Wansdyke Primary School Calculation Policy 2019

Reception			
Non-negotiable Milestones	**Early learning Goals**	**Addition**	**Subtraction**
Count reliably from 1 to 20. **Place numbers to 20 in order and say which number is one more or less than a given number.**		**Mental** Number bonds to 5 and 10. **Written** Recognise +1 to mean 1 more. Recognise = to mean the same as Simple addition problems using quantities and objects. Add 2 single-digit numbers and count on or back to find the answer up to 10.	**Mental** Number bonds to 5 and 10. **Written** Recognise -1 to mean 1 less. Recognise = to mean the same as Simple subtraction problems using quantities and objects. Subtract 2 single-digit numbers and count on or back to find the answer up to 10.
Non-negotiable Milestones		**Multiplication**	**Division**
		Mental Orally refer to x with the language of repeated addition. Use 'groups of' 'lots of' in discussion. **Written** Solve doubling problems using objects and record pictorially or photographs.	**Mental** Orally refer to ÷ with the language of sharing. **Written** Solve halving problems using objects and record pictorially or with photographs.

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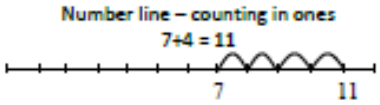
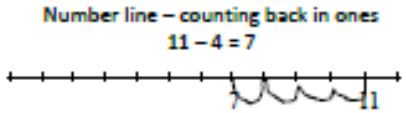
Year 1

Non-negotiable Milestones	National Curriculum	Addition	Subtraction
▪ Understanding of numbers to 100. ▪ Uses number bonds to 20 when adding and subtracting. ▪ Understanding of concept of half and quarter of shapes and quantities. ▪ Can explain the value of coins and notes. ▪ Uses vocabulary related to days, weeks and months. ▪ Can tell the time to o'clock and half past. ▪ Can measure in non-standard units.	▪ 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 = – 9.	**Mental** Number bonds to 10 and 20. **Written** 	**Mental** Number bonds to 10 and 20. **Written** 
Non-negotiable Milestones	**National Curriculum**	**Multiplication**	**Division**
▪ Beginning to understand the concept of multiplication and division. ▪ Can count in multiples of 2, 5 and 10.	▪ Solve one-step problems involving multiplication and division, by calculating the answer using concrete objects, pictorial representations and arrays with the support of the teacher.	**Mental** Counting in steps of 2, 5 and 10. Double numbers up to 20 **Pictorial** There are three sweets in one bag. How many sweets are there in 5 bags? 	**Mental** Counting in steps of 2, 5 and 10. How many steps of 2 does it take to get to 12? Halve even numbers up to 20. **Practical division of objects** 12 footballers shared into three teams. **Sharing and grouping using pictures.**

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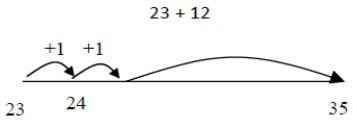
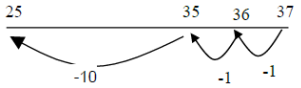
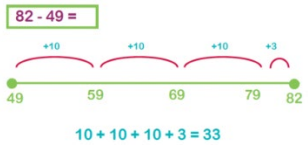
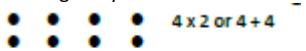
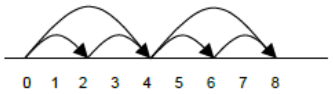
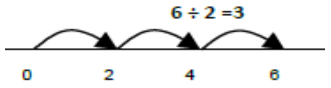
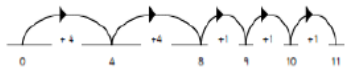
Year 2

Non-negotiable Milestones	National Curriculum	Addition	Subtraction
▪ Demonstrates secure understanding of place value up to 100 and applies this when solving calculations. ▪ Can calculate all four operations using mental and written methods. ▪ Can apply the inverse to addition and subtraction calculations. ▪ Can use number bonds to find related facts to 100.	▪ 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.	**Mental** Adding 9 and 11 Adding 19 and 21 Partitioning **Written** Using an empty number line  Expanded addition 42 + 34 40 + 2 30 + 4 70 + 6 = 76	**Mental** Subtracting 9 and 11 Subtracting 19 and 21 Partitioning Counting on to find a difference where numbers are close. **Written** Using an empty number line Counting back 37- 25  Counting on 

Non-negotiable Milestones	National Curriculum	Multiplication	Division
▪ Demonstrates fluency in multiplication and division facts for 2, 5 and 10 times tables. ▪ Can calculate all four operations using mental and written methods. ▪ Uses their knowledge of fractions to find, name and write 1/3, ¼, 2/4, and 3/4.	▪ Recall and use multiplication and division facts for the 2, 5 and 10 multiplication tables, including recognising odd and even numbers ▪ Calculate mathematical statements for multiplication and division within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs ▪ Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot ▪ Solve problems involving multiplication and division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts.	**Mental** Multiplication facts for 2,5, and 10 Use knowledge of doubling **Written** Creating arrays  Number line  4 x 2 or 2x 4	**Mental** Division facts for 2,5 and 10 Use knowledge of halving **Written** Creating arrays 8 ÷ 4  11÷4 = 2 r 3 

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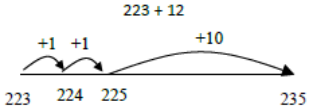
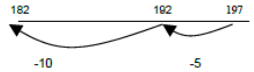
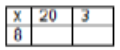
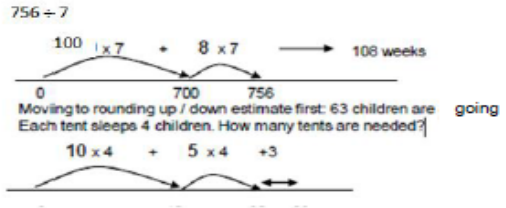
Year 3

Non-negotiable Milestones	National Curriculum	Addition	Subtraction
▪ Applies an understanding of the place value of numbers up to 1000. ▪ Can add and subtract 3 digit numbers. ▪ Has an understanding of fractions including tenths	▪ 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.	**Mental** Adding TU to TU when they are secure with partitioning method from written. HTU + U HTU + multiple of ten HTU + multiple of hundred Estimating answers first	**Mental** Subtracting TU to TU when they are secure with partitioning method from written. HTU - U HTU - multiple of ten HTU - multiple of hundred Estimating answers first Counting up to find a difference where numbers are close together with appropriate numbers
		Written Number line – estimate first.  Expanded addition 358 + 73 11 (8+3) 120 (50 + 70) 300 431	**Written** Number line – estimate first. 197- 15  Expanded subtraction 754 700 50 4 - 86 80 6 600 60 8 =668 "We need to rearrange the number so that there are enough tens to complete the subtraction." " 754 600 140 14 - 86 80 6 600 60 8 =668
Non-negotiable Milestones	**National Curriculum**	**Multiplication**	**Division**
▪ Demonstrates fluency using multiplication and division facts for 3, 4 and 8 times tables. ▪ Can multiply and divide 2 digit and 1 digit numbers.	▪ Recall and use multiplication and division facts for the 3, 4 and 8 multiplication tables ▪ Write and calculate mathematical statements for multiplication and division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods ▪ Solve problems, including missing number problems, involving multiplication and division, including positive integer scaling problems and correspondence problems in which n objects are connected to m objects.	**Mental** Multiplication facts for 3,4 and 8 Multiplying multiples of 10 e.g. 30 x 4	**Mental** Division facts for 3,4 and 8
		Written Grid Method  With manipulatives and then without Expanded multiplication 46 x 9 54 (9 x 6) 360 (9 x 40) 414	**Written** Number line using multiples 

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Year 4

Non-negotiable Milestones

- Can apply an understanding of the place value of numbers up to 10,000 including decimals.
- **Can calculate with whole numbers using all four written methods.**
- Applies an understanding of fractions when adding, subtracting and finding decimal equivalences.

National Curriculum

- 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.

Addition

Mental

Reinforcing partitioning
Recap on compensation (-39 – 41 etc)

Written

Expanded addition

```
  7648
+ 1486
    14
   120
  1000
+8000
  9134
```

Standard compact addition

```
  5,647
+ 2,994
  8,641
   1 1
```

Subtraction

Mental

Counting on to find a difference where numbers are close together with appropriate numbers

Written

Expanded subtraction with exchange.

```
 754    700  50   4
-  86         80   6
 ____   ____ ____ ____
           600  60   8  =668

 754    600 140  14
-  86         80   6
 ____   ____ ____ ____
           600  60   8  =668
```

Standard compact subtraction

```
    4 11
  5,1 0
- 3,025
  2,125
```

Non-negotiable Milestones

- Recalls times tables to 12 x 12 and the associated division facts.
- **Calculates with whole numbers using all four written methods.**

National Curriculum

- Recall multiplication and division facts for multiplication tables up to 12 × 12
- Use place value, known and derived facts to multiply and divide mentally, including: multiplying by 0 and 1; dividing by 1; multiplying together three numbers
- Recognise and use factor pairs and commutativity in mental calculations
- Multiply two-digit and three-digit numbers by a one-digit number using formal written layout
- Solve problems involving multiplying and adding, including using the distributive law to multiply two digit numbers by one digit, integer scaling problems and harder correspondence problems such as n objects are connected to m objects.

Multiplication

Mental

If the children know multiplication and division facts for: 2/5/10/3/4/8/ they now need to learn.
6 x 6 7 x 7 9 x 9 11 x 11 7 x 6 9 x7 11 x 9 12 x 11 9 x 6 11 x 7 12 x 9 12 x 12
11 x 6 12 x 7 12 x 6

Written

Expanded multiplication

```
  346
  x  9
   54 (9 x 6)
  360 (9 x 40)
 2700 (9 x 300)
 3114
```

Extension to compact multiplication where secure.

Division

Mental

Using times table facts for all associated divisions to 12 x 12

Written

Short division with manipulatives

98 ÷ 7 becomes

```
   1  4
  ____
7 | 9  8
    2
```

Answer: 14

432 ÷ 5 becomes

```
   8  6  r 2
  _____
5 | 4  3  2
    3
```

Answer: 86 remainder 2

Long division 'Chunking' with TU ÷ U

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Year 5

Non-negotiable Milestones

- Is secure in numbers up to 1 million.
- Can calculate with decimals and whole numbers, using all four written methods.
- Can identify links between properties of numbers up to 100.

National Curriculum

- 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.

Addition

Mental

Choose and use appropriate and efficient mental strategies (to include decimals to 2d.p.)

Written

Standard written addition

789 + 642 becomes

Answer: 1431

Subtraction

Mental

Choose and use appropriate and efficient mental strategies (to include decimals to 2d.p.)

Written

Standard written subtraction

932 – 457 becomes

Answer: 475

Non-negotiable Milestones

Understands how the values of digits change when multiplied and divided by multiples of 10, 100 and 1000.

Can calculate with decimals and whole numbers, using all four written methods.

Understands a range of fraction types and uses them in calculations.

National Curriculum

- Identify multiples and factors, including finding all factor pairs of a number, and common factors of two numbers
- Know and use the vocabulary of prime numbers, prime factors and composite (non-prime) numbers
- Establish whether a number up to 100 is prime and recall prime numbers up to 19
- Multiply numbers up to 4 digits by a one- or two-digit number using a formal written method, including long multiplication for two-digit numbers
- Multiply and divide numbers mentally drawing upon known facts
- divide numbers up to 4 digits by a one-digit number using the formal written method of short division and interpret remainders appropriately for the context
- multiply and divide whole numbers and those involving decimals by 10, 100 and 1000

Multiplication

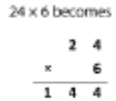
Mental

Calculation with multiples of 10 e.g. 40 x 80.

Written

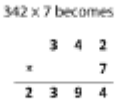
Short multiplication

24 x 6 becomes



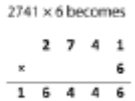
Answer: 144

342 x 7 becomes



Answer: 2394

2741 x 6 becomes



Answer: 16 446

Long multiplication TUxTU

Grid method to model calculations needed for compact long multiplication

x	30	4
40		
5		

34
x 45
170
1360
1530

Division

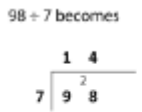
Mental

Choose and use appropriate and efficient mental strategies.

Written

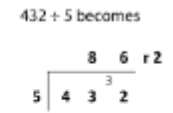
Short division

98 ÷ 7 becomes



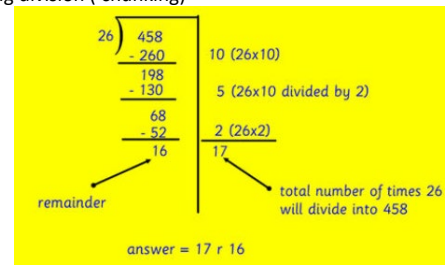
Answer: 14

432 ÷ 5 becomes



Answer: 86 remainder 2

Long division (chunking)



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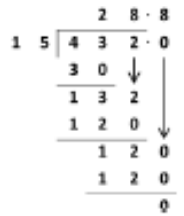
Year 6

Non-negotiable Milestones	National Curriculum	Addition	Subtraction
Secure in reading, using and place value of numbers up to 10 million Can calculate with decimals and whole numbers, using the most efficient method.	▪ Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why	**Mental** Choose and use appropriate and efficient mental strategies **Written** Standard written addition to include decimals.	**Mental** Choose and use appropriate and efficient mental strategies **Written** Standard written subtraction to include decimals.
Non-negotiable Milestones	**National Curriculum**	**Multiplication**	**Division**
Can calculate with decimals and whole numbers, using the most efficient method. Can manipulate fractions	▪ Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication ▪ Divide numbers up to 4 digits by a two-digit whole number using the formal written method of long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context ▪ Divide numbers up to 4 digits by a two-digit number using the formal written method of short division where appropriate, interpreting remainders according to the context ▪ Perform mental calculations, including with mixed operations and large numbers ▪ Identify common factors, common multiples and prime numbers ▪ Use their knowledge of the order of operations to carry out calculations involving the four operations	**Mental** Choose and use appropriate and efficient mental strategies **Written** Short multiplication to include decimals. 14.7 X 6 88.2 2 4 Long multiplication HTU x TU 465 X 38 3720 13950 17670	**Mental** Choose and use appropriate and efficient mental strategies **Written** Short and long division as in Y5 but with remainders given as fractions, decimals or as integers as appropriate to the task. 432 ÷ 15 becomes