build an understanding of it and support the development of fluency and understanding.

Step 3: Children who are confident and accurate with this stage should move onto the expanded addition methods with 2 and 3-digit number. (see year 3)

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, addition, column, tens boundary

National Curriculum 2014 statements:

- Solve problems with addition and subtraction:
 - Using concrete objects and pictorial representations, including those involving numbers, quantities and measures.
 - Applying their increasing knowledge of mental methods and written methods.
- Recall and use addition and subtraction facts to 20 fluently, and derive and use related facts up to 100.
- Add and 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.
- Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot.
- Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems.

Key skills for addition at Year 2:

- Add a 2-digit number and ones (e.g. $27 + 6$)
- Add a 2-digit number and tens (e.g. $23 + 40$)
- Add pairs of 2-digit numbers (e.g. $35 + 47$)
- Add three single-digit numbers (e.g. $5 + 9 + 7$)
- Show that adding can be done in any order (the commutative law).
- Recall bonds to 20 and bonds of tens to 100 ($30 + 70$ etc)
- Count in steps of 2, 3 and 5 and count in tens from any number.
- Understand the place value of 2-digit numbers (tens and ones)
- Compare and order numbers to 100 using $<$ $>$ and $=$ signs.
- Read and write numbers to at least 100 in numerals and words.
- Solve problems with addition, using concrete objects, pictorial representations, involving numbers, quantities and measures, and applying mental and written methods.

Stages in Addition

Year 3

Children will continue to use empty number lines with increasingly large numbers, (hundreds) including compensation where appropriate. Children will extend their use of informal pencil and paper methods (jottings) to support, record and explain partial mental methods building on existing mental strategies. Children who are very secure and confident with 3-digit expanded column addition should be moved onto the **compact column addition** method, (a formal written method), being introduced to 'carrying'.

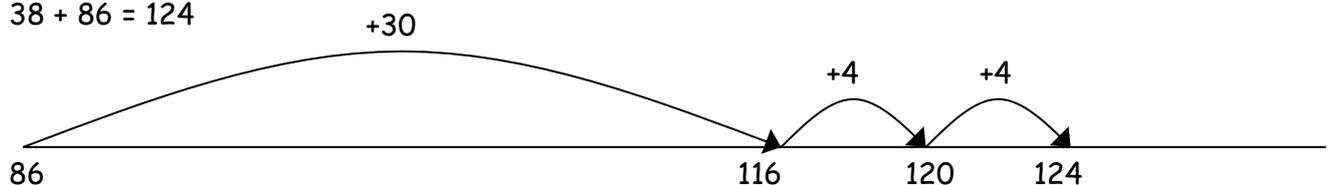
Counting on

Add two 2-digit numbers by adding the multiple of ten then ones, e.g. $67 + 55$ as 67 add 50 (117) add 5 (122).

❖ Using an empty number line

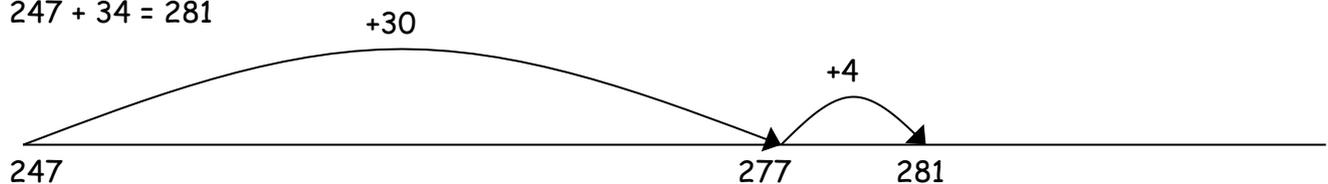
Count on from the largest number irrespective of the order of the calculation.

$$38 + 86 = 124$$



Count on from 3-digit numbers, e.g. $247 + 34$ as $247 + 30$ (277) then $277 + 4 = 281$

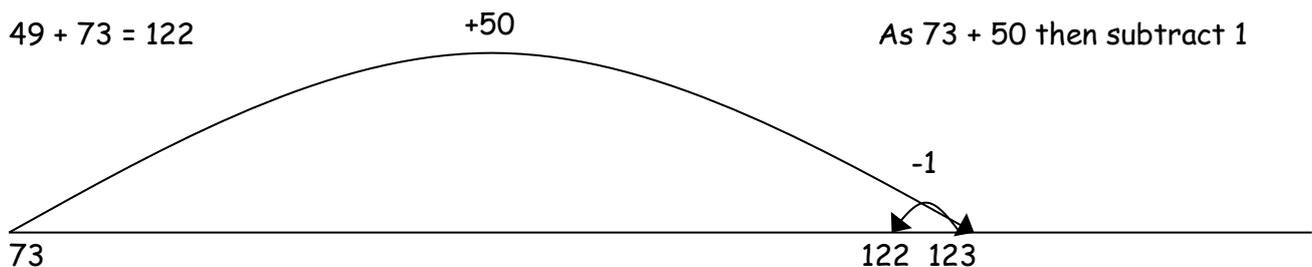
$$247 + 34 = 281$$



❖ Using an empty number line and compensation

Add near multiples of 10 and 100, e.g. $67 + 39$ or $364 + 199$

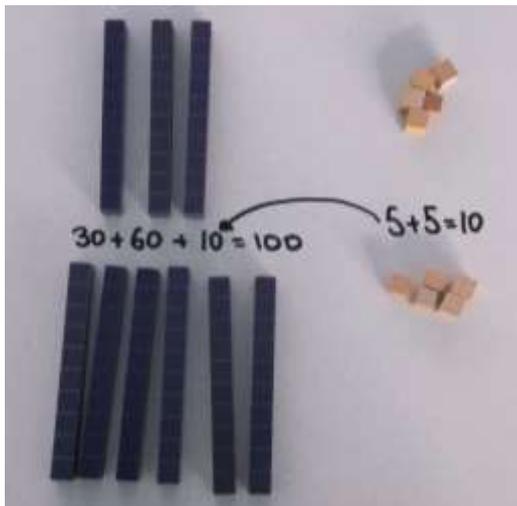
$$49 + 73 = 122$$



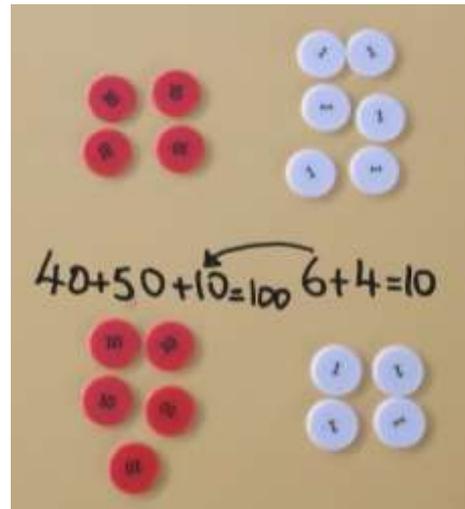
Stages in Addition

Using number facts

Number bonds to 100, e.g. $35 + 65$, $46 + 54$, $73 + 27$, etc



$$35 + 65 = 100$$



$$46 + 54 = 100$$

Add to next ten and next hundred, e.g. $176 + 4 = 180$, (knowing pairs to 10 and applying) or $435 + 65 = 500$, (knowing pairs to 100 and applying), etc

Bar Model

247	
173	74

$$173 + 74 = 247$$

$$74 + 173 = 247$$

$$247 - 173 = 74$$

$$247 - 74 = 173$$

Using place value

Count in hundreds, e.g. knowing $475 + 200$ as 475, 575, 675.

Add multiples of 10, 100 and £1, e.g. $746 + 200$ or $746 + 40$ or $£6.34 + £5$ as $£6 + £5$ and 34p



Stages in Addition

Partitioning, e.g. $68 + 74$ as $60 + 70$ and $8 + 4$ and combine the totals: $130 + 12 = 142$ or $\pounds 8.50 + \pounds 3.70$ as $\pounds 8 + \pounds 3$ and $50p + 70p$ and combine $\pounds 11 + \pounds 1.20$



Use a 200 grid to support counting on in tens and bridging 100 and with addition of a three-digit and a two-digit number.

e.g. $65 + 53 = 118$

add on the tens from 2-digit number and then add units from second number

$65 + 50 + 3 = 118$

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

e.g. $83 + 58 = 141$

add on the tens then the units

$80 + 50 + 3 + 8 = 141$

101	102	103	104	105	106	107	108	109	110
111	112	113	114	115	116	117	118	119	120
121	122	123	124	125	126	127	128	129	130
131	132	133	134	135	136	137	138	139	140
141	142	143	144	145	146	147	148	149	150
151	152	153	154	155	156	157	158	159	160
161	162	163	164	165	166	167	168	169	170
171	172	173	174	175	176	177	178	179	180
181	182	183	184	185	186	187	188	189	190
191	192	193	194	195	196	197	198	199	200

Stages in Addition

Written addition

Partitioning

Continue to develop expanded column addition with two-digit numbers using the methods described in Year 2 - column method and 'farmer's field.' (page 10)

Build on partitioning to develop expanded column addition with two 3-digit numbers.

For example:

	H	T	U	
	400	60	6	
+	<u>300</u>	<u>50</u>	<u>8</u>	
	700	+ 110	+ 14	= 824

Expanded column method

Introduce the expanded column method

	2	3	6	
+	7	3		
(6 + 3)			9	
(30 + 70)	1	0	0	
	2	0	0	
	<u>3</u>	<u>0</u>	<u>9</u>	

Add the **units** first, in preparation for the compact

In order to carry out this method of addition:

- Children need to recognise the value of the hundreds, tens and units without recording the partitioning.
- Pupils need to be able to add in columns.



Move to the **compact column addition** method, with 'carrying':

	H	T	U	
	2	3	6	
+	7	3		
	<u>3</u>	<u>0</u>	<u>9</u>	
	3	0	9	

1

'Carry' numbers **underneath** the bottom line.

Children who are very secure and confident with 3-digit expanded column addition should be moved onto the **compact column addition** method, being introduced to 'carrying'. Compare the expanded method to the compact column method to develop understanding of the process and the reduced number of steps involved.

Remind pupils the actual value is '**three tens add seven tens**' not 'three add seven', which equals **ten tens**.

Stages in Addition

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, **hundreds boundary, increase, vertical, 'carry', expanded, compact**

National Curriculum 2014 statements:

- Add and subtract numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds
- add and subtract numbers with up to three digits, using formal written methods of columnar addition and 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.

Key skills for addition at Year 3:

- Read and write numbers to at least 1000 in numerals and words.
- Add a three-digit number and ones mentally (e.g. $175 + 8$)
- Add a three-digit number and tens mentally (e.g. $249 + 50$)
- Add a three-digit number and hundreds mentally (e.g. $381 + 400$)
- Estimate answers to calculations, using inverse to check answers.
- Solve problems, including missing number problems, using number facts, place value, and more complex addition.
- Recognise place value of each digit in a 3-digit numbers (hundreds, tens and ones)
- Continue to practise a wide range of mental addition strategies, i.e. number bonds, adding to the nearest multiple of 10, 100, 1000 and adjusting, using near doubles, partitioning and recombining.

Stages in Addition

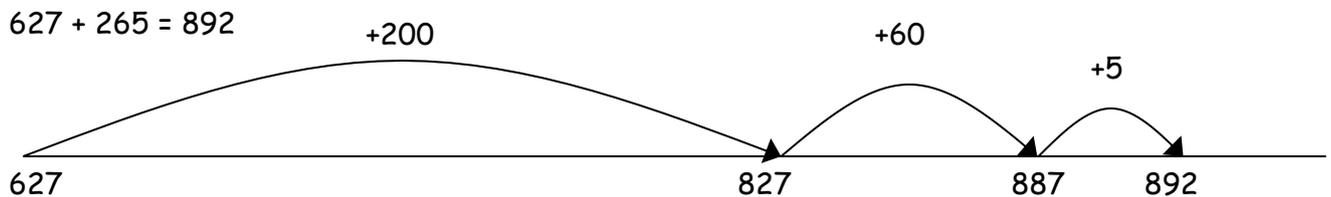
Year 4

Children continue to develop their mental and written methods using numbers in thousands (4-digits). Children are also introduced to numbers with one decimal place. They move from expanded addition to the compact column method, **adding units first**, and 'carrying' numbers **underneath** the calculation. Children also solve money and measure problems in context.

Counting on

Add two 3-digit numbers by adding the multiple of hundreds, then the tens then the ones, e.g. $627 + 265$ as 627 add 200 (827) add 60 (887) add 5 (892)

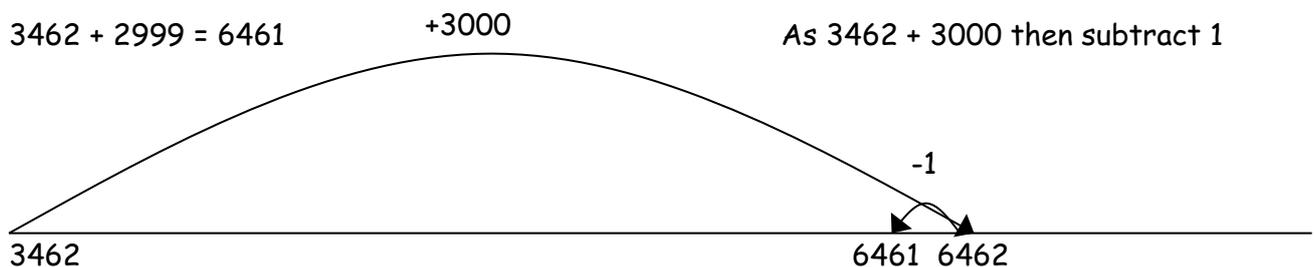
❖ Using an empty number line



Count on to add 3-digit numbers and money, e.g. $463 + 124$ as $463 + 100$ (563) $+ 20$ (583) $+ 4 = 587$ or $£4.67 + £5.30$ as $£9.67$ add 30p

❖ Using an empty number line and compensation

Add near multiples of 10, 100 and 1000, e.g. $467 + 199$ or $3462 + 2999$



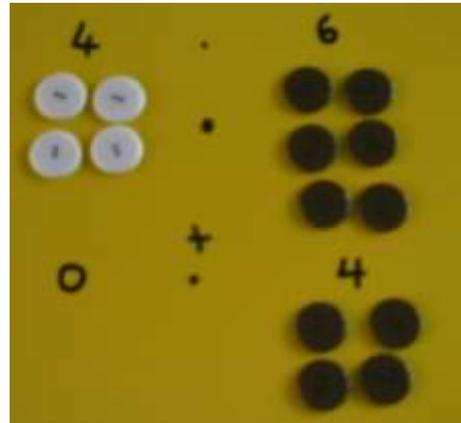
Stages in Addition

Using number facts

Number bonds to 100 and to the next multiple of 100, e.g. $463 + 37 = 500$, $1353 + 47 = 1400$

Number bonds to £1 and to the next whole pound, e.g. $£3.45 + 55p = £4.00$

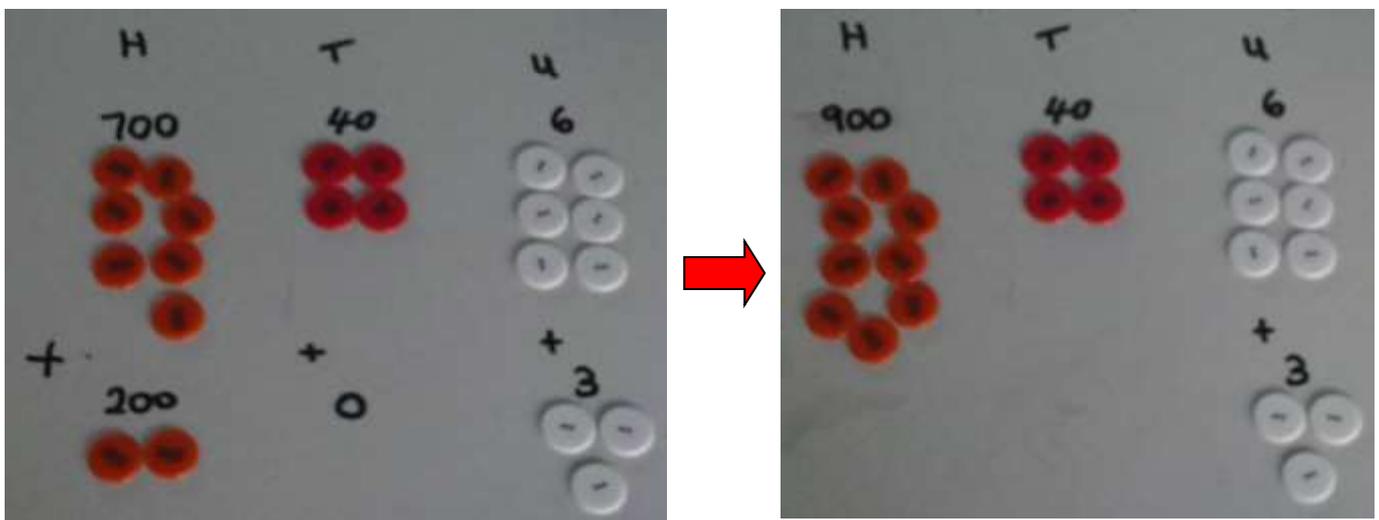
Add to the next whole number, e.g. $4.6 + 0.4 = 5.0$, $7.2 + 0.8 = 8.0$



Using place value

Count in thousands, e.g. knowing $4754 + 2000$ as 4754, 5754, 6754.

Partitioning, e.g. $746 + 203$ as $700 + 200$ and 40 and $6 + 3$ or $134 + 707$ as $100 + 700$ and 30 and $4 + 7$



$$746 + 203 = 946 + 3 = 949$$

Stages in Addition

Written addition

Move from expanded addition to the compact column method, **adding units first**, and 'carrying' numbers **underneath** the calculation.

	H	T	U
	2	3	4
+	<u>1</u>	<u>8</u>	<u>9</u>
	4	2	3
	100	10	

Reinforce correct place value by reminding pupils the actual value is '**1 ten and 1 hundred**' before compacting.

Introduce the **compact column addition** method by asking children to add the two given numbers together using the expanded column method (year 3 page 15).

For example: $3517 + 396 = 3913$

	3	5	1	7
+		3	9	6
	3	9	1	3

Model the compact method with carrying, asking children to discuss similarities and differences and establish how it is carried out.

Reinforce correct place value by reminding pupils the actual value is '**5 hundreds add 3 hundreds**' not '5 add 3'.

'Carry' numbers **underneath** the bottom line.

Add **units** first.

Children should know that the decimal points should line up under each other, particularly when adding mixed amounts, e.g. $£3.59 + 78p$

	3	.	5	9
+		.	7	8
	£4	.	3	7
		1	1	

Stages in Addition

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, **thousands, hundreds, digits, inverse**

National Curriculum 2014 statements:

- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate.
- Estimate and use inverse operations to check answers to a calculation.
- Solve addition and subtraction two-step problems in contexts, deciding which operations and methods to use and why.

Key skills for addition at Year 4:

- Select most appropriate method: mental, jottings or written and explain why.
- Recognise the place value of each digit in a four-digit number.
- Round any number to the nearest 10, 100 or 1000.
- Estimate and use inverse operations to check answers to a calculation.
- Solve 2-step problems in context, deciding which operations and methods to use and why.
- Find 1000 more or less than a given number.
- Continue to practise a wide range of mental addition strategies, i.e. number bonds, adding to the nearest multiple of 10, 100, 1000 and adjusting, using near doubles, partitioning and recombining.
- Add numbers with up to 4 digits using the formal written method of column addition.

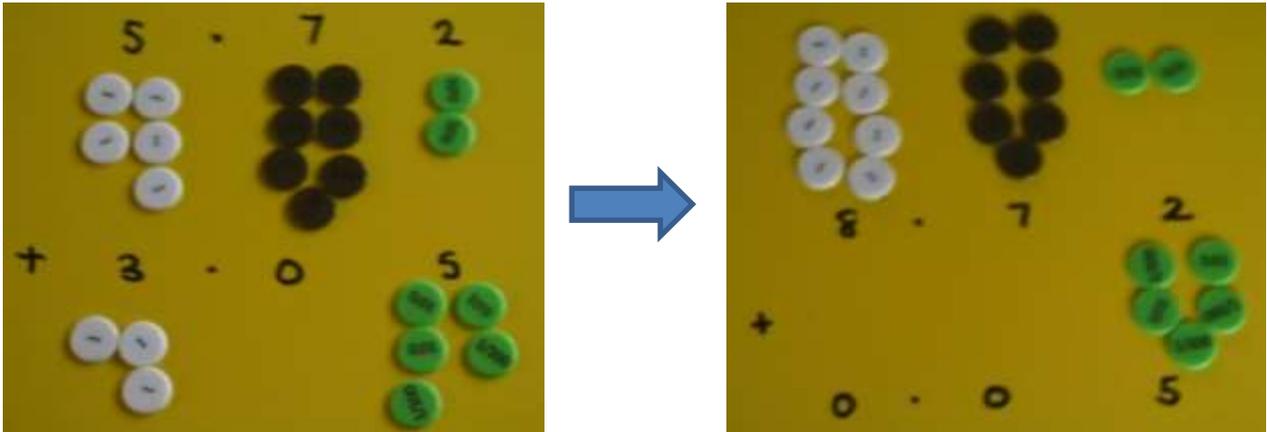
Stages in Addition

Year 5

Children add numbers with more than 4 digits and are introduced to numbers with two decimal places, including measures and money.

Counting on

Add two decimal numbers by adding the ones and then the tenths/hundredths, e.g. $5.72 + 3.05$ as 5.72 add 3 (8.72) then add 0.05 (8.77)



$$5.72 + 3.05 = 8.72 + 0.05 = 8.77$$

Add near multiples of 1, e.g. $6.34 + 0.99 = 7.33$ as $6.34 + 1.00 - 0.01$
or $5.63 + 0.9 = 6.53$ as $5.63 + 1.0 - 0.1$

Count on from large numbers, e.g. $6834 + 3005$ as $9834 + 5 = 9839$

Using number facts

Number bonds to 1 and to the next whole number, e.g. $0.4 + 0.6 = 1.0$ or $5.7 + 0.3 = 6.0$

Add to next ten from a decimal number, e.g. $7.8 + 2.2 = 10$

Bar Model

6.2	
3.4	2.8

$$3.4 + 2.8 = 6.2$$

$$2.8 + 3.4 = 6.2$$

$$6.2 - 3.4 = 2.8$$

$$6.2 - 2.8 = 3.4$$

Stages in Addition

Using place value

Count in 0.1s, 0.01s, e.g. knowing what 0.1 more than 0.51 is

100s	10s	1s	0.1s	0.01s	0.001s
			.5	1	
			.1		
			.6	1	

Partitioning, e.g. $2.4 + 5.8$ as $2 + 5$ and $0.4 + 0.8$ and combine the totals: $7 + 1.2 = 8.2$

$$\begin{array}{r}
 2.4 + 5.8 \\
 \swarrow \quad \searrow \\
 2 + 5 \\
 \downarrow \quad \downarrow \\
 7 + 1.2 = 8.2
 \end{array}$$

Written addition

Continue using the compact column method, **adding units first**, and 'carrying' numbers **underneath** the calculation.

	2	3	4	8	1
+		1	3	6	2
	2	4	8	4	3
				1	

Numbers should exceed 4 digits.

£	2	3	.	5	9
+	£	7	.	5	5
£	3	1	.	1	4

The decimal point should be aligned in the same way as other place value columns, and must be in the same column as the answer.

	1	9	.	0	1
		3	.	6	5
+	0	.	7		
	2	3	.	3	6

Empty decimal places can be filled with zero to show the place value in each column.

Pupils should be able to add more than two values, carefully aligning place value columns.

Say '6 tenths add 7 tenths' to reinforce place value.

Stages in Addition

Children should understand the place value of **tenths and hundredths** and use this to align numbers with different numbers of decimal places.

Ensure children are given problems with mixed amounts to practise aligning the decimal points.

For example: $3.2\text{m} + 280\text{cm}$

$$\begin{array}{r} 3.2 \\ + 2.8 \\ \hline 6.0\text{m} \\ \hline 1 \end{array}$$

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse and **decimal places, decimal point, tenths, hundredths, thousandths**

National Curriculum 2014 statements:

- Add and subtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction).
- Add and subtract numbers mentally with increasingly large numbers.
- 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 contexts, deciding which operations and methods to use and why.

Key skills for addition at Year 5:

- Add numbers mentally with increasingly large numbers, using and practising a range of mental strategies, i.e. adding the nearest multiple of 10, 100, 1000 and adjust, using near doubles, inverse, partitioning and recombining; using number bonds.
- Use rounding to check answers and accuracy.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Read, write, order and compare numbers to at least 1 million and determine the value of each digit.
- Round any number up to 1,000,000 to the nearest 10, 100, 1000, 10 000 and 100 000.
- Add numbers with more than 4 digits using the formal written method of columnar addition.

Stages in Addition

Year 6

Children will extend the carrying method to add several numbers of increasing complexity. This will include numbers to three decimal places (thousandths).

Counting on

Add two decimal numbers by adding the ones then the tenths/hundredths or thousandths, e.g. $6.314 + 3.006$ as 6.314 add 3 (9.314) then add 0.006 (9.32)

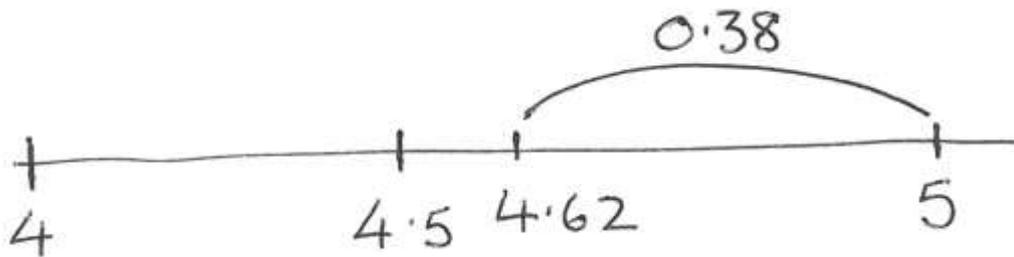
Add near multiples of 1, e.g. $6.345 + 0.999 = 7.344$ as $6.345 + 1.000 - 0.001$
or $5.673 + 0.9 = 6.573$ as $5.673 + 1.0 - 0.1$

Count on from large numbers, e.g. $16375 + 12003 = 28378$ as $16375 + 12000 + 3$

Using number facts

Number bonds to 1 and to the next multiple of 1, e.g. $0.63 + 0.37$ or $2.355 + 0.645$

Add to the next ten, e.g. $4.62 + 0.38 = 5.0$



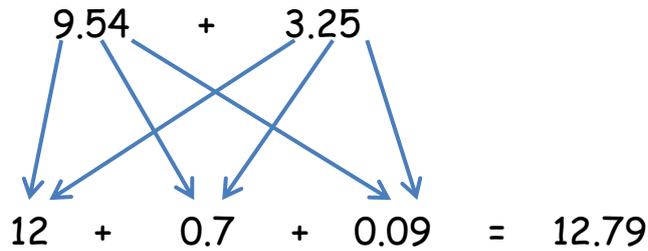
Using place value

Count in 0.1s, 0.01s, 0.001s, e.g. knowing what 0.001 more than 6.725 is.

100s	10s	1s	0.1s	0.01s	0.001s
		6.	7	2	5
		,	0	0	1
		6.	7	2	6

Stages in Addition

Partitioning, e.g. $9.54 + 3.25$ as $9 + 3$ and $0.5 + 0.2$ and $0.04 + 0.05$ to get 12.79



Written addition

Adding several numbers with different numbers of decimal places (including money and measures):

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

Tenths, hundredths and thousandths should be correctly aligned, with the decimal point lined up vertically including in the answer row.

Empty decimal places can be filled with zero to show the place value in each column.

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

Adding several numbers with more than 4 digits.

Stages in Addition

Key vocabulary: add, more, plus, and, make, altogether, total, equal to, equals, double, most, count on, number line, sum, tens, units, partition, plus, addition, column, tens boundary, hundreds boundary, increase, vertical, 'carry', expanded, compact, thousands, hundreds, digits, inverse and decimal places, decimal point, tenths, hundredths, thousandths

National Curriculum 2014 statements:

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

Key skills for addition at Year 6:

- Perform mental calculations, including with mixed operations and large numbers, using and practising a range of mental strategies.
- Solve multi-step problems in context, deciding which operations and methods to use and why.
- Use estimation to check answers to calculations and determine, in the context of a problem, levels of accuracy.
- Read, write, order and compare numbers to at least 10 million and determine the value of each digit.
- Round any whole number to a required degree of accuracy.
- Pupils understand how to add mentally with larger numbers and calculations of increasing complexity.