## **Bishop King Calculation Policy**



#### **Implementation:**

This policy must be adhered to when teaching the four operations. If you feel that the children are not ready for the strategy for their year, please refer to the strategy from the previous year/s.

We have adopted the White Rose maths scheme to *support* teachers in delivering our mathematics curriculum from Years One to Six. We have adapted the scheme so that our teaching and learning objectives reflect the National Curriculum.

#### Early Years

Mathematics involves providing children with opportunities to develop and improve their skills in counting, understanding and using numbers, calculating simple addition and subtraction problems; and to describe shapes, spaces, and measures (Statutory Framework for the Early Years Foundation Stage, DfE: 2012).

**Concrete:** Concrete is the "doing" stage, using concrete objects to model problems.

**Pictorial:** Pictorial is the "seeing" stage, using representations of the objects to model problems.

**Abstract:** Abstract is the "symbolic" stage, where children are able to use abstract symbols to model problems. This approach develops children's understanding at a deeper level and helps children learn new ideas and build on their existing knowledge by introducing abstract concepts in a more familiar and tangible way.

We use the White Rose Maths alongside the Development Matters in the Early Years Foundation Stage (EYFS) to plan our maths lessons. By the end of the reception year children are expected to reach the Early Learning Goal (ELG) outlined below:

#### Early Learning Goal for Number:

Children can count reliably with numbers from 1 to 20, place them in order and say which number is one more or one less than a given number. Using quantities and objects, they add and subtract 2 single-digit numbers and count on or back to find the answer. They solve problems, including doubling, halving and sharing.

Children must be exposed to different representations of mathematical concepts in order to embed conceptual understanding. One of the aims under the Characteristics of Effective Learning is 'creating and thinking critically.' Children are encouraged to make links, find new ways to do things, solve problems, change strategies as needed, make predictions and develop ideas of grouping, sequencing, cause and effect.

Maths for young children should be meaningful. Where possible, concepts should be taught in the context of real life.

### **Addition**

### **GUIDANCE/MODELS AND IMAGES**

Children begin to combine groups of objects or pictures using concrete apparatus.

Solve simple problems using fingers.

Construct number sentences verbally or using cards to go with practical activities.

Children are encouraged to read number sentences aloud in different ways e.g. "Three add two equals 5" "5 is <u>equal</u> to three and two."

Count on to find the answer.

Have an understanding of what "more" means and be able to say what is one more than a given number.

Number tracks can be introduced to count up on and to find one more.

Children make a record in pictures, words or symbols of addition activities.

When appropriate, numicon shapes are introduced to identify 1 more/less, combine pieces to add and find number bonds.

Number lines can be used alongside number tracks and practical apparatus to solve addition calculations and word problems.









#### Vocabulary:

Games and songs to begin using vocabulary involving addition.

Add, more, and, make, total, altogether, double, one more, two more, how many more, equals.

**Nursery children focus on**: Counting songs, counting rhymes, counting real objects, counting people, how many altogether, counting then saying the total, counting 1:1 correspondence, real life adding eg apples at snack time, milk, girls and boys.

### **Subtraction**

### **GUIDANCE/MODELS AND IMAGES**

Concrete apparatus is used to relate subtraction to taking away and counting how many objects are left.

Solve simple problems using fingers.

Construct number sentences verbally or using cards to go with practical activities.

Children are encouraged to read sentences aloud in different ways "five subtract one leaves four" "four is equal to five subtract one."

Count back to find the answer.

Have an understanding of what "less" means and be able to say what is one less than a given number. What is 1 less than 9? 1 less than 20?

Number tracks can be introduced to count back and to find one less.

Children make a record in pictures, words or symbols of subtraction activities.

Number lines can then be used alongside number tracks and practical apparatus to solve subtraction calculations and word problems.













## Vocabulary:

Take away, leave, how many are left, how many have gone, one less, two less, is the same as.

**Nursery children focus on:** Counting songs, counting rhymes, counting real objects, using language associated with less, counting people, counting 1:1 correspondence, real life subtraction eg apples at snack time, milk, girls and boys, take away, identifying when totals are the same.

## **Multiplication**



### Vocabulary:

Lots of, groups of, double.

**Nursery children focus on:** counting groups of, groups of same numbers, pairs of objects, sets of objects.

### **Division**

#### **GUIDANCE/MODELS AND IMAGES**

Division can be introduced through halving or sharing an equal amount into 2 groups.

Children begin with mostly pictorial representations linked to real life contexts.

Children need to see and hear representations of division as both grouping and sharing.

#### Grouping model:

Mum has 6 socks. She grouped them into pairs. How many pairs did she make?

Sharing model:

I have 10 sweets. I want to share them with my friend. How many will we have each?

The sharing model is a useful way to introduce young children to fractions e.g. Can you cut the pizza in half?

Children make a record in pictures, words or symbols of division activities.

Children are encouraged to have a go at recording the calculation that has been carried out e.g. by arranging concrete objects into groups.











#### Vocabulary:

Half, halve, equal, groups of.

# Nursery children focus on: Sharing, halving, equals

## Addition

## YEAR 1: Statutory requirements: Addition and Subtraction

### Pupils should be taught to:

- 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.

## Notes and guidance (non-statutory)

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 - 7 = 9; 7 = 16 - 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations. Pupils combine and increase numbers, counting forwards and backwards. They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

	Concrete	Pictorial	Abstract
Y1:	Combining two parts to make a whole (use other resources too e.g. eggs shells teddy bears cars)	Children to represent the cubes using dots or crosses. They could put each part on a part whole model too.	4 + 3 = 7 Four is a part 3 is a part and the whole
Read, write			is seven.
and interpret		(::)	7
statements		(···)	$\succ$
using addition		C: to	$\Delta \Sigma$
and the		()	
equals sign.			
Y1	Regrouping to make 10; using ten frames and	Children to draw the ten frame and counters/cubes.	Children to develop an understanding of equality e.g.
Regrouping to	6+5		
make TU			6 + 🗆 = 11
			6 + 5 = 5 + 🗆
			6 + 5 = 🗆 + 4
Y1	Add, more, and, make, total, altogether, double, one more, two more, how many more, equals.		
Vocabulary	+ plus, = sum, number bonds, equal to, digit		

## YEAR 2: Statutory requirements.

Pupils should be taught to:

- 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:
  - $\circ$  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; use to check calculations and solve missing number problems. **Notes and guidance (non-statutory)**

Pupils extend their understanding of the language of addition and subtraction to include sum and difference.

Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100; 100 - 70 = 30 and 70 = 100 - 30.

They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition.

Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.



## Year 3 Statutory Requirements

Pupils should be taught to:

- 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.

## Notes and guidance (non-statutory)

Pupils practise solving varied addition and subtraction questions.

For mental calculations with two-digit numbers, the answers could exceed 100.

Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent

Y3 TO + TO using partitioning and place value	Use the model of partitioning and place value	105 11 00 11 00 00 00 00 00 00 00	36-5-0-	
Y3 TO + TO using base 10	TO + TO using base 10. Continue to develop understanding of partitioning and place value. 36 + 25 10s 1s 6 1	Chidlren to represent the base 10 in a place value chart. 10s $1s111$ $10s$ $1s10s$ $1s111$ $10s$ $1s10s$ $1s1s1s$ $1s1s$ $1s1s$ $1s1s$ $1s1s$ $1s1s$ $1s$ $1s1s$ $1s$ $1s$ $1s$ $1s$ $1s$ $1s$ $1s$	Looking for ways to make 10. 36 + 25z  30 + 20 = 50 5 + 5 = 10 50 + 10 + 1 = 61 1 5 36 Formal method: $\frac{+25}{61}$	
Y3 Use of place value counters to add HT0 + TO, HTO +HTO etc	Use of place value counters to add HTO + TO, HTO + HTO etc. When there are 10 ones in the 1s column- we exchange for 1 ten, when there are 10 tens in the 10s column- we exchange for 1 hundred.	Chidren to represent the counters in a place value chart, circling when they make an exchange.	243 <u>+368</u> <u>611</u> <sup>1</sup> 1	
Y3	Add, more, and, make, total, altogether, double, one more, two more, how many more, equals.			

Year 4 : Sta	Year 4 : Statutory requirements				
Pupils should	Pupils should be taught to:				
<ul> <li>add and st</li> </ul>	ubtract numbers with up to 4 digits using formal written methods of columnar addition and subtraction where appropriate				
estimate a	nd use inverse operations to check answers to a calculation				
<ul> <li>solve addit</li> </ul>	tion and subtraction two-step problems in contexts, deciding which operations and methods to use and why.				
Notes and gu	uidance (non-statutory)				
Pupils continu	ie to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency				
Year 5 Stat	utory requirements				
Pupils should	be taught to:				
<ul> <li>add and st</li> </ul>	ubtract whole numbers with more than 4 digits, including using formal written methods (columnar addition and subtraction)				
<ul> <li>add and st</li> </ul>	ubtract numbers mentally with increasingly large numbers				
Use round	ing to check answers to calculations and determine, in the context of a problem, levels of accuracy				
<ul> <li>solve addit</li> </ul>	tion and subtraction multi-step problems in contexts, deciding which operations and methods to use and why.				
Pupile practice	nuance (non-statutory) a using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency				
They practise	mental calculations with increasingly large numbers to aid fluency				
(for example	12462 - 2300 = 10162				
Years 4 5 a	and 6: As taught in V3, (up to 4 digit numbers in V4 and more than 4 digits in V5 and 6.)				
Y4	Add more and make total altogether double one more two more how many more equals + plus = sum number bonds				
Vocabularv	equal to, digit, partitioning, addition, one hundred more, commutative, column addition, exchange, decimals, round to the				
	nearest 10, 100, 1000				
Y5	Use the place value chart to add 3.45 and 4.14				
Use of place	Ise of place				
counters to					
add decimals 3 . 4 5					
places	$\frac{1}{2} = \frac{1}{2} = \frac{1}$				
Y5	Add, more, and, make, total, altogether, double, one more, two more, how many more, equals. + plus. = sum, number bonds.				
Vocabularv	equal to, digit, partitioning, addition, one hundred more, commutative, column addition, exchange, decimals, round to the				

# Year 6 Statutory requirements (These are for addition, subtraction, multiplication and division)

#### Pupils should be taught to:

- 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example,  $2 + 1 \times 3 = 5$  and  $(2 + 1) \times 3 = 9$ .
- Common factors can be related to finding equivalent fractions.

Y6 Use of place	Use the place value grid to answer 0.455 + 0.664		
value	Ones Tenths Hundredths Thousandths		
counters to			
beyond 2			
decimal			
places			
Y6	dd, more, and, make, total, altogether, double, one more, two more, how many more, equals, + plus, = sum, number bonds,		
Vocabulary	equal to, digit, partitioning, addition, one hundred more, commutative, column addition, exchange, decimals, round to the		
	nearest 10, 100, 1000, 10,000, 100,000 efficient written method, round to 2 decimal places, order of operations, round to		
	egree of accuracy: 3 decimal places, nearest 20, nearest 50		

## **Subtraction**

## YEAR 1: Statutory requirements: Addition and Subtraction

## Pupils should be taught to:

- 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.

## Notes and guidance (non-statutory)

Pupils memorise and reason with number bonds to 10 and 20 in several forms (for example, 9 + 7 = 16; 16 - 7 = 9; 7 = 16 - 9). They should realise the effect of adding or subtracting zero. This establishes addition and subtraction as related operations. Pupils combine and increase numbers, counting forwards and backwards. They discuss and solve problems in familiar practical contexts, including using quantities. Problems should include the terms: put together, add, altogether, total, take away, distance between, difference between, more than and less than, so that pupils develop the concept of addition and subtraction and are enabled to use these operations flexibly.

	Concrete	Pictorial	Abstract
Y1	Physically taking away and removing objects from a whole	Children to draw the concrete resources they are using	4-3=
Physically taking	(ten frames, Numicon, cubes and other items such as	and cross out the correct amount. The bar model can	
away and removing objects	beanbags could be used).	also be used.	= 4 - 3
from a whole	4 - 3 = 1		4
		XXX XXX	3 ?

Y1 Counting back	Counting back (using number lines or number tracks) children start with 6 and count back 2. 6 - 2 = 4 1 2 3 4 5 6 7 8 9 10	Children to represent what they see pictorially e.g.	Children to represent the calculation on a number line or number track and show their jumps. Encourage children to use an empty number line
Y1 Finding the difference	Finding the difference (using cubes, Numicon or Cuisenaire rods, other objects can also be used). Calculate the difference between 8 and 5.	Children to draw the cubes/other concrete objects which they have used or use the bar model to illustrate what they need to calculate.	Find the difference between 8 and 5. 8 – 5, the difference is Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.
Y1 Making 10 using 10 frames	Making 10 using ten frames. 14 - 5 4 - 1 4 - 1 4 - 1 4 - 1 4 - 1	Children to present the ten frame pictorially and discuss what they did to make 10.	Children to show how they can make 10 by partitioning the subtrahend. 14 - 5 = 9 4 - 1 14 - 4 = 10 10 - 1 = 9
Y1 Vocabulary	Take away, leave, how many are left, how many h between, subtract, take away, minus, count back,	nave gone, one less, two less, is the same as, half, h one less, two less, ten less, = How many are left?	alve, equals, difference

## YEAR 2: Statutory requirements

#### Pupils should be taught to:

- 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 A 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.

#### Notes and guidance (non-statutory)

Pupils extend their understanding of the language of addition and subtraction to include sum and difference. Pupils practise addition and subtraction to 20 to become increasingly fluent in deriving facts such as using 3 + 7 = 10; 10 - 7 = 3 and 7 = 10 - 3 to calculate 30 + 70 = 100; 100 - 70 = 30 and 70 = 100 - 30. They check their calculations, including by adding to check subtraction and adding numbers in a different order to check addition (for example, 5 + 2 + 1 = 1 + 5 + 2 = 1 + 2 + 5). This establishes commutativity and associativity of addition. Recording addition and subtraction in columns supports place value and prepares for formal written methods with larger numbers.

Y2 Column method using base 10 (no exchange)	Column method using base 10. 48-7 10s 1s 10s 1s	Children to represent the base 10 pictorially.	Column method or children could count back 7. 4 8 - 7 4 1
Y2 Subtraction using the number line	52 – 39 Use of concrete reasonable the 'difference' and 'adding on.	Use of the bar model to show the 'difference' and 'adding on. 52 39	Use of a number line 82-49 = 49 = 59 = 69 = 79 = 32 10 + 10 + 10 + 3 = 33
Y2 Vocabulary	Take away, leave, how many are left, how many have go between, subtract, take away, minus, count back, one le backwards, commutative, inverse	one, one less, two less, is the same as, half, h ess, two less, ten less,  = How many are left?	halve, equals, difference minus, subtract

## Year 3: Statutory requirements

### Pupils should be taught to:

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.

- Pupils practise solving varied addition and subtraction questions.
- For mental calculations with two-digit numbers, the answers could exceed 100.
- Pupils use their understanding of place value and partitioning, and practise using columnar addition and subtraction with increasingly large numbers up to three digits to become fluent



## Year 4 Statutory requirements

Pupils should be taught to:

- 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.

## Notes and guidance (non-statutory)

Pupils continue to practise both mental methods and columnar addition and subtraction with increasingly large numbers to aid fluency

## Year 5 Statutory requirements

Pupils should be taught to:

- 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.

## Notes and guidance (non-statutory)

- Pupils practise using the formal written methods of columnar addition and subtraction with increasingly large numbers to aid fluency
- They practise mental calculations with increasingly large numbers to aid fluency

(for example, 12 462 – 2300 = 10 162).

Years 4, 5 a	<b>Years 4, 5 and 6:</b> As taught in Y3, (up to 4 digit numbers in Y4 and more than 4 digits in Y5 and 6.				
Y5 Use of place value	Ones Tenths Hundredths				
counters to subtract decimals to 2 decimal places	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$				
Y4	Take away, leave, how many are left, how many have gone, one less, two less, is the same as, half, halve, equals, difference				
Vocabulary	between, subtract, take away, minus, count back, one less, two less, ten less, = How many are left? minus, subtract				
, , , , , , , , , , , , , , , , , , ,	backwards, commutative, inverse, partitioning, exchange, formal column method, regrouping, decimals, round to the nearest 10, 100,				
	1000				
Y5	Take away, leave, how many are left, how many have gone, one less, two less, is the same as, half, halve, equals, difference				
Vocabulary	between, subtract, take away, minus, count back, one less, two less, ten less, = How many are left? minus, subtract				
	backwards, commutative, inverse, partitioning, exchange, formal column method, regrouping, decimals, round to the nearest 10, 100,				

## Year 6 Statutory requirements Addition, subtraction, multiplication and division

#### Pupils should be taught to:

- 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example,  $2 + 1 \times 3 = 5$  and  $(2 + 1) \times 3 = 9$ .
- Common factors can be related to finding equivalent fractions.

Y6 Use of place value counters to subtract decimals with different number of decimal places	Use the place value grid to subtract 3.52 – 1.3 Use the place value grid to subtract 3.52 – 1.3	
Y6	Take away, leave, how many are left, how many have gone, one less, two less, is the same as, half, halve, equals, difference	
Vocabulary	between, subtract, take away, minus, count back, one less, two less, ten less, = How many are left? minus, subtract	
	backwards, commutative, inverse, partitioning, exchange, formal column method, regrouping, decimals, round to the nearest 10, 100,	
	1000, Round to nearest 10,000, 100,000, 1,000,000, round to 2 decimal places, order of operations, round to degree of accuracy:	
	3 decimal places, nearest 20, nearest 50	

# **Multiplication**

#### Year 1

#### Statutory requirements

Pupils should be taught to:

• 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.

- Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.
- They make connections between arrays, number patterns, and counting in twos, fives and tens.

	Concrete	Pictorial	Abstract
Y1	4 + 4 + 4	Children to represent the practical resources in a	4 + 4 + 4 = 12
Repeated addition	There are 3 equal groups, with 4 in each group.	picture and use a bar model.	
		88 88 88	
Y1 Vocabulary	Lots of, equal groups of, double, count in twos equals, repeated addition	, fives, count in tens (forwards from/backward	s from). How many times?
Year 2 Statutory re	quirements		

#### Pupils should be taught to: 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. Notes and guidance (non-statutory) Pupils use a variety of language to describe multiplication and division. Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other. They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face. They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations. Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to . repeated addition. They begin to relate these to fractions and measures (for example, $40 \div 2 = 20$ , 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, $4 \times 5 = 20$ and $20 \div 5 = 4$ ). Represent this pictorially alongside a number line e.g.: Y2 Number lines to show repeated groups-Abstract number line showing three jumps $3 \times 4$ of four. Number lines to show repeated groups $3 \times 4 = 12$ 00001000 10000 In the second seco \* Cuisenaire rods can be used too. Y2/Y3 Use arrays to illustrate commutativity counters and other Children to represent the arrays pictorially. Children to be able to use an array to write a objects can also be used. range of calculations e.g. Use arrays to illustrate $2 \times 5 = 5 \times 2$ commutativity 88 00000 $10 = 2 \times 5$ 00000 $5 \times 2 = 10$ 00 2+2+2+2=1000 10 = 5 + 52 lots of 5 5 lots of 2 00 Y2 Vocabulary Lots of, equal groups of, double. Count in twos, fives, count in tens (forwards from/backwards from). How many times?

equals, repeated addition, commutative, odd, even, arrays, repeated groups, equal groups, row, column

## **Y3 Statutory requirements**

Pu	pils should be taug	ght to:			
•	recall and use mult	all and use multiplication and division facts for the 3, 4 and 8 multiplication tables			
•	write and calculate	mathematical statements for multiplication and divis	ion using the		
•	multiplication tables	s that they know, including for two-digit numbers time	es one-digit		
•	numbers, using me	ental and progressing to formal written methods			
•	solve problems, inc	cluding missing number problems, involving multiplic	ation and		
•	division, including p	positive integer scaling problems and correspondence	e problems in		
•	which n objects are	e connected to m objects.			
Not	tes and guidance (	non-statutory)			
•	Pupils continue to p	practise their mental recall of multiplication tables wh	en they are calculating mathematical statements in order to im	prove fluency.	
•	Through doubling,	they connect the 2, 4 and 8 multiplication tables.			
•	Pupils develop effic	cient mental methods, for example, using commutati	vity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20$	× 12 = 240) and multiplication and	
	division facts (for e	xample, using $3 \times 2 = 6$ , $6 \div 3 = 2$ and $2 = 6 \div 3$ ) to c	lerive related facts (for example, $30 \times 2 = 60, 60 \div 3 = 20$ and 2	$20 = 60 \div 3$ ).	
•	Pupils develop relia	able written methods for multiplication and division, s	tarting with calculations of two-digit numbers by one-digit numb	pers and progressing to the formal	
	written methods of	short multiplication and division.			
•	Pupils solve simple	e problems in contexts, deciding which of the four op	erations to use and why. These include measuring and scaling	contexts, (for example, four times	
	as high, eight times	s as long etc.) and correspondence problems in whic	h m objects are connected to n objects (for example, 3 hats an	d 4 coats, how many different	
	outfits?; 12 sweets	shared equally between 4 children; 4 cakes shared	equally between 8 children).	Children to be approved to about the store	
Y3		rods.	children to represent the concrete manipulatives pictorially.	they have taken.	
Par	rtition to	4 × 15		4×15	
mu	птру		$ O_s  _s$	10 5	
			. 1	10 x 4 = 40 5 x 4 = 20	
			1	40 + 20 = 60	
			1	A number line can also be used	
	1 Il				
	6 20				
Y3	Vocabulary Lots of equal groups of double. Count in twos fives, count in tens (forwards from/backwards from). How many times?				
1.0	, vocabulary Lots of, equal groups of, double. Count in twos, nives, count in tens (forwards noninbackwards nonin). How many limes?			column partition multiply by	
		equals, repeated addition, commutative, out	a, even, anays, repeated groups, equal groups, row,	column, paradon, malaply by,	
	ſ	multiple, multiple of, alvided into, multiples,			

### Year 4 Statutory requirements

#### Pupils should be taught to:

- 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.

- Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency. Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).
- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers .
- Pupils write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)).
- They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60.
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.

Y4 Formal Column Method using place value counters of 2 digit and 3 digit numbers by a 1 digit number	Formal column method with place value counters (base 10 can also be used.) 3 × 23	Children to represent the counters pictorially. $ \begin{array}{c c c c c c c c c c c c c c c c c c c $	Children to record what it is they are doing to show understanding. $3 \times 23$ $3 \times 20 = 60$ $/ 3 \times 3 = 9$ 20 $3$ $60 + 9 = 6923\times 369$
Y4 Formal Column Method using regrouping	Formal column method with place value counters. 6 x 23 100s 10s 1s 000 000 000 0000 00000 00000 0000 0000 0000 0000 0000 0000 0000 00	Children to represent the counters/base 10, pictorially e.g. the image below.	Formal written method $6 \times 23 =$ $\frac{23}{\times 6}$ $\frac{138}{11}$
Y4 Vocabulary	Lots of, equal groups of, double. Count in twos, fives, count commutative, odd, even, arrays, repeated groups, equal groproduct, division, multiplication facts up to 12 x 12, derive, for	in tens (forwards from/backwards from). How many to pups, row, column, partition, multiply by, multiple, mul prmal column method, factor, quotient, divisor, divisib	times? equals, repeated addition, Itiple of, divided into, multiples, ble by, inverse

## Year 5 Statutory requirements

## Pupils should be taught to:

- 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 (nonprime) 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
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- 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.

- Pupils practise and extend their use of the formal written methods of short multiplication and short division.
- They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.
- They use and understand the terms factor, multiple and prime, square and cube numbers.
- Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, 98 ÷ 4 = 4 98 = 24 r 2 = 24 2 1 = 24.5 ≈ 25).
- Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by
  powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and
  metres.
- Distributivity can be expressed as a(b + c) = ab + ac.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 92 x 10).
- Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (e.g. 13 + 24 = 12 + 25)

## Year 6 - Statutory requirements Addition, subtraction, multiplication and division

#### Pupils should be taught to:

- 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
- · solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example,  $2 + 1 \times 3 = 5$  and  $(2 + 1) \times 3 = 9$ .
- Common factors can be related to finding equivalent fractions.

Y5 Formal Column Method using regrouping – multiplying up to 4 digit numbers by 1 or 2 digit numbers Y6 Formal Column Method using regrouping – multiplying 4 digit numbers by 2 digit numbers.		When children start to multiply $3d \times 3d$ and $4d \times 2d$ etc., they should be confident with the abstract: To get 744 children have solved $6 \times 124$ . To get 2480 they have solved $20 \times 124$ .	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$
Y5 Vocabulary Lots of, equal gro repeated addition multiple of, divide quotient, divisor, numbers, cube n		ups of, double. Count in twos, fives, count in tens (forwards from/backwards from). H , commutative, odd, even, arrays, repeated groups, equal groups, row, column, parti d into, multiples, product, division, multiplication facts up to 12 x 12, derive, formal co divisible by, inverse, factor pairs, Composite numbers, prime numbers, prime factor imbers	low many times? equals, ition, multiply by, multiple, olumn method, factor, s, common factors, square
Y6 Vocabularv	As Y5 plus: Order of operation	ns, common multiples, ratio	

## **Division**

## Year 1 Statutory requirements

## Pupils should be taught to:

• 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.

## Notes and guidance (non-statutory)

• Through grouping and sharing small quantities, pupils begin to understand: multiplication and division; doubling numbers and quantities; and finding simple fractions of objects, numbers and quantities.

They make connections between arrays, number patterns, and counting in twos, fives and tens.

	Concrete	Pictorial	Abstract						
Y1 Sharing using a range of objects		Represent the sharing pictorially.	6+2=3 <b>33</b>						
Division as grouping		· · · · · · · · · · · · · · · · · · ·	Children should also be encouraged to use their 2 times tables facts.						
Y1 Vocabulary	Half, halve, equal groups of.								
	How many times? groups of, share, share equally, group in pairs, divide, divided by, = equals								

## Year 2 statutory requirements

Pupils should be taught to:

- 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.

- Pupils use a variety of language to describe multiplication and division.
- Pupils are introduced to the multiplication tables. They practise to become fluent in the 2, 5 and 10 multiplication tables and connect them to each other.
- They connect the 10 multiplication table to place value, and the 5 multiplication table to the divisions on the clock face.
- They begin to use other multiplication tables and recall multiplication facts, including using related division facts to perform written and mental calculations.
- Pupils work with a range of materials and contexts in which multiplication and division relate to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition.
- They begin to relate these to fractions and measures (for example, 40 ÷ 2 = 20, 20 is a half of 40). They use commutativity and inverse relations to develop multiplicative reasoning (for example, 4 × 5 = 20 and 20 ÷ 5 = 4).

	9,								
Y2	Repeated subtraction using Cuisenaire rods above a ruler.	Children to represent repeated subtraction	Abstract number line to represent the equal						
Repeated subtraction	6+2	pictorially.	groups that have been subtracted.						
	-2 -2 -2 -2 -2 -2 -2 -2 -2 -2	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	-Z -2 -2 0 1 2 3 4 5 6 3 groups						
Y2	12 sweets divided by 3								
Division with arrays linking to multiplication	,								
Y2 Vocabulary	Half, halve, equal groups of. How many times? groups of, share, share equally, group in pairs, divide, divided by =								
	equals commutative repeated subtraction odd even								

Y3 Statutory requirements         Pupils should be taught to:         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.         Notes and guidance (non-statutory)         Pupils continue to practise mental recall of multiplication tables.         Pupils develop efficient mental methods, for example, using commutativity and associativity (for example, $4 \times 12 \times 5 = 4 \times 5 \times 12 = 20 \times 12 = 240$ ) and multiplication and division facts (for example, using $3 \times 2 = 6$ , $6 + 3 = 2$ and $2 = 6 + 3$ ) to derive related facts (for example, $30 \times 2 = 60$ , $60 + 3 = 20$ and $20 = 60 + 3$ ).         Pupils develop reliable written methods for multiplication and division, starting with calculations of two-digit numbers by one-digit numbers and progressing to the formal written methods of short multiplication and division.         Pupils solve simple problems in contexts, deciding which of the four operations to use and why. These include measuring and scaling contexts, (for example, four times as high, eight times as long etc.) and correspondence problems in which m objects are connected to n objects (for example, 3 hats and 4 coats, how many different outfits?; 12 sweets shared equally between 4								
Y3 2 digit by 1 digit with remainders (Only to be experienced practically)	2d + 1d with remainders using lollipop sticks. Cuisenaire rods, above a ruler can also be used. 13 + 4 Use of lollipop sticks to form wholes- squares are made because we are dividing by 4. There are 3 whole squares, with 1 left over.	Children to represent the lollipop sticks pictorially.	13 $\div$ 4 - 3 remainder 1 Children should be encouraged to use their times table facts; they could also represent repeated addition on a number line. '3 groups of 4, with 1 left over' 4 4 5 9 13					
Y3 Sharing using place value counters	Sharing using place value counters. $42 \div 3 = 14$ 10s $1s$ $10s$ $1s$ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$ $0$	Children to represent the place value counters pictorially.	Children to be able to make sense of the place value counters and write calculations to show the process. 42 + 3 42 = 30 + 12 30 + 3 = 10 12 + 3 = 4 10 + 4 = 14					
Y3 Vocabulary	Half, halve, equal groups of, How many times? groups of, share, share equally, group in pairs, divide, divided by, = equals, commutative, repeated subtraction, odd, even, product, multiples, column method							

## Year 4 Statutory requirements

## Pupils should be taught to:

- 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.

- Pupils continue to practise recalling and using multiplication tables and related division facts to aid fluency. Pupils practise mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6).
- Pupils practise to become fluent in the formal written method of short multiplication and short division with exact answers .
- Pupils write statements about the equality of expressions (for example, use the distributive law 39 × 7 = 30 × 7 + 9 × 7 and associative law (2 × 3) × 4 = 2 × (3 × 4)).
- They combine their knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60.
- Pupils solve two-step problems in contexts, choosing the appropriate operation, working with increasingly harder numbers. This should include correspondence questions such as the numbers of choices of a meal on a menu, or three cakes shared equally between 10 children.



#### Year 5 Statutory requirements

#### Pupils should be taught to:

- · 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 (nonprime) 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
- recognise and use square numbers and cube numbers, and the notation for squared (2) and cubed (3)
- solve problems involving multiplication and division including using their knowledge of factors and multiples, squares and cubes
- 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.

- Pupils practise and extend their use of the formal written methods of short multiplication and short division.
- They apply all the multiplication tables and related division facts frequently, commit them to memory and use them confidently to make larger calculations.
- They use and understand the terms factor, multiple and prime, square and cube numbers.
- Pupils interpret non-integer answers to division by expressing results in different ways according to the context, including with remainders, as fractions, as decimals or by rounding (for example, 98 ÷ 4 = 4 98 = 24 r 2 = 24 2 1 = 24.5 ≈ 25).
- Pupils use multiplication and division as inverses to support the introduction of ratio in year 6, for example, by multiplying and dividing by powers of 10 in scale drawings or by multiplying and dividing by powers of a 1000 in converting between units such as kilometres and metres.
- Distributivity can be expressed as a(b + c) = ab + ac.
- They understand the terms factor, multiple and prime, square and cube numbers and use them to construct equivalence statements (for example, 4 x 35 = 2 x 2 x 35; 3 x 270 = 3 x 3 x 9 x 10 = 92 x 10).
- Pupils use and explain the equals sign to indicate equivalence, including in missing number problems (for example, 13 + 24 = 12 + 25).

Year 5 (up to 4 digits by 1 digit numbers, including remainders for Y5)		Thousands	Hundreds	Tens	Ones		4	1	2 8	2 9	3 <sup>1</sup> 4		r2					
Y5 Vocabulary	Half, halve, equal groups of, How many times? groups of, share, share equally, group in pairs, divide, divided by, = equals, commutative, repeated subtraction, odd, even, product, multiples, column method, short division, inverse, exchange, regroup, remainder, formal written method, common factors																	

## Year 6 Statutory requirements Addition, subtraction, multiplication and division

#### Pupils should be taught to:

- 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
- solve addition and subtraction multi-step problems in contexts, deciding which operations and methods to use and why
- solve problems involving addition, subtraction, multiplication and division
- use estimation to check answers to calculations and determine, in the context of a problem, an appropriate degree of accuracy.

- Pupils practise addition, subtraction, multiplication and division for larger numbers, using the formal written methods of columnar addition and subtraction, short and long multiplication, and short and long division.
- They undertake mental calculations with increasingly large numbers and more complex calculations.
- Pupils continue to use all the multiplication tables to calculate mathematical statements in order to maintain their fluency.
- Pupils round answers to a specified degree of accuracy, for example, to the nearest 10, 20, 50 etc., but not to a specified number of significant figures.
- Pupils explore the order of operations using brackets; for example, 2 + 1 x 3 = 5 and (2 + 1) x 3 = 9.
- Common factors can be related to finding equivalent fractions.

		<u> </u>
Year 6	Long division using place value counters	
	2544 + 12	0.2
Short division (up to 4	1000s 100s 10s 1s	12 2544
digits by a 2 digit	Contemporary Contemporary 2 thousands into	12 2344
	groups of 12 so will exchange them.	24
number, including		24
remainders)		1
-	1000s 100s 10s 1s	1
	We can group 24 hundreds	
	into groups of 12 which leaves	0.3.1
		12 25 44
	With Hohored.	12 2544
		i. 14
		Z
		0212
		12 2544
		24
		inder 14
		12
		24
		24
		0

	1000s       10s       1s         Image: Comparison of the state of the st							
	1000s       10s       1s         Image: Second							
Y6 Vocabulary	Half, halve, equal groups of, How many times? groups of, share, share equally, group in pairs, divide, divided by, = equals, commutative, repeated subtraction, odd, even, product, multiples, column method, short division, inverse, exchange, regroup, remainder, formal written method, common factors, common multiples, ratio							