Trumpington Federation calculation policy

Vision

For our children to feel confident, wanting to give it a go, when solving a mathematical problem that they haven't seen before.

Introduction

The purpose of this calculation policy is to ensure consistency and progression in the teaching of the different calculation methods across the school from Years 1 to 6. It aims to give an overview of the key calculation strategies for addition, subtraction, multiplication and division. Our intention is that our children will be flexible with the methods that they use to perform different calculations.

Early Years: for information on the approach to the teaching of Maths in the Early Years please see the document 'Early Years Approach to Teaching Maths'.

CALCULATION STRATEGIES	Key manipulatives
Year 1	1
Number lines	Rekenrek
Start adding using a number line.	Bead strings
Initially, children are taught to start at the biggest number.	Numicon
As they grow in confidence they start to explore starting with the smallest number which develops an	Multi-link
understanding of commutativity.	Dienes
	Number line
5 + 2 = 7	
Children are shown how the number sentence can be represented in a part-whole model and on a bar	
model.	

Addition





Partitioning

Children are shown how to partition numbers into tens and ones and then add them.

5	6	+	1	3	Ξ	6	9
5	0	+	1	0		6	0
6	<u> </u>	2		Q		Ŭ	Ŭ
0	Ŧ	5	=	1			
6	0	+	9	=	6	9	-

Expanded column method

Building on from partitioning, children are shown how to set up the 10s and 1s in columns. They are taught to add the 1s first.



Here is an example where the 1s exceed 9.	
$\cdot 56 + 15 = 71$	
50 + 6	
+	
10 + 5	
+0 + 1	
Year 3	
Number lines	Road strings
Switch to an empty number line to increase flexibility and speed and allow demonstration of	Dienes
understanding.	Place value counters
	Number line
356+213=569	
+100 +100 +10 +3	
356 456 556 569	
3 5 6 + 2 1 3 = 5 6 9	
+200	
+10 +3	
356 556 566 569	
Children are shown how the number sentence can be represented in a part-whole model and on a bar	
model.	



Partitioning

Children are shown how to partition numbers into hundreds, tens and ones and then add them.

Expanded column method

Building on from partitioning, children are shown how to set up the 100s, 10s and 1s in columns, showing the full value of each digit. They are taught to add the 1s first.

3	5	6	÷	.2	1	3	=	5	6	9	
	3	0	0	+	5	0	+	6			+
		•	•					0	-	-	+
_	2	0	0	+	1	0	+	3	-	-	+
-	F	^	0		C	0	-	0	F	+	+
-	5	0	0	Ŧ	6	0	T	Ч	-	+	+
3	6	6	. +	2	6	3	11	6	2	9	
	÷,	0	0			-	η.		,		
_	3	0	0	+	6	0	+	6			
-	-	•	0		-	0		2	_		
+	2	0	0	+	6	0	Ŧ	3			
	6	0	0	+	2	0	÷	9			

Compact column method

Building on from the expanded column method, children are shown how to set up an addition by putting their 100s, 10s and 1s in the correct place value column. They are taught to add the 1s first.

3	5	6 +	2	1	3 =	5	6	9		
	3	56				-	-			
+	2	1 3	/			-				
-	5	6 9	+			-				
-	5	0	-							
Wit	h ex	char	gin	g						
3	5	7+	2	1	3	= 5	57	0		
Ŭ	-									
	-		-		- 4	1				
		3 5	7			-				
	+	21	2				-		-	
		5 -	10					-	-	
		1						-		
							1			
Yea	r 4									
Chil	drei	ו cor	soli	date	the	ir lea	arnir	ng fi	rom previous years.	Bead strings
The	у со	ntinu	ie to	o be	sho	wn h	low	tοι	se a blank number line, partitioning, the expanded and the	Dienes
compact column method.						1.			Place value counters	
Chil	drei	n con	tinu	ie to	bes	shov	vn h	ow	the number sentence can be represented in a part-whole model	Number line
and	on	a bar	mc	del.						
[Chi	ldre	en sh	oulo	d be	sho	wn h	now	to ı	use the number line and the compact column method when	
add	ing	deciı	nals	5]						
Vec	r 5									
Teu	/ 5									
Chil	drei	n con	soli	date	the	ir lea	arnir	ng fi	rom previous years.	Dienes
The	у со	ntinı	ie to	o be	sho	wn h	low	toι	se a blank number line, the expanded and the compact column	Number line
met	hod									
Chil	drei	n con	tinu	ie to	bes	shov	vn h	ow	the number sentence can be represented in a part-whole model	
and	on	a bar	mc	del.						

[Children should be shown how to use the number line and the compact column method when adding decimals]	
Year 6	
Children consolidate their learning from previous years.	Dienes
They continue to be shown how to use a blank number line, the expanded and the compact column method.	Number line
Children continue to be shown how the number sentence can be represented in a part-whole model and on a bar model.	
[Children should be shown how to use the number line and the compact column method when adding decimals]	

Subtraction

CALCULATION STRATEGIES	Key manipulatives
Year 1	
Number lines Start subtracting using a number line. With subtraction, children are taught to count back to take away or count up to find the difference. Take away 3 + 3 + 5 + 10 + 10 + 10 + 10 + 10 + 10 + 10	Rekenrek Bead strings Numicon Multi-link Dienes Number line
Find the difference $0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10 \ 7 \ 7 \ 7 \ 7 \ 7 \ 7 \ 7 \ 7 \ 7 \ $	
Children are shown how the number sentence can be represented in a part-whole model and on a bar model.	
Year 2	
Number lines Switch to a partially empty number line (e.g. with multiples of 5, 10).	Rekenrek Bead strings



Numicon Multi-link Dienes Place value counters Number line

		1
• + 8 - 45 = 3 3		
+0 8		
405		
30 3		
Here is an example with exchanging.		
$\cdot 75 - 48 = 27$		
70 5		
- 40 8		
70 8		
20 +		
Year 3		
Number lines	Read strings	
Switch to an empty number line to increase flexibility and sneed and allow demonstration of	Dienes	
understanding	Place value counters	
	Number line	
Take away		
875-626=249		
-75		
-4 -70 100		
626 630 700 800 875		
Find the difference		



Children are shown how the number sentence can be represented in a part-whole model and on a bar model.

Partitioning

Children are shown how to partition numbers into hundreds, tens and ones and then subtract them.



Expanded column method

Building on from partitioning, children are shown how to set up the 100s, 10s and 1s in columns, showing the full value of each digit with the larger number on top. They are taught to subtract the 1s first.



Building on from the expanded column method, children are shown how to set up a subtraction putting their 100s, 10s and 1s in the correct place value column. They are taught to subtract the 1s first.	
876-625=251	
876	
625 (876)	
251	
(251) (625)	
With exchanging	
0 1 6 - 6 2 1	
Vear A	
Children consolidate their learning from previous years. Bead strings	
I hey continue to be shown how to use a blank number line, partitioning, the expanded and the Dienes	
Children continue to be shown how the number sentence can be represented in a part-whole model	5
and on a bar model.	
[Children should be shown how to use the number line and the compact column method when	
subtracting decimals	
Year 5	

Children consolidate their learning from previous years.	Dienes	
They continue to be shown how to use a blank number line, the expanded and the compact column	Number line	
method.		
Children continue to be shown how the number sentence can be represented in a part-whole model		
and on a bar model.		
Children should be shown how to use the number line and the second state the durber		
[Children should be shown now to use the number line and the compact column method when subtracting decimals]		
Year 6		
Children consolidate their learning from previous years.	Dienes	
They continue to be shown how to use a blank number line, the expanded and the compact column	Number line	
method.		
Children continue to be shown how the number sentence can be represented in a part-whole model		
and on a bar model.		
[Children should be shown now to use the number line and the compact column method when		
subtracting decimals]		

Multiplication

Key manipulatives
Number line Counters Multi-link cubes
Number line Counters Multi-link

15 3 3 3 3 3	
Arrays Children are shown how multiplication can be represented as an array. $3 \times 7 = 21$	
Year 3	
Children consolidate their learning from previous years. Partitioning Children are shown how to partition numbers into tens and ones and then multiply them. $6 \times 5 4 = 3 2 4$ $6 \times 5 0 = 3 0 0$ $6 \times 4 = 2 4$ 3 0 0 + 2 4 = 3 2 4	
Grid method Building on from partitioning, children are shown how to set up the 10s and 1s in a grid and add the products.	

$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Year 4	
Children consolidate their learning from previous years. They continue to use the grid method and partitioning.	
Children are shown how to partition numbers into hundreds, tens and ones and then multiply them.	
$4 \times 2 7 1 = 1084$	
$h \times 200 = 200$	
$4 \times 200 = 800$	
$4 \times 7 0 = 280$	
4 x 1 = 4	
Grid method	
Building on from partitioning, children are shown how to set up the 100s, 10s and 1s in a grid and add	
the products.	



Children are shown how the grid method and expanded column method can be used when multiplying by a 2 digit number. Children learn how to use the compact column method multiplying by a 2 digit number. Children learn how to use the compact column method multiplying by a 2 digit number. 18 \times 13 1234 1234 1234 1234 1234 19744	
Year 6	
Children consolidate their learning from previous years. They continue to use the grid method, expanded and compact column method.	

Division

CALCULATION STRATEGIES	Key manipulatives	
Year 1		
Start with objects and pictorial representations showingequal sharing of small quantities and repeated subtraction.	Number line Counters Multi-link Bead strings	
Number lines Divide using a number line, continue framing as repeated subtraction. 30 ÷ 6 = 5 6 6 6 6 6 6 7 18 24 30 Arrays Children are shown how to share the dividend by the divisor. 30 ÷ 6 = 5 6 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Number line Counters Multi-link Bead strings	



Year 4	
Children consolidate their learning from previous years. They continue to use the number line with grouping and chunking. Bus-stop method Children learn to apply this formal method. $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	
Year 5	
Children consolidate their learning from previous years. They continue to use the number line with grouping, chunking and the bus stop method.	
Year 6	
Children consolidate their learning from previous years. They continue to use the number line with grouping, chunking and the bus stop method. All these methods can be used to divide by a 2-digit number. Long division Children learn to apply this formal method.	
6 8 4 ÷ 1 9 = 3 6	
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	

Other useful documents:

- Federation approach to teaching times tables
- Mathematical vocabulary progression