

success for today, prepared for tomorrow

# Bonneville Primary School

# Calculations Policy Policy



# Introduction

The Calculations Policy has been put together in consultation with the staff at Bonneville Primary School to ensure that there is a consistent approach to the teaching of calculation throughout the school. All staff should refer to the policy in order to provide continuity and development in written calculations as children progress through the school.

This policy brings together our ideas and practice in striving to provide our children with every opportunity of achieving in mathematics. It has been updated to reflect the changes to the National Curriculum in 2014. It is in line with the framework of objectives for each year group.

#### <u>Aims:</u>

- To raise attainment and increase pupil progress
- To have a consistent approach to the teaching of calculations throughout the school
- To ensure progression between classes and across the Key Stages
- To provide all teaching and support staff with a framework for the teaching of calculation strategies

Zenia McIntosh 2015



# Written calculation strategies: Nursery

# ADDITION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Concrete addition in role play.
- 2 Adding one more.
- 3 Washing line to 10/20
- 4 Adding using fingers.
- 5 Number songs and rhymes.
- 6 Stories relating to number facts, etc.
- 7 Label sets.
- 8 Sorting and classification.
- 9 Ordering.
- 10 Tally charts.
- 11 Number games.

Opportunities given for child to choose themselves

# **SUBTRACTION**

Underpinning mental and oral skills, knowledge and understanding.

- 1 Concrete subtraction in role play.
- 2 Activities involving one less.
- 3 Hiding objects.
- 4 Using fingers.
- 5 Using fingers to calculate one less.
- 6 Songs etc. as in addition.



# Written calculation strategies: Reception

## ADDITION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Washing line to 20. Saying and using number games.
- 2 Missing numbers.
- 3 Number grid to 10 and 100.
- 4 Practical activities in role play.
- 5 Number songs and rhymes.
- 6 Number stories.
- 7 Sorting and ordering.

# Written recording and calculation strategies.

1. Recording additions using both pictures and objects, one more



Moving from concrete materials and pictures to written calculations

- ➤ 2 and 3 is 5
- ≽ 2+3=5

2. Empty box problems. How many more?



(Use numerals as appropriate and vocabulary: Add, equals, more than, altogether, plus and greater.)

- 3. Relate to combining two groups and practical problem solving.
- 4. Writing numbers. Number formation.
- 5. Games and stories, etc.



#### **SUBTRACTION**

Underpinning mental and oral skills, knowledge and understanding.

- 1 Washing line to 20. Saying and using number names.
- 2 Missing numbers.
- 3 Number grid to 10 and 100.
- 4 Dice and other games.
- 5 Practical activities in role play.

#### Written recording calculation strategies

1 Recording subtractions using both pictures and objects – one less.

산 산 산 산	take away 🛞	is	
4 take away 1 is	s = 🗖		

4 – 1 =

- 2 Empty box problems. How many less?
- 3 (using numerals as appropriate and vocabulary less than, take away. Subtract, how many left, difference between.)

운 운 운 운	take away 🔲 = 🟵
4 take away	is 2
4 - 🔲 = 2	

Pictures to match practical situation, subtraction is "taking away"



#### **MULTIPLICATION**

Underpinning mental and oral skills, knowledge and understanding.

1 Role play repeated addition.



2 + 2 + 2 + 2 + 2 = 10

2 ´ 5 = 10 2 multiplied by 5 5 pairs 5 hops of 2

2 Counting in 2's.

- 3 Pairing socks, shoes, etc.
- 4 Doubling numbers.
- 5 Lining up.

#### Written recording and calculation strategies

6 Using number line to count in 2's

0 2 4 6

7 Recording doubling using objects and pictures.



- 8 Songs, books, stories, etc.
- 9 Use hundred squares and number lines to practise counting

#### DIVISION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Practical sharing activities e.g., sweets and fruit.
- 2 How many each?
- 3 Grouping for PE, etc.
- 4 Introduce arrays as a form of recording.



# Written calculation strategies: Year 1

# ADDITION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Washing line to 30. Saying and using number names. Missing numbers.
- 2 Number grid to 100
- 3 Read and write numerals to 20 in numbers and words.
- 4 Count, read and write numbers to 100 in numerals
- 5 show and use subtraction facts within 20
- 6 Represent and use number bonds to 20
- 7 Doubles of numbers to 10.
- 8 Count to and across 100, forwards and backwards, beginning with 0 or 1, or from any given number
- 9 Use a range of mathematical vocabulary including: equal to, more than, most,
- 10 Adding 1 and 2 digit numbers to 20, including 0

#### Method:

Put number in head and count on.

Putting larger number first.

Reinforce learning with equipment.

#### Written recording and calculation strategies

1. Empty box pictorially.



2. Empty box with numerals

 $4 + \Box$  is 7

3p + □ + 1p = 8p

3. Adding three numerals e.g.,

3+4+2=□



4. Using a completed number line or track to count on.



Slider box to introduce empty box number problems. Mental strategies to solve simple problems in addition and encourage children's own recording using conventional signs.

- 3 Problem solving games.
- 4 Number rhymes and songs

# SUBTRACTION

Underpinning mental and oral skills, knowledge and understanding.

1 Washing line to 30. Saying and using number names. Missing numbers.





- 2 Number grid to 100
- 3 Counting back from any number up to 100
- 4 Compare less than (fewer)
- 5 Inverse of number bonds to 20, e.g. 10-3=7
- 6 Use a range of mathematical vocabulary including: less than (fewer), least, take away, difference.

#### Method:

Put number in head and count back. Count back from the largest number. Count up from given number.

# Written recording and calculation strategies

1. How many less (fewer)?



- 2. Empty box pictorially.
- 3. Empty box with numerals



4. Use an empty number line or track to count back.

$$7 - 3 = 4$$



- 4 Slider box to introduce empty box number problems.
- 5 Mental strategies to solve simple problems in subtraction. Encourage children's own recording using conventional signs.

#### **MULTIPLICATION**



Underpinning mental and oral skills, knowledge and understanding.

- 1 Recognise odd and even numbers.
- 2 Doubles of single digit numbers
- 3 Repeated addition
- 4 Counting in 2s, 5s and 10s
- 5 Use arrays to multiply

#### Written recording and calculation strategies

1. Multiplication as repeated addition



2. Arrays as a form of recording

# 5 groups of 3







or





# 5 x 3 = 15

#### DIVISION



Underpinning mental and oral skills, knowledge and understanding.

- 1. Halves of numbers to 10
- 2. Repeated subtraction
- 3. Counting back in 2s, 5s and 10s
- 4. Share and group small amounts using concrete objects

# Written recording and calculation strategies

 Division as sharing and grouping How many groups of 5 are there in 15? What is 15 shared between 5 people?

Practical activities for calculating

15 shared between 5

# Written calculation strategies: Year 2



# ADDITION

Underpinning mental and oral skill, knowledge and understanding.

- 1. Use a number line or number grid to 100 to compare and order numbers
- 2. Read and write numbers to at least 100
- 3. Read and write numbers to one hundred in numerals and words
- 4. Find more than, one more, two more, five more, ten more, 20 more.
- 5. Use and understand range of Mathematical vocabulary
- 6. Count on in steps of 10 from any number
- 7. Understand that addition can be done in any order

#### Method:

Put number in head and count on in 1s, 2s, 5s and 10s. Put larger number first Use numbers bonds to 20 (derive facts to 100) Doubles to 20 (extend facts to 100) Recognise and partition two digit numbers into tens and units e.g. 235=200+30+5

Place value arrow cards.

Add a near multiple of 10 by adjusting.

Reinforce learning with equipment.

# Written recording and calculation strategies

- 1. Solve number problems recording using conventional signs and symbols. Develop recording in the context of practical work and in explaining how problems were solved.
- 2. Empty number boxes with missing numbers in all three positions.

 $3 + 4 = \square$  $3 + \square = 7$  $\square + 4 = 7$ 

3. Use blank number line to count on in 1's or 10's (or head)

36+40 =





4. Use arrow cards and place value materials to partition (and part partition) numbers into tens and units





- 6. Apply increasing knowledge of written method through recording addition of 1 and 2 digit numbers as vertical calculation
  - a. First using an expanded method (with no crossing the boundaries)

22 + 14 =		54	4 +	5 =	=
2 0 + 2		5	0	+	4
+ 1 0 + 4	+				5
3 0 + 6		5	0	+	9
=36				=5	59

b. Then shortening this to a more compact expanded method once children are secure with the place value of each digit (with no crossing the boundaries)

2	2			5	4
+ 1	4		+		5
3	0			5	0
	6				4
3	6	-		5	4



5

5

╋

4

5

9

c. Moving to a compact method (with no crossing the boundaries)



7. Adding 9 by adding 10 and adjusting (also19)



#### **SUBTRACTION**

Underpinning mental and oral skills, knowledge and understanding.

- 1. Number line to 50 and 100
- 2. Sections of number line to 1000
- 3. Number grid to 100
- 4. Empty number lines
- 5. Less than (fewer than), one less (fewer), ten less (fewer), five less (fewer), 10 less (fewer), 20 less (fewer)
- 6. Method. Put largest number in head and count back in 1s, 2s, 5s and 10s.
- 7. Inverse of number bonds to 20 in reverse 20-7=13 (derive facts to 100)
- 8. Halves to 20 (extend facts to 100)
- 9. Place value for 2,3 and 4 digit numbers
- 10. Use part partitioning
- 11. Finding the difference by counting up
- 12. Understand that the order of numbers affects the answer when subtracting

#### Written recording and calculation strategies

1. Solve number problems recording using conventional signs and symbols. Develop recording in the context of practical work and in explaining how problems were solved.

2. Empty number boxes with missing numbers in all three positions



 $10 - 7 = \square$  $10 - \square = 3$  $\square + 3 = 10$ 

3. Use blank number line to find the difference between numbers that are close by counting up in 1s and 10s



4. Part partitioning numbers into tens and units to subtract on a blank number line. E.g. 49-27= can also be written 49-20-7=



5. Apply increasing knowledge of written method through recording subtraction of 1 and 2 digit numbers as vertical calculation

a. First using an expanded method (with no crossing the boundaries)





b. Moving to a compact method, once children are secure with the value of each digit (with no crossing the boundaries)

	7	8			5	4	
-		3		-	1	2	
	7	5	_		4	2	

6. Subtracting 9 by subtracting 10 and adjusting using mental methods and informal jottings (also 19)



#### **MULTIPLICATION**



Underpinning mental and oral skills, knowledge and understanding.

- 1. Recognise odd and even
- 2. Show that multiplication can be done in any order
- 3. Recall doubles of numbers to 20
- 4. Understand multiplication as repeated addition
- 5. Know by heart the facts for the 2,5 and 10 times tables
- 6. Understand the meaning of the sign X
- 7. Understand and use multiplication in problem solving

#### Methods:

Counting in 2s, 5s and 10s

Use place value to understand the effect of multiplying by 10 Use concrete materials to complete multiplication problems

#### Written recording and calculation strategies

1. Multiplication as repeated addition in any order. (Using blank number line.)







Underpinning mental and oral skills, knowledge and understanding.

- 4 Halves of numbers to 20
- 5 Understanding division as repeated subtraction
- 6 Recall division facts for 2,5 and 10 x tables
- 7 Recognition of sign ÷
- 8 Use division in problem solving

#### Methods:

Counting in 2s, 5s and 10s

Use place value to understand the effect of multiplying by 10 Use concrete materials to complete multiplication problems

-5

q

#### Written recording and calculation strategies

- 1. Reintroduce division as sharing.
- 2. Division as repeated subtraction (moving away from sharing) on an empty number line

-5

-5

19

-5

24

 $\overline{29} = 5r4$ 

3. Use an empty number line to divide numbers that leave remainders

14

-5

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4. Use arrays as a form of recording making links with multiplication facts (See multiplication)





# Written calculation strategies: Year 3

# ADDITION

- 1. Underpinning mental and oral skills, knowledge and understanding.
- 2. Number line to 50 and 100
- 3. Sections of number line to 1000
- 4. Place value chart/ arrow cards to 1000
- 5. Number grid to 100
- 6. Empty number lines
- 7. More than, one more, ten more, 20 more, 100 more
- 8. Compare, read, write and order numbers up to 1000

#### Method:

Put number in head and count on in 1s, 10s and 100s Putting larger number first Number bonds to 20 (extend facts to 100) Doubles to 20 (extend facts to 100) Format 21=20+1 235 = 200 + 30 + 5 Place value arrow cards Add a near multiple of 10 by adjusting

#### Written recording and calculation strategies

- 1. Solve number problems recording using conventional signs and symbols. Develop recording in the context of practical work and in explaining how problems were solved.
- 2. Empty number boxes with missing numbers in all three positions.

$$34 + 5 = \square$$
  
 $34 + \square = 39$   
 $\square + 5 = 39$ 

3. Add HTU + U, HTU+TU, HTU+HTU mentally, using informal jotting to support calculations

Develop and build on informal year 2 methods and strategies



- 4. Use formal written methods to add up to three digit numbers
  - a. Revise using an expanded method (crossing the boundary in one column)

223 + 142 =	349 + 143 =
2 0 0 + 2 0 + 3	3 0 0 + 4 0 + 9
+ 1 0 0 + 4 0 + 2	+ 1 0 0 + 4 0 + 3
3 0 0 + 6 0 + 5	4 0 0 + 8 0 + 12
=365	=492

b. Develop this using a method that requires less recording, once children have a secure understanding of the place value of each digit. Begin by adding the units (crossing the boundary in one column)

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

c. Move to a compact method (crossing the boundary in one column)



#### SUBTRACTION



Underpinning mental and oral skills, knowledge and understanding.

- 1. Number line to 50 and 100
- 2. Sections of number line to 1000
- 3. Place Value chart/ arrow cards to 1000
- 4. Number grid to 100
- 5. Empty number lines
- 6. Less than (fewer), one less (fewer), ten less (fewer), 20 less (fewer)

#### Methods:

Put number in head and count back in 1s, 10s and 100s. Count back from largest number Inverse of number bonds to 20 (extend to 100) Halves to 20 (extend facts to 100) Place value for 2, 3 and 4 digit numbers Partitioning format Subtract a near multiple of 10 by adjusting

#### Written recording and calculation strategies

- 1. Extend subtraction to three digit numbers
- 2. Solve number problems using conventional signs and symbols. Developing recording in the context of practical work and in explaining how problems are solved.
- 3. Empty number box problems (as for addition)
- 4. Counting back using an empty number line or in the head
- 5. Counting in 1s, 10s and 100s
- 6. Using mental methods to subtract HTU-HTU, HTU-TU, HTU-U supported by informal jottings

See Year 2 for methods and strategies

- 7. Use formal written methods to add up to three digit numbers
  - a. First using an expanded method beginning with subtracting the least significant figure



Including examples that cross the boundary in one column 834 - 217 =

	8	0	0	<b>3</b> <sup>2</sup>	0	14	
-	2	0	0	1	0	7	
	6	0	0	1	0	7	
							- = 617

Moving to a compact method (crossing the boundary in one column)

	2	8	7		8	<b>3</b> <sup>2</sup>	<sup>1</sup> 4
-	1	4	2		2	1	7
	1	4	5		6	1	7

#### MULTIPLICATON

Underpinning mental and oral skills, knowledge and understanding.

- 1 Understand multiplication as repeated addition
- 2 Know by heart the facts for tables 2,3,4,5 and 10
- 3 Recall the division facts for the 8 times table
- 4 Recognise sign X
- 5 Use multiplication in problem solving
- 6 Doubles of numbers to 100
- 7 Understand that multiplication can be done in any order

#### Methods:

Count in multiples of 4, 8, 50 and 100 Multiplication of a number by 10,100 and 1000 Doubling a 2/3 digit number by partitioning Using repeated doubling, e.g. X4 Derive multiplication facts based on the facts that they already know Use understanding of partitioning to multiply TUxU mentally

e.g.

24 x 3 can be calculated as:

20 x 3 + 4 x 3 =



Empty number boxes with missing numbers in all three positions.



Use mental strategies supported by informal jottings taught in years 2 and 3

#### Written recording and calculation strategies

- 1 Multiplication as repeated addition on a number line (see year 2)
- 2 Use arrays to introduce the grid method
- 3 Develop written methods for multiplying TU x U 23 x 3 =



## DIVISION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Understand division as repeated subtraction
- 2 Halves of numbers to 100
- 3 Know facts for 2,3,4,5 and 10 times tables
- 4 Use division in problem solving using repeated subtraction
- 5 Estimate and approximate
- 6 Understand that division is the inverse of multiplication

#### Methods:

Count back in multiples of 4, 8, 50 and 100 Doubling a 2/3 digit number by partitioning Using repeated halving Empty number boxes with missing numbers in all three positions.

$$8 \div 2 = \square$$
  
 $24 \div \square = 4$   
 $\square \div 3 = 10$ 



#### Written recording and calculation strategies

- 1 Division of TU÷U and U÷U as repeated subtraction using a blank number line (see year 2)
- 2 Finding remainders after division (see year 2)
  - 3 Use arrays as a form of recording making links with multiplication facts (See multiplication)



$$45 \div 5 = (25 + 20) \div 5$$
  
= 5 + 4  
= 9



# Written calculation strategies: Year 4

# ADDITION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Number line to 100
- 2 Sections of number line -100 to 1000+
- 3 Number grid to 100
- 4 Empty number lines
- 5 Recognise place value in numbers up to 10 000
- 6 Compare, read write and order numbers to to 10000

#### Methods:

Count on in 10s, 100s and 1000s Partitioning 21=20+1 235 = 200 + 30 + 5 Place value charts and arrow cards to 10 000 Add a near multiple of 10 by adjusting Use known facts to add mentally Crossing the 100 and 1000 boundary Round numbers to the nearest 10, 100 or 1000 to estimate Add 10, 100 and 1000 to a given number

#### Written recording and calculation strategies

- 1 Solve number problems recording using conventional signs and symbols. Develop recording in the context of practical work and in explaining how problems were solved.
- 2 Empty number boxes with missing numbers in all three positions.
- 3 Continue work from year 3 using empty number lines to add up to 4 digit numbers
- 4 Develop use of a standard written method for addition of ThHTU+ThHTU.
- 5 Introduce addition of numbers with up to two decimals to solve simple money and measure problems

a. First using an expanded metho boundary in more than one colu	d (crossing the umn)
2249 + 2914 =	$\pounds 22.24 + \pounds 31.97 =$
2000 + 200 + 40 + 9	£20 + £2 + 20p + 4p
+ 2000 + 900 + 10 + 4	+ £30 + £1 + 90p + 7p
4000 + 1100 + 50 + 13	£50 + £3+£1.10+11p
=5163	=£54.21
b. Once children can confidently (	and instantly) identify the value of each digit,

b. Once children can confidently (and instantly) identify the value of each digit, reduce the recording needed, but continue to add each digit separately (crossing the boundary in more than one column)

2249	+ 2	291	4 =	U		£22.24 + £31.97 =					
		2	2	4	9		2	2		2	4
	+	2	9	1	4	+	3	1	•	9	7
				1	3					1	1
				5	0			1	•	1	0
		1	1	0	0			3	•	0	0
		4	0	0	0		5	0	•	0	0
		5	1	6	3	£	5	4	-	2	1

c. Move to a compact method formal method (crossing the boundary in more than one column)

224	9 +	29	14 =	-		£2	2.24	4 +	£31	1.97
	<mark>1</mark> 2	2	<sup>1</sup> 4	9		2	<sup>1</sup> 2	-	<sup>1</sup> 2	4
+	2	9	1	4	+	3	1	•	9	7
	5	1	6	3	£	5	4		2	1

#### **SUBTRACTION**



Underpinning mental and oral skills, knowledge and understanding

- 1 Number line to 100
- 2 Sections of number line to 1000+
- 3 Number grid to 100

#### Methods:

Count back in 10s, 100s and 1000s Halves to 20 (extend facts to 100) Place value for 2, 3 and 4 digit numbers (partitioning format) Subtract a near multiple of 10 by adjusting Use known number facts to subtract mentally Subtract multiples of 10, 100 and 1000 from 2, 3 and 4 digit numbers Crossing the 100 and 1000 boundary Finding difference using number line

## Written recording and calculation strategies

- 1 Solve number problems using conventional signs and symbols. Develop recording in the context of practical work and in explaining how problems are solved.
- 2 Empty number box problems with numbers missing in all three position

3 Build on prior learning from year 3 using empty number lines to find the difference between numbers with up to three digits that are close together

4 Develop use of standard written methods to subtract numbers with up to four digits (ThHTU- ThHTU)

5 Use expanded methods to explore subtraction of numbers with up to two decimal places in the context of money and measures.

2 First using an expanded method (crossing the boundary in more than one column) 3684 - 2917 = £54 28 - £36 19

	-				~~ .	~			
<del>3000</del>	<mark>1</mark> 600	<del>80</del>	<mark>1</mark> 4		<del>£50</del>	£14	<del>20</del> р	<mark>1</mark> 8p	
2000		70			£40		10p		
- 2000	900	10	7	-	£30	£6	10p	9p	
0	700	60	7		£10	£8	0p	9р	
		=76	7				=£	218.09	



3 Once children can confidently (and instantly) identify the value of each digit, reduce the recording needed, but continue to subtract each digit separately, beginning with the least significant digit (crossing the boundary in more than one column)

3684 - 2917 =	£54.28 - £36.19
<del>3</del> <sup>2</sup> <sup>1</sup> 6 <del>8</del> <sup>7</sup> <sup>1</sup> 4	<del>5</del> <sup>4</sup> <sup>1</sup> 4 . <del>2</del> <sup>1</sup> <sup>1</sup> 8
- 2 9 1 7	- 3 6 . 1 9
7	9
6 0	0 0
7 0 0	8.00
0 0 0 0	10.00
767	18.09

#### MULTIPLICATION

Underpinning mental and oral skills, knowledge and understanding

- 1 Understand multiplication as repeated addition
- 2 Know by heart the facts for tables 2,3,4,5,6,8 and 10
- 3 Use multiplication in problem solving
- 4 Doubles of numbers to 100
- 5 Understand that multiplication can be done in any order
- 6 Recall multiplication facts up to 12x12

#### Methods:

Counting in multiples of 6, 7, 9, 25 and 1000 Multiplication of a number by 10,100 and 1000 Doubling a 2/3 digit number by partitioning Using repeated doubling, e.g. X4 Use understanding of partitioning, factors and commutativity to multiply TUxU mentally

e.g.

24 x 3 can be calculated as:

20 x 3 + 4 x 3 = 12 x 3 x 2 =



# 6 x 3 x 2 x 2 = Written recording and calculation strategies

1 Revise the use of grid method to ensure secure understanding of the place value of digits with HTUxU and TUxU

323 x 3 =



2 Move to using an expanded column method, ensuring that the link between each step and the grid method is made explicit



# DIVISION

Underpinning mental and oral skills, knowledge and understanding

- 1 Understand division as repeated subtraction
- 2 Find halves of numbers to 100
- 3 Derive division facts for all multiplication facts up to 12 x 12
- 4 Use division in problem solving
- 5 Estimate and approximate
- 11 Understand that division is the inverse of multiplication

#### Methods:

Counting back in multiples of 6, 7, 9, 25 and 1000 Divide TU and HTU numbers by 10 and 100 Halving a TU and HTU digit number by partitioning and part partitioning



Using repeated halving

#### Written recording and calculation strategies

1 Use knowledge of place value and number facts to complete division of TU bu U, HTU by U and HTU by TU

- a. Revise the use of an empty number line to complete division as repeated subtraction (see year 2)
- b. Revise written division strategies using an expanded horizontal method (see year 3)

$$69 \div 3 = (30 + 30 + 9) \div 3 = 10 + 10 + 3 = 23$$

$$148 \div 4 =$$

$$= (100 + 40 + 8) \div 4$$
  
= 25 + 10 + 2  
= 37

c. Introduce a vertical method for division that builds on the expanded horizontal method (chunking)



# Written calculation strategies: Year 5

#### Addition

Underpinning mental and oral skills, knowledge and understanding

- 1 Number line to 100
- 2 Negative number line
- 3 Decimal number line
- 4 Sections of number line to 1000+
- 5 Number grid to 100
- 6 Empty number lines
- 7 Place value charts to 1 000 000
- 8 Arrow cards to 1000
- 9 Decimal arrow cards
- 10 Compare, order, read and write numbers to 1 000 000
- 11 Read and interpret negative numbers in context

#### Methods:

Continue use of empty number lines

Use rounding to estimate and check the reasonableness of answers Continue methods as for year 3+4

#### Written recording and calculation strategies

Empty number lines As for year 3 and 4

EXTENDED METHODS

As for year 4 Extend to increasingly large numbers and to decimals up to three places Consolidate use of compact column addition with numbers crossing the boundaries.

#### SUBTRACTION

Underpinning mental and oral skills, knowledge and understanding

- 1 Number line to 100
- 2 Negative number line
- 3 Decimal number line
- 4 Sections of number line to 1000+
- 5 Number grid to 100
- 6 Empty number lines



#### Methods:

Continue work using empty number lines Continue methods as for year 4 Find a difference between two close numbers on a number line

#### Written recording and calculation strategies

- 1 Empty number line
  - As for year 3 and 4

2 Revise expanded subtraction method for numbers up to 1 000 000 and those with three decimals

As year 4

3 Once children have a secure understanding of the value of digits and of the processes involved in exchange or 'carrying', move to a compact written method for subtraction.

	5	<sup>1</sup> 4	<sup>1</sup> 2			2	<sup>1</sup> 4	<sup>1</sup> 0	
	6	5	3	<mark>1</mark> 2		3	5	1	<sup>1</sup> 7
-	1	8	4	9	-	1	6	9	8
	4	6	8	3		1	8	1	9

# **MULTIPLICATION**

Underpinning mental and oral skills, knowledge and understanding

- 1 Understand multiplication as repeated addition
- 2 Know by heart the facts for all tables
- 3 Use multiplication in problem solving

#### Methods:

Multiplication of a number by 10, 100 and 1000 Multiply decimals by 10, 100 or 1000 Count up in powers of ten from any number up to 1 000 000 Doubling number by partitioning Using repeated doubling Use knowledge of factors and factor pairs when calculating Use understanding of commutativity to calculate



#### Written recording and calculation strategies

1 Continue with methods as in years 3 and 4

2 Develop expanded column method to a short multiplication method for ThHTUxU once children have a secure understanding of place value and the processes involved.



Including examples that cross the boundaries

х	6	4	8	2 4						
		3	2	8 0			1 6	3 ∕I	ß	2
	1	6	0	0		х	0	4	0	4
2	4	0	0	0		2	5	9	2	8
2	5	9	2	8	becomes					



#### 3 Introduce expanded long multiplication for HTUXTU

and ThHTU xTU, first revising the grid method and making the links between the two methods



#### DIVISION

Underpinning mental and oral skills, knowledge and understanding

- 1 Understand division as repeated subtraction
- 2 Know facts for all tables
- 3 Use division in problem solving
- 4 Estimate and approximate

#### Methods:

Division of a number by 10, 100 and 1000 Divide decimals by 10, 100 or 1000 Halving a number by partitioning Count up in powers of ten from any number up to 1 000 000 Using repeated halving Use knowledge of factors and factor pairs when calculating

#### Written recording and calculation strategies

- 1 Continue with methods as in years 3 and 4
- 2 Introduce short division method for ThHTU÷U
  - a. Begin with examples that do not cross the boundary



b. Moving on to examples that cross the boundary

c. Include examples that give rise to remainders

	0	9	0	3	r4
7	6	<mark>6</mark> 3	2	<sup>2</sup> 5	



# Written calculation strategies: Year 6

#### ADDITION

Underpinning mental and oral skills, knowledge and understanding

- 1 Number line to 100
- 2 Sections of number line to 1000+
  - 3 Negative number line. Vertical, horizontal
- 4 Decimal number line. Scales, Tenths, Hundredths and Thousandths
- 5 Number grid to 100
- 6 Empty number lines
- 7 Place Value charts to 10 000 000

#### Methods:

Continue use of empty number lines Continue methods as for year 3, 4 and 5

#### Written recording and calculation strategies

As for years 3, 4 and 5

#### SUBTRACTION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Number line to 100
- 2 Sections of number line to 1000+
- 3 Negative number line. Vertical, horizontal.
- 4 Decimal number line. Scales. Tenths, Hundredths, and Thousandths
- 5 Number gird to 100
- 6 Empty Number lines

#### METHOD

Continue to work using empty number lines As for year 4 and 5.

#### Written recording and calculation strategies

As for years 3, 4 and 5



#### **MULTIPLICATION**

Underpinning mental and oral skill, knowledge and understanding

- 2 Understand multiplication as repeated addition
- 3 Know by heart the facts for all tables
- 4 Use multiplication in problem solving

#### Methods:

Multiplication of a number by 10, 100 and 1000 Multiply decimals by 10, 100 or 1000 Doubling number by partitioning Using repeated doubling Use understanding of factors and factor pairs to calculate mentally Use understanding of commutativity

#### Written recording and calculation strategies

- 1 Continue with methods as in years 3, 4 and 5
- 2 Use short column method to multiply up to ThHTUxU
- 3 Use grid method, flowed by short column method to multiply U.thxU and T.thxTU
- 4 Revise expanded long multiplication for up to ThHTUxTU and move on to standard long multiplication when children have a secure understanding of place value So

		3	7	8	6						
	X			2	4						
				2	4						
		1	3	2	0						
	1	2	8	0	0			31	3 1	2 1	
	1	2	0	0	0			3	7	8	6
			1	2	0		Х			2	4
		1	6	0	0		1				
	1	4	0	0	0		1	5	1	4	4
_	6	0	0	0	0	_	7	5	7	2	0
	9	0	8	6	4	bacamas	9	0	8	6	4
						necomes					



#### DIVISION

Underpinning mental and oral skills, knowledge and understanding.

- 1 Understanding division as repeated subtraction
- 2 Know facts for all tables
- 3 Use division in problem solving
- 4 Estimate and approximate

#### Methods:

Division of a number by 10, 100 and 1000 Divide decimals by 10 or 100 Halving a number by partitioning Using repeated halving

#### Written recording and calculation strategies

- 1. Continue with methods as in years 3 and 4
- 2. Continue to use short division method as introduced in year 5
- 3. Introduce and develop use of long division to calculate ThHTU÷TU
  - So

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To calculate 8217 \div 23 =
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Begin by encouraging children to jot a list of the first 10 multiples of the divisor for reference

Set out the calculation using the 'bus stop' method, ensuring that children understand the value of the digits and their placement.





23 into 8 doesn't go so we look at the next digit





above the two and multiply 3x23 = 69

12 goes into 82 3 times so we put this

Calculate 82 - 69 = 13 to find the remainder

Bring down the next digit (1) and divide. 23 goes into 131 5 times so put the 5 above the 1 (the digit that you brought down)  $23 \times 5 = 115$ 

Calculate 131-115 to find the remainder



Bring down the next digit (7) and divide.

23 goes into 167 7 times. Put the digit 7 above the digit that you brought down. Calculate 7x23 = 161

Subtract 167 - 161 to find the remainder and write above the line after a lower case r