

Progression towards a standard written method of calculation

The National Curriculum for Mathematics provides a structured and systematic approach to teaching number. There is a considerable emphasis on teaching mental calculation strategies, problem solving and using and applying. Up to the age of 6 (Year 1), informal written recording should take place regularly and is an important part of learning and understanding that Mathematics is a written language. More formal written methods should follow only when the child is able to use a wide range of mental calculation strategies though there is an expectation that formal methods are introduced as soon as the children are ready.

The aim is that children use mental methods when appropriate, but for calculations that they cannot do in their heads they use an efficient written method accurately and with confidence. At Barcombe CE Primary School, children are entitled to be taught and to acquire secure mental methods of calculation and one efficient written method of calculation, for each of the four rules, which they know they can rely on when mental methods are not appropriate.

The objectives in the revised Framework show the progression in children's use of written methods of calculation in the strands 'Using and applying mathematics' and 'Calculating'.

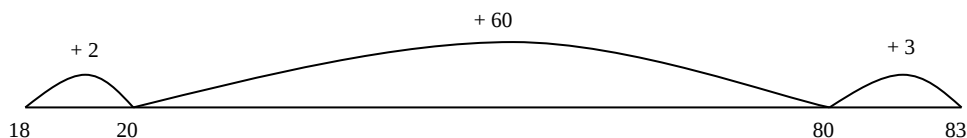
Reasons for Using Written Methods

- To aid mental calculation by writing down some of the numbers and answers involved
- To make clear a mental procedure for the pupil
- To help communicate methods and solutions
- To provide a record of work to be done
- To aid calculation when the problem is too difficult to be done mentally
- To develop and refine a set of rules for calculation

A Whole School Approach

We have developed a consistent approach to the teaching of written calculation methods. This will establish continuity and progression throughout the school. Mental methods will be established. These will be based on a solid understanding of place value in number and will include the following:

- i. Remembering number facts and recalling them without hesitation e.g.
pairs of numbers which make 10
Doubles & halves to 20
- ii. Using known facts to calculate unknown facts e.g.
 $6 + 6 = 12$ therefore $6 + 7 = 13$
 $24 + 10 = 34$ therefore $24 + 9 = 33$
- iii. Understanding and using relationships between addition & subtraction to find answers and check results e.g.
 $14 + 6 = 20$ therefore $20 - 6 = 14$
- iv. Having a repertoire of mental strategies to solve calculations e.g.
doubles / near doubles
bridging 10 / bridging 20
adding 9 by +10 & -1
- v. Making use of informal jottings such as blank number lines to assist in calculations with larger numbers e.g. $83 - 18 = 65$



- vi. Solving one-step word problems (either mentally or with jottings) by identifying which operation to use, drawing upon their knowledge of number bonds and explaining their reasoning
- vii. Beginning to present calculations in a horizontal format and explain mental steps using numbers, symbols or words
- viii. Learn to estimate/approximate first e.g. $29 + 30$ (round up to nearest 10, the answer will be near to 60).

Place value will be taught mentally first from Reception class where number tracks are used, progressing to number lines (to 10 or 20 as appropriate) in Years 1 and 2. The empty number line will then be introduced to aid calculations. Subtraction will be taught by counting on and counting back depending on the numbers. Numbers such as 10, 100, 1000 will be called Landmark Numbers.

Barcombe CE Primary School Written Calculations Policy

When are children ready for written calculations?

Addition

To add successfully, children need to be able to:

- recall all addition pairs to $9 + 9$ and complements in 10;
- add mentally a series of single-digit numbers, such as $5 + 8 + 4$;
- add multiples of 10, such as $60 + 70$, or of 100, such as $600 + 700$, using the related addition facts, 6 + 7, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways.

Subtraction

To subtract successfully, children need to be able to:

- recall all addition and subtraction facts to 20;
- subtract multiples of 10, such as $160 - 70$, , using the related subtraction fact, $16 - 7$, and their knowledge of place value;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and one in different ways, e.g. partition 74 into $70 + 4$ or $60 + 14$.

Multiplication

To multiply successfully, children need to be able to:

- recall all multiplication facts to 10×10 ;
- partition number into multiples of one hundred, ten and one;
- work out products such as 70×5 , 70×50 , 700×5 , or 700×50 , using their knowledge of the related fact, 7×5 , and of place value;
- add two or more single-digit numbers mentally;
- add multiples of 10, such as $60 + 70$, or of 100, such as $600 + 700$, using the related addition facts, 6 + 7, and their knowledge of place value;
- add combinations of whole numbers using the standard column method.

Division

To divide successfully in their heads, children need to be able to:

- understand and use the vocabulary of division, e.g. in $18 \div 3 = 6$, the 18 is the dividend, the 3 is the divisor and the 6 is the quotient;
- partition two-digit and three-digit numbers into multiples of one hundred, ten and ones in different ways;
- recall multiplication and division facts to 10×10 , recognise multiples of single-digit numbers, and divide multiples of 10 or 100 by a single-digit number using their knowledge of division facts and place value;
- know how to find a remainder working mentally, e.g. find the remainder when 48 is divided by 5;
- understand and use multiplication and division as inverse operations.

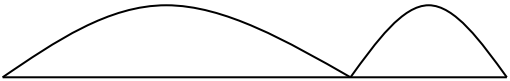
In order to carry out written methods of division successfully, children also need to be able to:

- understand division as repeated subtraction
- estimate how many times one number divides into another – e.g. how many sixes there are in 47, or how many 23s there are in 92
- multiply a two-digit number by a single-digit number mentally

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Barcombe CE Primary School Written Calculation Policy

Addition

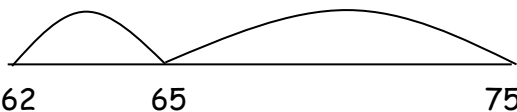
YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
1	Always use the comparison of subtraction and talk about addition being the <i>inverse</i> of subtraction. The mental methods that lead to column addition generally involve partitioning, e.g. adding the tens and ones separately, often starting with the tens. Children need to be able to partition numbers in ways other than into tens and ones to help them make multiples of ten by adding in steps.	Practical - $23 + 11$ +10 +1  23 33 34 +7 +4  23 30 34	Children will record their practical work in a number sentence e.g. $23 + 11 = 34$ The children begin this level by being provided with a number line and counting on from the smallest number. They need to progress to the empty number line which helps to record the steps on the way to calculating the total.	Numicon Number Tracks Whiteboards
1-2	The next stage is to record mental methods using partitioning. Add the tens and then the ones to form partial sums and then add these partial sums. As the children's understanding develops extend to include HTU.	 $\begin{array}{r} 23 + 11 = 34 \\ 20 + 10 = 30 \\ 3 + 1 = 4 \end{array}$	It is vital that when partitioning that place value is accurate. Children may find it useful to mark HTU above the numbers to keep alignment.	Numicon Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
3-6	An expanded version of the column method is introduced first that links closely to their partitioning work. It is at this point that we take the opportunity to start adding the least significant number first. The addition of the tens in the calculation $42 + 23$ is described in the words 'forty plus twenty equals sixty', stressing the link to the related fact 'four plus two equals six'. The expanded method leads children to the more compact method so that they understand its structure and efficiency. The amount of time that should be spent teaching and practicing the expanded method will depend on how secure the children are in their recall of number facts and in their understanding of place value. Carry digits are recorded below the line, using the words 'carry one ten' or 'carry one hundred', not 'carry one'.	$\begin{array}{r} \text{t u} \\ 42 \\ + 23 \\ \hline 5 \\ 60 \\ \hline 65 \end{array}$ $\begin{array}{r} \text{t u} \\ 42 \\ + 23 \\ \hline 65 \end{array}$ $\begin{array}{r} \text{t u} \\ 46 \\ + 27 \\ \hline 73 \\ 1 \end{array}$ Extending to: • Larger numbers • More carrying • Decimals	Extend to adding three two-digit numbers, two three-digit numbers and numbers with different numbers of digits.	Whiteboards

Barcombe CE Primary School Written Calculation Policy

Subtraction

YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
1	Always use the comparison of addition and talk about subtraction being the <i>inverse</i> of addition.	Lots of practical work on number lines jumping forward and back in steps of 1 initially, progressing to larger jumps.	Children will record their practical work in a number sentence.	Numicon Number Tracks Whiteboards
2	Subtraction will be taught by counting on and counting back depending on the numbers. When counting on we must ensure that the children know we are talking about the <i>difference between</i> the numbers.	75 - 13 -3 -10  62 65 75 34 - 28 +2 +4  28 30 34	Children will record their work in a number sentence.	Numicon Number Tracks Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
2-3	The expanded method leads children to the more compact standard method so that they understand the structure and efficiency of the standard method. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of number facts and with partitioning.	627-386= Stage 1 - Adjustment $ \begin{array}{r} 5 \ 0 \ 0 \quad 12 \ 0 \\ \cancel{6} \ \cancel{0} \ \cancel{0} + \cancel{2} \ \cancel{0} + 7 \\ - \ 3 \ 0 \ 0 + 8 \ 0 + 6 \\ \hline 2 \ 0 \ 0 + 4 \ 0 + 1 \end{array} $		
3-6	The expanded method leads children to the more compact standard method so that they understand the structure and efficiency of the standard method. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of number facts and with partitioning.	Stage 2 - Compact Decomposition $ \begin{array}{r} 5 \ 12 \\ \cancel{6} \ \cancel{2} \ 7 \\ - \ 3 \ 8 \ 6 \\ \hline 2 \ 4 \ 1 \end{array} $	The decomposition method can confuse children and goes against rules taught in mental calculations e.g. in the calculation 245-67 you would set out the subtraction and ask the children what's 5 subtract 7; progressing to explaining that you can't do it. Yet in mental maths we would ask this expecting the answer negative 2!	Whiteboards

Barcombe CE Primary School Written Calculation Policy

Multiplication

YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
1	In level 1 the children will be exploring number patterns and can be introduced to multiplication as repeated addition e.g. $3+3+3+3$ is the same as four lots of 3 or 3×4 . They should chant and learn tables by rote alongside continuing practical activities using the 100 square, Numicon and Cuisenaire to identify tables and patterns. Cuisenaire rods and number tracks help with early multiplication. Numicon is used to show how the threes and the fours can overlay each other showing the inverse and that 3×4 is the same as 4×3 . Children record their work with drawings, progressing to recording a number sentence e.g. $4 \times 3 = 12$	Practical Work  $3 + 3 + 3 + 3 = 12$ 4 lots of 3 = 12 $3 \times 4 = 12$ 	Children record their work with drawings, progressing to recording a number sentence. As with addition and subtraction, talk about how multiplication is the <i>inverse</i> of division.	Numicon Number Tracks Whiteboards
2	The next stage is to record mental methods using partitioning. Extend to multiplying larger multiples of ten. Multiply the tens and then the ones to form partial sums and then add these partial sums. This method should be introduced for level 2a+ children in Year 2 and Year 3.	$14 \times 3 = 42$ $10 \times 3 = 30$ $4 \times 3 = 12$ $21 \times 6 = 126$ $20 \times 6 = 120$ $1 \times 6 = 6$	It is vital that when partitioning that place value is accurate. Children may find it useful to mark HTU above the numbers to keep alignment.	Numicon Number Tracks Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
3	The grid method is introduced as it links closely to the children's partitioning work. Children should add across the row to find the answer. This is important for the long grid method taught later. The formal method for multiplications should be introduced alongside the grid method for multiplying a two-digit number by a single digit.	$23 \times 7 = 140 + 21 = 161$ $\begin{array}{r rr rr} \times & 2 & 0 & & 3 \\ 7 & 1 & 4 & 0 & 2 & 1 \end{array}$ Stage 1: expanded $\begin{array}{r} 32 \\ \times 4 \\ \hline 128 \end{array}$ $\begin{array}{r} 4 \times 2 \\ 4 \times 30 \\ \hline 8 \\ 120 \\ \hline 128 \end{array}$ Stage 2: compact $\begin{array}{r} 23 \\ \times 7 \\ \hline 161 \end{array}$	It is vital that when partitioning that place value is accurate. Children may find it useful to mark HTU above the numbers to keep alignment.	Times Table Grids Whiteboards
4	Children continue to use the formal method for multiplying a two-digit number by a single digit. As larger numbers are multiplied, the grid method expands. Children total each row to create a vertical column addition.	Children will also use the long grid method. $33 \times 24 = 792$ $\begin{array}{r rr rr} \times & 3 & 0 & & 3 \\ 20 & 6 & 0 & 0 & 6 & 0 \\ 4 & 1 & 2 & 0 & 1 & 2 \end{array} \rightarrow \begin{array}{r} 660 \\ 132 \\ \hline 792 \end{array}$	It is vital that when partitioning that place value is accurate. Children may find it useful to mark HTU above the numbers to keep alignment.	Times Table Grids Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
	The expanded method leads children to the more compact standard method so that they understand the structure and efficiency of the standard method. The amount of time that should be spent teaching and practising the expanded method will depend on how secure the children are in their recall of times table facts. As soon as the children understand the process, they should move on to formal calculations for HTU x U	$ \begin{array}{r} 6 \quad 2 \quad 3 \\ \times \qquad \qquad 7 \\ \hline 5 \quad 3 \quad 6 \quad 1 \\ \hline 1 \quad 1 \quad 2 \end{array} $		
5	The formal method should be developed to TU x TU and then HTU x TU Again refer back to grid methods to support children's understanding of the calculation process.	$ \begin{array}{r} 3 \quad 2 \\ \times 1 \quad 4 \\ \hline 1 \quad 2 \quad 8 \\ 3 \quad 2 \quad 0 \\ \hline 4 \quad 4 \quad 8 \\ \hline \hline \hline \end{array} $		Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
		$ \begin{array}{r} 3 \quad 4 \quad 7 \\ \times \quad 2 \quad 8 \\ \hline 2 \quad 7 \quad 7 \quad 6 \\ 2 \quad 3 \quad 5 \\ 6 \quad 9 \quad 4 \quad 0 \\ \hline 9 \quad 7 \quad 1 \quad 6 \\ 1 \quad 1 \end{array} $		
6	The formal method extends to ThHTU $\times$ U In year 6 the children use the grid method and then the formal method to multiply decimals. It is vital that the children estimate first so that they can establish where their answer will lie.	$ \begin{array}{r} 1 \quad 3 \quad 4 \quad 7 \\ \times \quad 2 \quad 8 \\ \hline 1 \quad 0 \quad 7 \quad 7 \quad 6 \\ 1 \quad 2 \quad 3 \quad 5 \\ 2 \quad 6 \quad 9 \quad 4 \quad 0 \\ \hline 3 \quad 7 \quad 7 \quad 1 \quad 6 \\ 1 \quad 1 \end{array} $ $4.9 \times 3 =$ Children need to estimate first, they know that: $4 \times 3 = 12$ and $5 \times 3 = 15$ So the answer will fall between 12 and 15 $ \begin{array}{r l} \times & 4 \quad 0 \quad .9 \\ \hline 3 & 1 \quad 2 \quad 2 \quad .7 \end{array} $ $4.9 \times 3 = 12 + 2.7 = 14.7$		

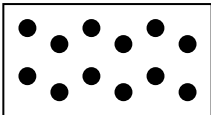
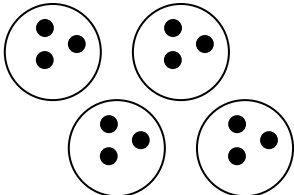
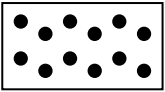
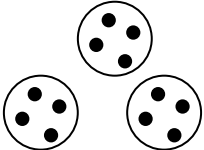


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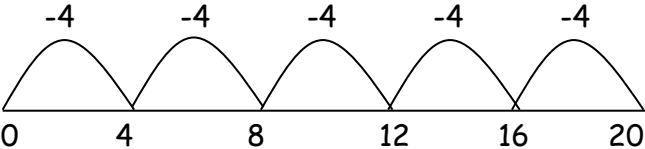
YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
		$\begin{array}{r} 4 \quad .9 \\ \times \quad 3 \\ \hline 1 \quad 4 \quad 7 \\ \hline \end{array}$ Then consider the estimated answer to work out where the decimal point should be.		

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Division

YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
1	Division as equal sharing :- Division as the inverse of multiplication (grouping/repeated addition/repeated subtraction) Using Numicon e.g. Make a 12 with a ten and a two If we cover it with fours, how many fours are there? Check by then putting 12 into 4 equal groups - three in each group.	$12 \div 4 =$ share 12 equally into 4 groups, how many in each group?   $12 / 4 =$ share 12 into groups of 4, how many groups?    	Always use the comparison of multiplication and talk about division being the <i>inverse</i> of multiplication. Children record their practical work in a number sentence.	Numicon Number Tracks Unifix Whiteboards

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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
2	For Level 2 the children explore division as repeated subtraction recording their work on a number and in a number sentence.	$20 \div 4 =$ 		Numicon Number Tracks Times Table Grids Whiteboards
3-4	Informal methods using multiples of the divisor or 'chunking' $TU \div U$	$72 \div 5$ $5 \times 10 = 50$ $5 \times 4 = 20$ Answer: 14 r 2	72 $- 50$ 22 $- 20$ 2	It is vital that place value is accurate. Children may find it useful to mark HTU above the numbers to keep alignment. Times Table Grids Whiteboards
4-5	The children will continue to develop the chunking method to $HTU \div U$ and will then move on to the formal short division method for $HTU \div U$ and $ThHTU \div U$	$256 \div 7$ $7 \times 10 = 70$ Approximate answer $280 \div 7 = 40$ $7 \times 20 = 140$ $7 \times 6 = 42$ Answer: 36 r 4	256 $- 70$ 186 $- 140$ 46 $- 42$ 4	Efficient 'chunking' $HTU \div U$ $196 \div 6$ $6 \times 30 = 180$ Approximate answer $180 \div 6 = 30$ $6 \times 2 = 12$ Answer: 32 r 4 Extend to decimals with up to 1 place



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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
		$7 \ 3 \ 2 \div 6 =$ $6 \overline{) 7 \ 3 \ 2}$		
6	The children will develop their use of formal methods to use short or long division for ThHTU ÷ U and ThHTU ÷ TU This should be supported by using chunking when division by 2 digits is first introduced as this supports mental calculation. They will also use short division for division involving decimals to 2 decimal places.	$560 \div 24$ $24 \times 10 = 240$ Approximate answer $550 \div 25 = 22$ $24 \times 10 = 240$ $24 \times 2 = 48$ $24 \times 1 = 24$ Answer: 23 r 8 560 $= 240$ 320 $= 240$ 80 -48 32 -24 8	Efficient chunking HTU ÷ TU $560 \div 24$ $24 \times 20 = 480$ Approximate answer $550 \div 25 = 22$ $24 \times 3 = 72$ Answer: 23 r 8 560 -480 80 -72 8	



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YEAR	METHOD	HOW IT WILL LOOK IN WRITTEN FORM	NOTES	RESOURCES
		$73.2 \div 6 =$ $\begin{array}{r} 12.2 \\ 6 \overline{) 73.2} \end{array}$	The understanding of the values of digits must be maintained when teaching this method.	

Statutory Elements of Progression in National Curriculum Objectives

Using and applying mathematics	Calculating
Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.	Year 1 • 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 $7 = \square - 9$ • 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
Year 2 Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.	Year 2 • Show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot • 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 • Recognise and use the inverse relationship between addition and subtraction and use this to check calculations and solve missing number problems 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 • Show that multiplication of two numbers can be done in any order (commutative) and division of one number by another cannot • 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 ($\times$), division ($\div$) and equals (=) signs Solve problems involving multiplication and division), using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts

Using and applying mathematics

Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.

Year 3

- 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

- 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

Using and applying mathematics

Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.

Year 4

- Add and subtract numbers with up to 4 digits using the formal written methods of columnar addition and subtraction where appropriate
- Estimate; 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
- Recognise and use factor pairs and commutativity in mental calculations
- 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
- 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

Using and applying mathematics

Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.

Year 5

- Add and subtract numbers mentally with increasingly large numbers
- Add and subtract whole numbers with more than 4 digits including using formal written methods (columnar addition and subtraction)
- 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
- 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
- Recognise and use square (2) and cube (3) numbers, and notation
- Multiply and divide numbers mentally drawing upon known facts
- Solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- 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
- 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
- Solve problems involving addition, subtraction, multiplication and division and a combination of these, including understanding the meaning of the equals sign

Solve problems involving multiplication and division, including scaling by simple fractions and problems involving simple rates

Using and applying mathematics

Using and applying has been removed as a separate element of the new curriculum. Instead, it is embedded within the overall aims of the teaching and learning of mathematics. Children should be supported to work mathematically, reason and solve problems in all lessons.

Year 6

- Perform mental calculations including with mixed operations and large numbers *and decimals*
 - Use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
 - Use knowledge of the order of operations to carry out calculations
 - Solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- Solve problems involving all four operations, Identify common factors, common multiples and prime numbers
- Perform mental calculations, including with mixed operations and large numbers
 - Multiply multi-digit numbers up to 4 digits by a two-digit whole number using the formal written method of long multiplication
 - Multiply one-digit numbers with up to two decimal places by whole numbers
 - Divide numbers up to 4 digits by a two-digit whole number using the formal written methods of short or long division, and interpret remainders as whole number remainders, fractions, or by rounding, as appropriate for the context
 - Use written division methods in cases where the answer has up to two decimal places

- Use estimation *to* check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy
 - Use knowledge of the order of operations to carry out calculations
- Solve problems involving all four operations

Summary

- children should always estimate first
- always check the answer, preferably using a different method eg. the inverse operation
- always decide first whether a mental method is appropriate
- pay attention to language - refer to the actual value of digits
- children who make persistent mistakes should return to the method that they can use accurately until ready to move on
- children need to know number and multiplication facts by heart
- discuss errors and diagnose problem and then work through problem - do not simply re-teach the method
- when revising or extending to harder numbers, refer back to expanded methods. This helps reinforce understanding and reminds children that they have an alternative to fall back on if they are having difficulties.

Policy Reviewed : September 2016

Reviewed by: Ruth Force (Head of School / Maths Co-Ordinator)