NUMBER, PLACE VALUE, ADDITION AND SUBTRACTION

PHASE 2

Parent Information Workshop.

Why is maths taught differently now?

When I was at school I remember the few occasions that the teacher stood at the front of the class and did some maths teaching, it involved teaching rules of how we do things.
For example: long multiplication. We didn't question and often we didn't understand why we were "carrying ten" or "borrowing one".

The rest of the time I was taught Maths through a text book and would line up at the teacher's desk to get my work marked once I had finished.

Activities like this were probably okay for the children who 'got' maths, but not for those who found it tricky or were uninspired by the work on offer.

Aims:

- To provide you with a greater understanding of how mathematics is taught in school.

- To understand the different mathematical strategies that the children use in number, place value, addition and subtraction and the progression through Phase 2.

- To see the importance of mental maths skills and the strategies children are taught.

- To help you understand how you can help your child at home.

Children need:

- To be taught the specific skills needed in calculation
- To understand what they are doing and why
- To **enjoy** maths
- To leave education with a solid understanding in maths in order to help them in adult life.

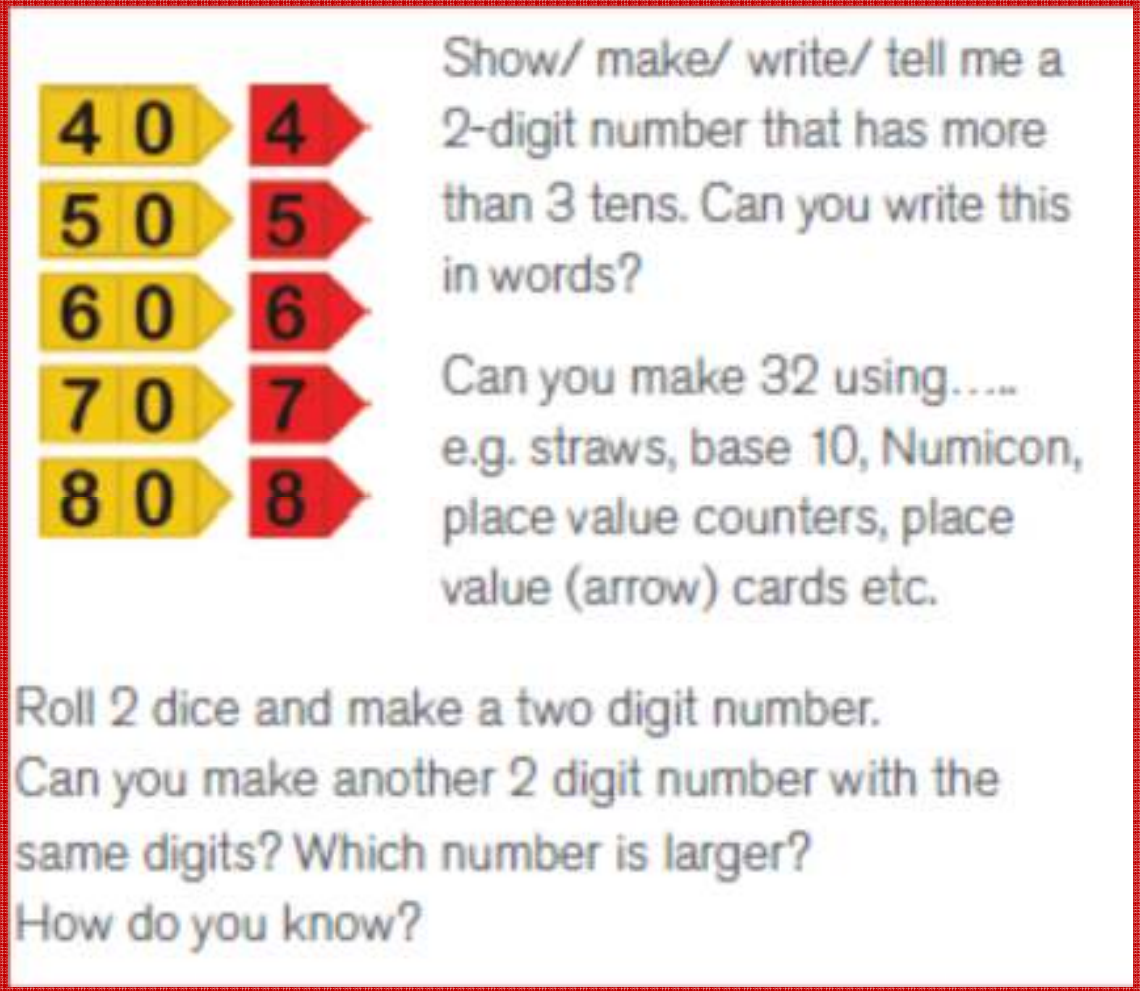
Introduction

In phase 2 the Autumn term focus is number, place value and addition and subtraction.

Year 2 Number and Place Value

- Children count in steps of 2, 3 and 5 from 0 and in tens from any number, forward or backward
- Recognise the place value of each digit in a two-digit number (tens, ones)
- Children must read and write numbers to at least 100 in numerals and in words
- Children Compare and order numbers from 0 up to 100; use < > and = signs
- Use place value and number facts to solve problems.

- Children identify, represent and estimate numbers using different representations, including the number line.



Object Counting

Oral Counting

Counting Hoops

Counting

Counting songs

Interesting objects to count

Counters and coins

Teaching and learning resources

Number washing line

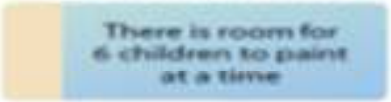
Number floor tiles and playground markings

Digit cards

Dominoes

Hundred square

Labels and posters



Number tracks and lines

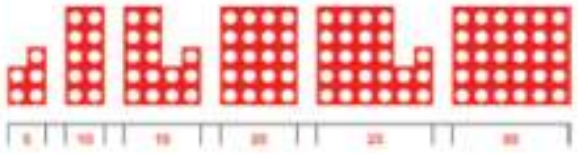
Instruments to count sounds

Beadstrings

Track games

Coins in a tin

Count in 5's starting from zero (Use handprints, Numicon images etc.)



Are multiples of 5 odd or even? How do you know?

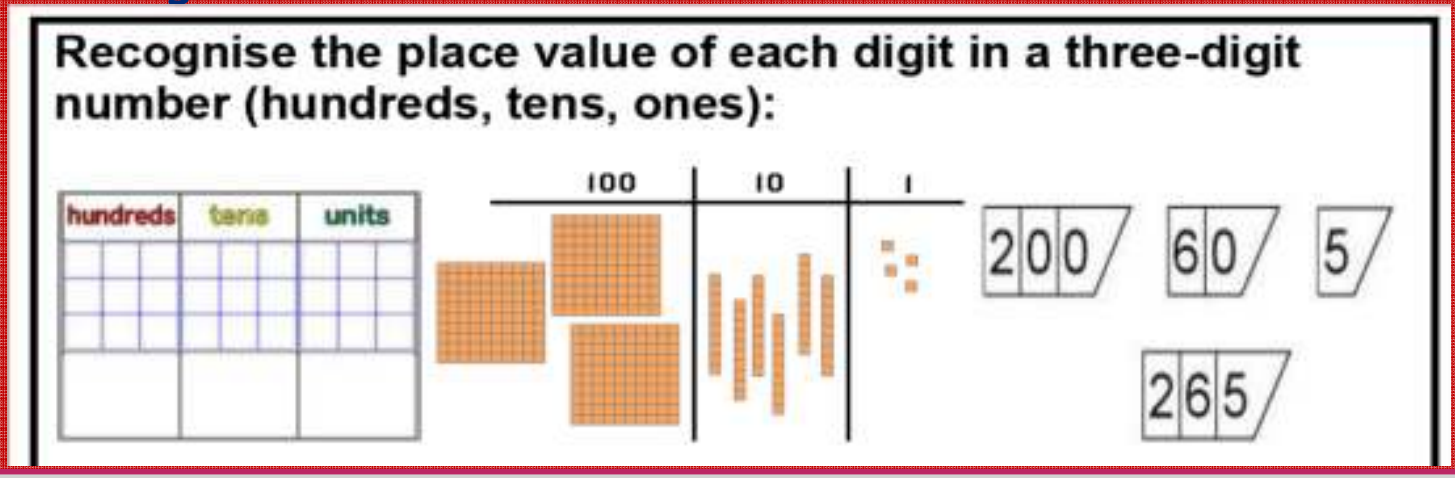
Drop six 2 pence coins into the moneybox, how much money altogether?

There's 15p in the tin, let's count on in 5s using 5p coins

Year 3 Number and Place Value

- Children then begin to count from zero in multiples of 4, 8, 50 and 100 using bridging strategies as appropriate

- Children must now recognise the place value of each digit in a three-digit number



The use of place value charts, dienes and arrow cards are invaluable in supporting your children's understanding of the value of each individual digit within a number. These resources allow your children to partition the digits to clarify the value they hold before recombining to read the whole number.

- Children can then use their place value knowledge to compare and order numbers up to 1000
- Children identify, represent and estimate numbers using different representations.

For example.

Can children recognise the number six hundred and thirty four is 634, 600 + 30 + 4, 600 + 34?

Can they recognise it as 63 tens add 4?

- Children read and write numbers up to 1000 in numerals and in words
- Children then use these skills to solve number problems and apply to practical problems.

Year 4 Number and Place Value

- Children progress to counting in multiples of 6, 7, 9, 25 and 1000
- Children must find 1000 more or less than a given number
- Children count backwards through zero to include negative numbers
- Children recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones)
- Children order and compare numbers beyond 1000
- Children identify, represent and estimate numbers using different representations – Can children now round a given number to the nearest hundred? Can they estimate where it is on a number line marked off in hundreds? tens?

- Children must now round any number to the nearest 10, 100 or 1000

Bead strings help children to identify multiples of ten that a given number lies between so that they can decide which number the multiple is closer to.

Number lines also help children to see the multiples they are closest to in order to round to the nearest 10, 100 or 1000.

- Children solve number and practical problems that involve all of the previous skills and with increasingly large positive numbers and place value

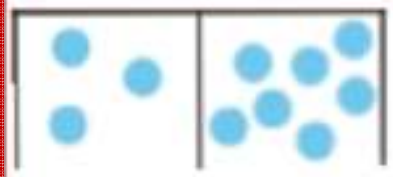
- In year 4 children read Roman numerals to 100 (I to C) and will know that over time, the numeral system changed to include the concept of zero and place value.

I	1	XXX	30
II	2	XL	40
III	3	L	50
IV	4	LX	60
V	5	LXX	70
VI	6	LXXX	80
VII	7	XC	90
VIII	8	C	100
IX	9	D	500
X	10	M	1000
XX	20	MD	1500

PROGRESSION THROUGH THE DOMAINS		
NUMBER AND PLACE VALUE		
Y2	**Y3**	**Y4**
count in steps of 2, 3, and 5 from 0, and in tens from any number, forward or backward	**count from 0 in multiples of 4, 8, 50 and 100; find 10 or 100 more or less than a given number**	count in multiples of 6, 7, 9, 25 and 1000
recognise the place value of each digit in a two-digit number (tens, ones)	**recognise the place value of each digit in a three-digit number (hundreds, tens, ones)**	find 1000 more or less than a given number
identify, represent and estimate numbers using different representations, including the number line	**compare and order numbers up to 1000**	count backwards through zero to include negative numbers
compare and order numbers from 0 up to 100; use <, > and = signs	**identify, represent and estimate numbers using different representations**	recognise the place value of each digit in a four-digit number (thousands, hundreds, tens, and ones)
read and write numbers to at least 100 in numerals and in words	**read and write numbers up to 1000 in numerals and in words**	order and compare numbers beyond 1000
use place value and number facts to solve problems.	**solve number problems and practical problems involving the ideas from number and place value**	identify, represent and estimate numbers using different representations
		round any number to the nearest 10, 100 or 1000
		solve number and practical problems that involve all of the above and with increasingly large positive numbers and place value
		read Roman numerals to 100 (I to C) and know that over time, the numeral system changed to include the concept of zero and place value

Year 2 Addition

Early in the phase children will use a range of resources to support their recall of addition facts to 20. For e.g. Games including pairs, snap, dominoes and the use of money.



Using a box lid divided into two and counters: Record mathematical statements:

$3 + 7 = 10$, turn box around and record new statement $7 + 3 = 10$

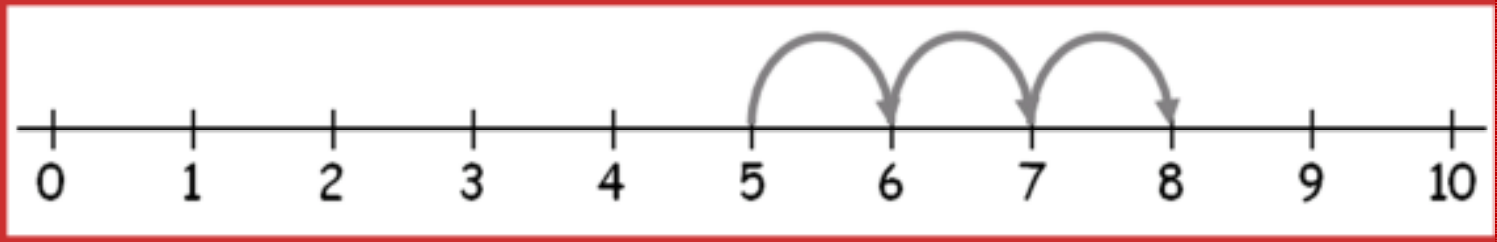
If you know $7 + 3 = 10$ what else do you know?

Representing images as calculations will support children's understanding of mathematical statements and allow them to identify patterns in calculations.

Practical (combining) and adding on (increasing)

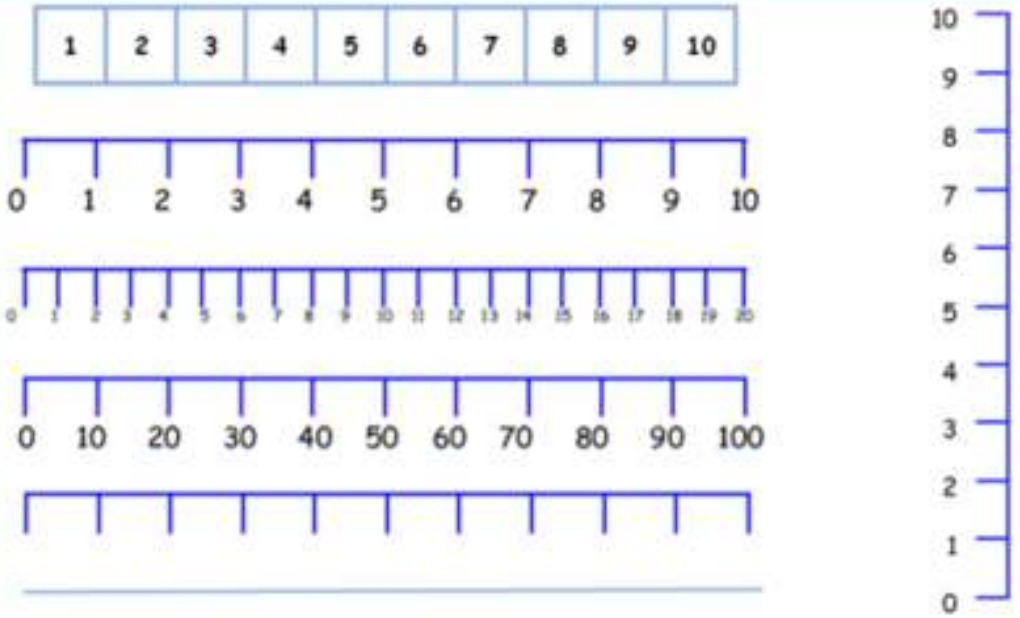
Prior to recording addition steps on a number line, children will work practically with equipment where they are combining sets of objects. As they become more confident, this practical addition of sets of objects will be mirrored on a number line so that the two are being done together and children are adding on. This will prepare them for the abstract concept of adding numbers rather than objects.

Count on from the larger number : 3 + 5 a child chooses the larger number, even when it is not the first number, and counts on from there: *'six, seven, eight'*



It is more efficient to count on from the larger number because you have less to work out. It also shows children that addition can be done in any order ; it doesn't matter which number you add first, you get the same answer.

Number Tracks and Number Lines



Steps in addition can be recorded on a number line. The steps often bridge through a multiple of 10 and, this is more efficient if children know how to partition 1-digit numbers

In year 2 children will cover adding:

- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers
- Three one-digit numbers.

8 + 7 = 15

In this example, 7 has been partitioned into 2 and 5 which makes bridging through 10 more efficient

48 + 36 = 84

In these examples, the 6 in 36 has been partitioned into 2 and 4 which makes bridging through 10 more efficient

At this stage children must have a concrete understanding of counting forwards and backwards in tens and ones from different starting point. The ability to locate numbers on a number line or 100 square is essential.

Year 3 Addition

In year 3 children will begin to add with up to 3 digits.

Progression shown through:

HTU + TU (no bridging)

HTU + TU (bridging 10)

HTU + TU (bridging 100)

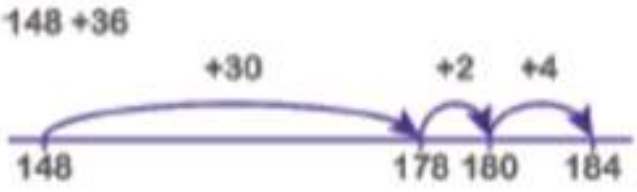
HTU + TU (bridging 10 and 100)

HTU + HTU (no bridging)

HTU + HTU (bridging 10)

HTU + HTU (bridging 10 and 100)

Number line



Children will begin by using the number line method and once secure will progress to use the expanded columnar method.

Partitioning (expanded columnar method)

48 + 36 = 84

	40	8	
+	30	6	
	70	$^{1}4$	84

148 + 36 = 184

	100	40	8	
+		30	6	
	100	70	$^{1}4$	184

This builds on children's mental maths skills of partitioning and recombining

40 + 30 = 70

8 + 6 = 14

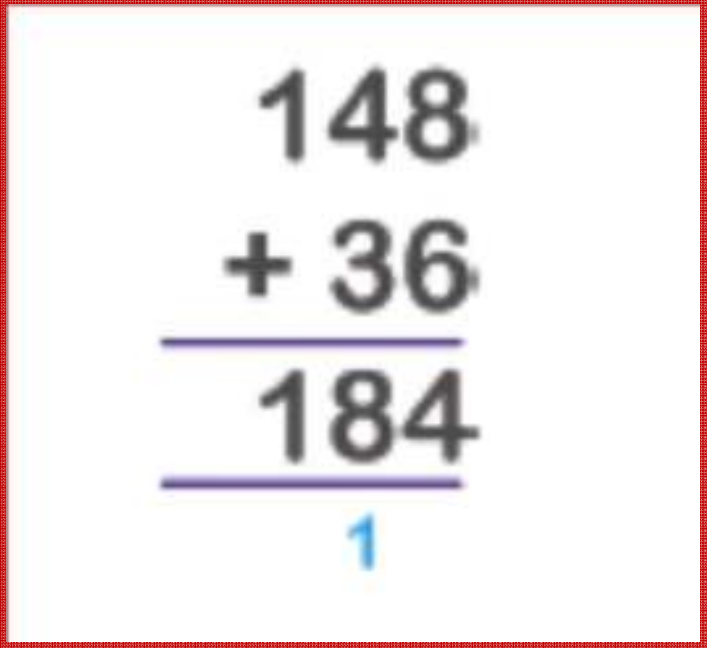
48 + 36 = 84

Children must use their understanding of place value and partitioning.

It is important for all of the children across the phase to understand the 'Commutative Law': we can add numbers in any order and still get the same answer.

Column Method (efficient)

Once children's knowledge and understanding of the expanded columnar method is secure they will then progress to use a further written method; efficient column method.



It is vital that the children understand the value of the digits in which they are adding.

Year 4 Addition

Now children have reached year 4 they will begin to add up to 4-digit numbers using the expanded columnar method and the efficient column method.

Progression shown through:

THTU + HTU (no bridging)

THTU + HTU (bridging 10)

THTU + HTU (bridging 100)

THTU + THTU (no bridging)

THTU + THTU (bridging 10)

THTU + THTU (bridging 100)

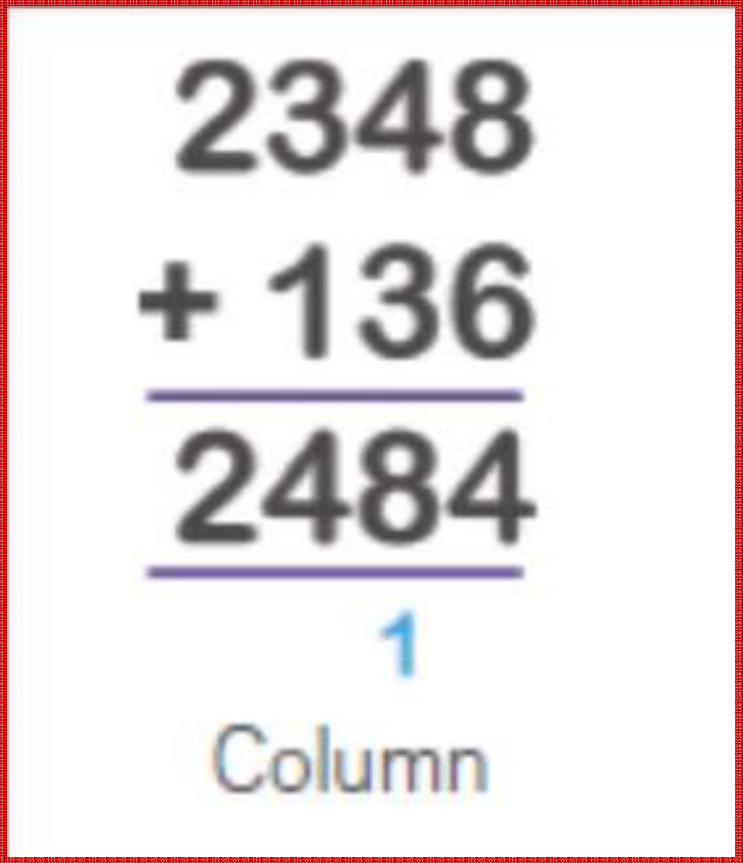
THTU + THTU (bridging 10 and 100)

	2000	300	40	8	
+		100	30	6	
	2000	400	70	$^{1}4$	2484

Expanded columnar

Children's ability to recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones) underpins their ability to use expanded columnar addition.

Column Method (efficient)



The use of the efficient column method in year 4 will involve progressively greater digits.

As the children progress through year 4 they will be encouraged to estimate their answers first.

Have a go…

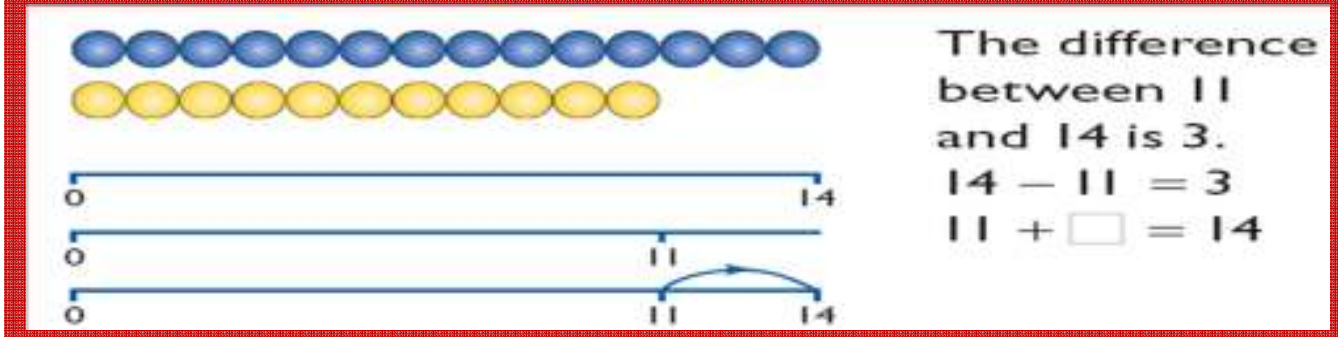
Choose a number from each box and use any of the methods discussed to add them, compare the successes of each

87	36	25
94	18	11
73	50	46

24	10	93
29	15	12
50	32	45

Year 2 Subtraction

Prior to recording subtraction steps on a number line, children will work practically with equipment where they are 'taking away' a small group from a larger set of objects. As they become more confident, this practical subtraction will be mirrored on a number line so that the two are being done together. This will prepare them for the abstract concept of subtracting numbers rather than objects.



Key words:

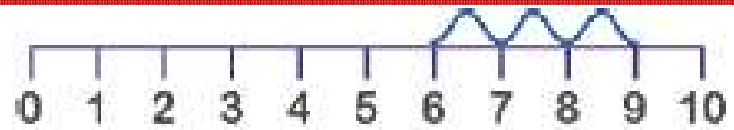
Removal Comparison Partitioning

In year 2 children will cover subtracting:

- A two-digit number and ones
- A two-digit number and tens
- Two two-digit numbers.

You started with 16 balloons and I have taken away/subtracted 4 balloons, how many are left?

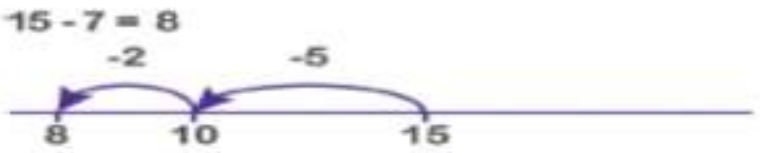
Children's understanding of the concept of subtraction will be reinforced be removing objects or comparing them to find the difference. As at this stage their understanding of the language of subtraction will be extended to include 'difference.'



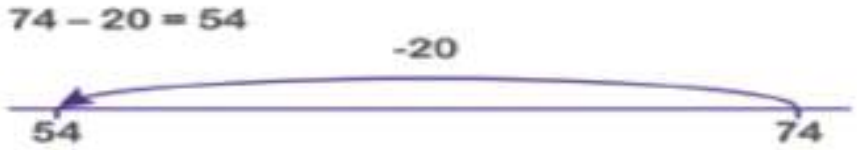
Extend to counting up to find the difference if appropriate, 'Mollie has 20p, she spends 11p, what will her change be?' Model counting up from 11p to 20p to find the difference.

Use a range of images to support finding the difference and begin with equality to support understanding:

15 – 7 = 8

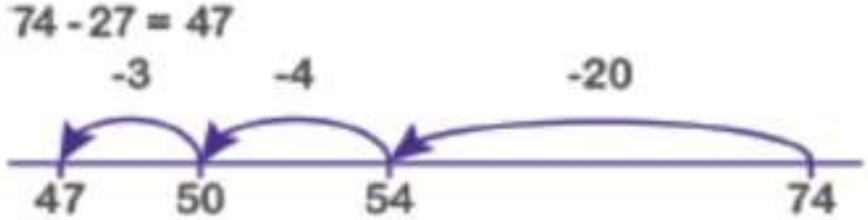


74 – 20 = 54



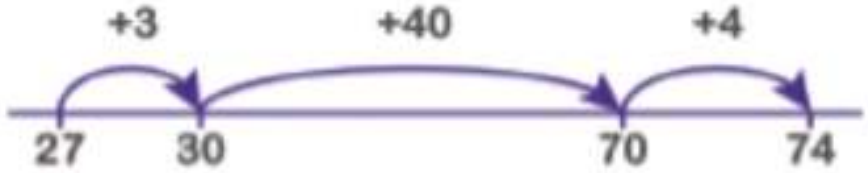
Counting back to subtract:

74 – 27 = 47



Counting on to find the difference:

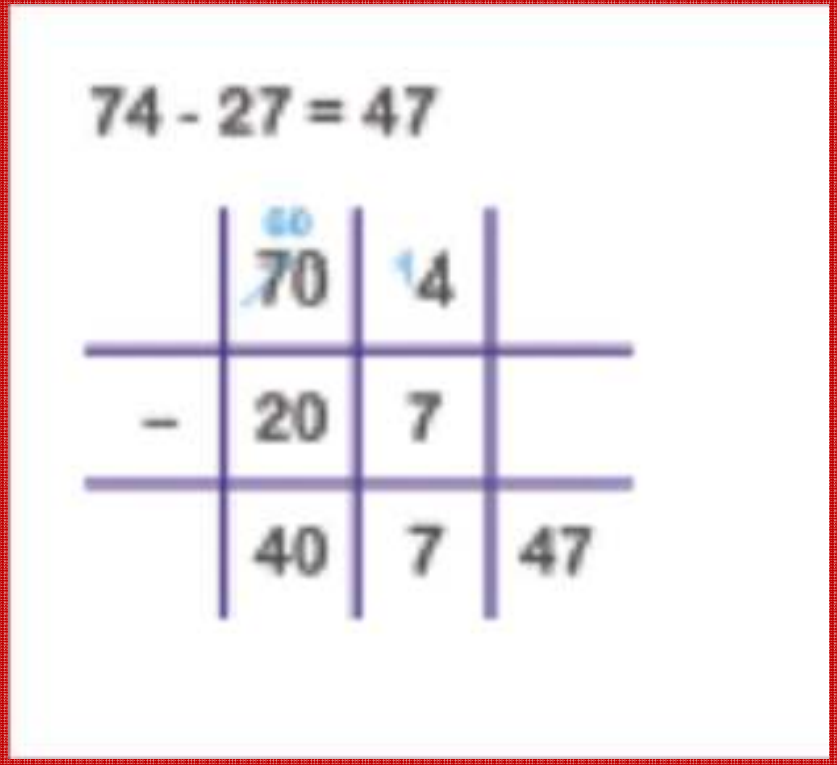
74 – 27 = 47



Progression shown through:

- TU ± U (no bridging)
- TU ± U (bridging 10)
- TU ± multiples(s) 10 (no bridging 100)
- TU ± multiple(s) 10 (bridging 100)
- TU ± TU (no bridging)
- TU ± TU (bridging 10)
- TU + TU (bridging 100)
- TU + TU (bridging 10 and 100)

Extending to columnar methods:



Structured apparatus is used to support conceptual understanding.

Year 3 Subtraction

In year 3 children will begin to subtract with up to 3 digits.

Progression shown through:

HTU + TU (no bridging)

HTU + TU (bridging 10)

HTU + TU (bridging 100)

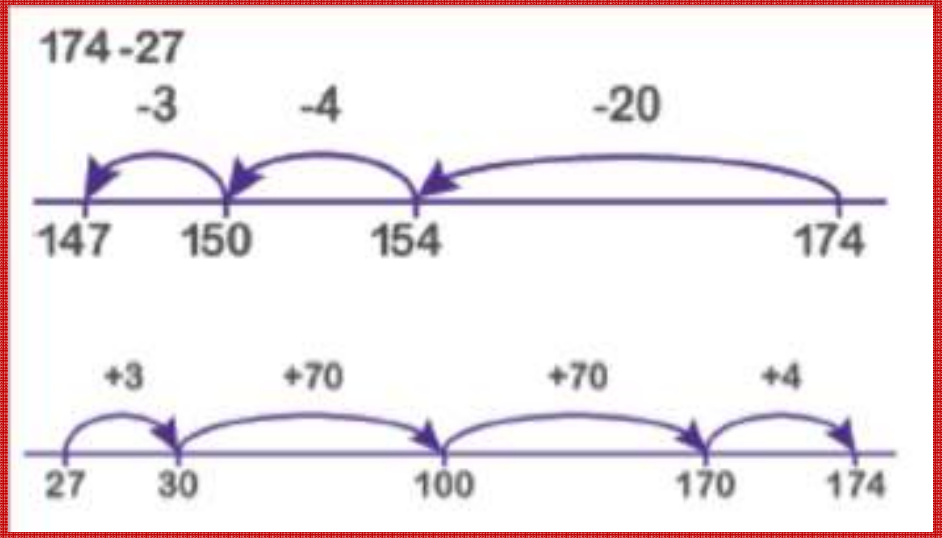
HTU + TU (bridging 10 and 100)

HTU + HTU (no bridging)

HTU + HTU (bridging 10)

HTU + HTU (bridging 10 and 100)

Same progression as above for subtraction



When counting back children will partition the second number only.

Children will begin by using the number line method and once secure will progress to use the expanded columnar method.

Partitioning (expanded columnar method)

	60	1
	70	4
−	20	7
	40	7

47

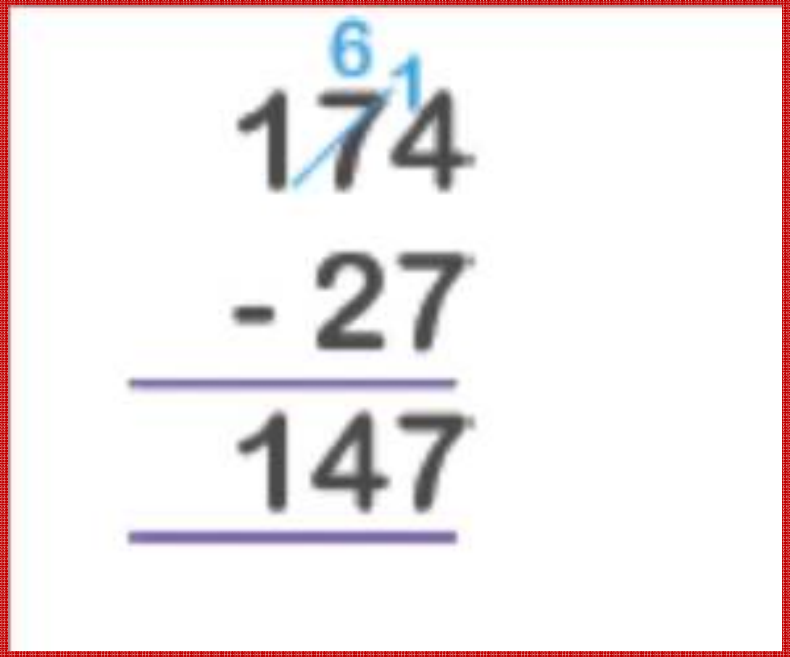
	100	60	1
		70	4
−		20	7
	100	40	7

Initially, the children will be taught using examples that do not need the children to exchange/regroup (what you might know as borrowing).

It is important for all of the children across the phase to understand that subtraction is non-commutative.

Column Method (efficient)

Once children's knowledge and understanding of the expanded columnar method is secure they will then progress to use a further written method; efficient column method.



It is vital that the children understand the value of the digits in which they are subtracting in order to regroup tens and hundreds.

Year 4 Subtraction

Now children have reached year 4 they will begin to subtract up to 4-digit numbers using the expanded columnar method and the efficient column method.

Progression shown through:

THTU + HTU (no bridging)

THTU + HTU (bridging 10)

THTU + HTU (bridging 100)

THTU + THTU (no bridging)

THTU + THTU (bridging 10)

THTU + THTU (bridging 100)

THTU + THTU (bridging 10 and 100)

Same progression as above for subtraction

	2000	300	40	8	
-		100	30	6	
	2000	200	10	2	2212

Children's ability to recognise the place value of each digit in a four-digit number (thousands, hundreds, tens and ones) underpins their ability to use expanded columnar subtraction.

Column Method (efficient)

The use of the efficient column method in year 4 will involve progressively greater digits.

As the children progress through year 4 they will be encouraged to estimate their answers first.

Have a go…

Choose a number from each box and use any of the methods discussed to subtract them , compare the successes of each

87	36	25
94	18	11
73	50	46

24	10	93
29	15	12
50	32	45

PROGRESSION THROUGH THE DOMAINS		
ADDITION AND SUBTRACTION		
Y2	**Y3**	**Y4**
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 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	**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**	add and subtract numbers with up to four digits using 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

Mental Maths

Year 2

Add and subtract numbers mentally, including:

- ***A two-digit number and ones***
- ***A two-digit number and tens***
- ***Two two-digit numbers***
- ***Adding three one-digit numbers***

- Reordering
- Near doubles
- Adjustment
- Partitioning
- Bridging through multiples of 10
- Counting on to find a small difference

How would you add 24 + 25?
Did you use the near doubles strategy? Why?
Did you need to use a jotting?

Year 3

Add and subtract numbers mentally, including

- HTU + U
- HTU + multiples of 10
- HTU + multiples of 100

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

$375 + 7 =$

$427 + 30 =$

$208 + 300 =$

Year 4

Add and subtract mentally THTU ± U, THTU ± T, THTU ± H, TU ± TU and HTU ±TU

Children need to be secure with the skills of bridging, partitioning, doubling and know their number pairs up to ten to add and subtract mentally

1236 + 4	1236 + 40	1236 + 400	36 + 57	136 + 23
1236 + 7	1236 + 70	1236 + 700	36 + 57	136 + 57

Bridging – when calculations take you over 10, 100, 1000, etc. For example. 8 + 5 = 8 +2 (takes you to 10) Then 10 + 3 = 13.

Partitioning - splitting the digits up into thousands, hundreds, tens an ones. Use partitioning to double so that it becomes double 60 + double 5. Halve 130 by partitioning it into 100, 20 and 10 then halving each and recombining.

Secure mental calculation requires the ability to:

- Recall key number facts instantly.

e.g. to know all addition and subtraction facts for each number to 10.

Sums and differences of multiples of 10.

- Use different strategies to work out calculation.

e.g. To recognise that addition can be done in any order.

Partition 2-digit numbers, adding the tens, then the ones. (42 + 37 = 40 + 30 + 2 + 7 = 79)

Without secure mental calculation children cannot move onto written methods of calculation.

Helping at home

- Play Snakes and Ladders, darts and other games that depend on **counting and calculation**
- Look for **numbers in the environment**
- Watch and play sports that involve **scoring, timing, counting, measuring**
- Invest in a range of maths **puzzle** books
- Shop using **money and calculate change**
- Cook together and enjoy the result!
- **Calculate time duration** using both analogue and digital clocks (e.g. use TV magazines)

Please remember that each child is an individual and all children develop their mathematical understanding at a different pace.

Thank you!