COUNTESS GYTHA PRIMARY SCHOOL

Countess Gytha Primary School

Written Calculation Policy

Progression Towards a Standard Written Method of Calculation

Introduction

This calculation policy has been written in line with the programmes of study taken from the revised National Curriculum for Mathematics (2014). It provides guidance on appropriate calculation methods and progression. The content is set out in yearly blocks under the following headings: addition, subtraction, multiplication and division and within each of these how the processes of concrete, pictorial and abstract fit within each category. These may vary and particularly in KS2, concrete and pictorial methods may only be used where further support is needed in developing a particular child's understanding.

Children will use mental methods as their first port of call when appropriate, but for calculations that they cannot do in their heads, they will need to use an efficient written method accurately and with confidence. Our aim is that by the end of Y6, children use mental methods (with jottings) when appropriate, but for calculations that they cannot do in their heads, they use an efficient formal written method accurately and with confidence.

Many of the diagrams/models/ calculations in this policy use the term 'ones' to define the smallest whole number place value column. Although in EYFS, it will remain solely as 'ones', in the following year groups the use of both 'ones' and 'units' to denote this place value column will be taught.

Aims of the Policy

- To ensure consistency and progression in our approach to calculation.
- To ensure that children develop an efficient, reliable, formal written method of calculation for all operations.
- To ensure that children can use these methods accurately with confidence and understanding.

How to use this Policy

- Be aware of steps taught in previous year groups.
- Use the policy as part of your planning but ensure you use previous or following years' guidance to allow for personalised learning.
- Always use Assessment for Learning to identify suitable next steps in calculation for groups of children, including to challenge pupils to progress to the next group expectations.
- Always use suitable resources, models and images to support children's understanding of calculation and place value, as appropriate.
- Encourage children to make efficient choices about the methods they use when solving problems.

Addition

Key Vocabulary

sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' 'is the same as.'

EYFS

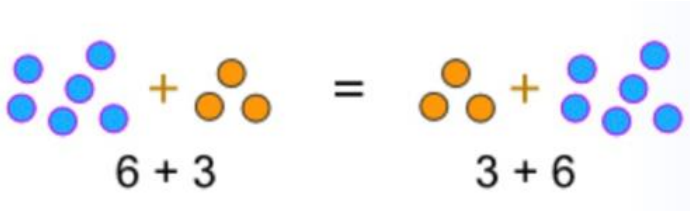
Children will engage in a wide variety of songs and rhymes, games and activities.
They will begin to relate addition to combining two groups of objects, first by counting all and then by counting on from the largest number. There will be a focus on children finding cardinal numbers to understand quantity before and after an addition takes place.
They will find one more than a given number.
In practical activities and through discussion they will begin to use the vocabulary involved in addition.

Pictures and concrete objects used to demonstrate two parts e.g:

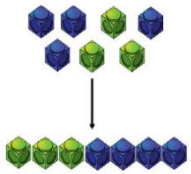
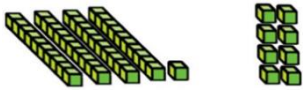
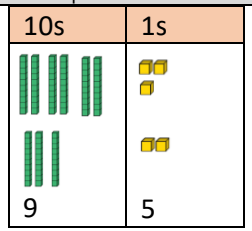
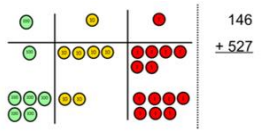
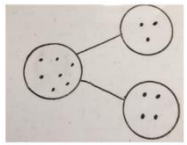
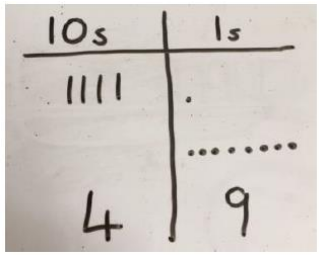
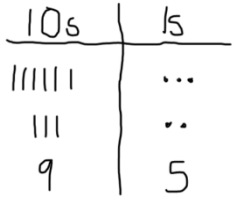
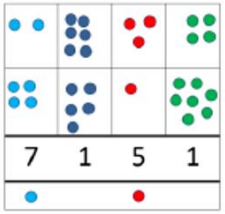
'You have five apples and I have three apples. How many apples altogether?'

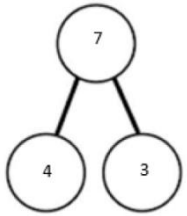
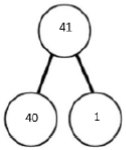
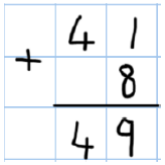
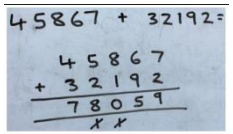
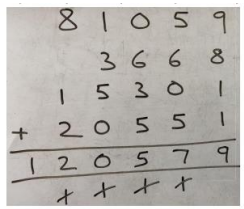
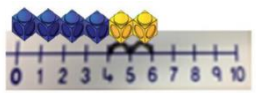
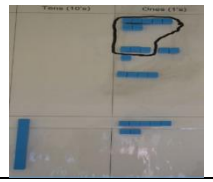
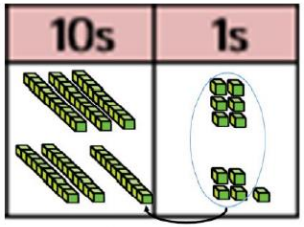
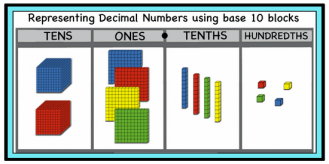
Number lines will be used to show adding one more.

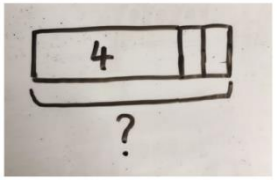
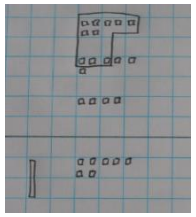
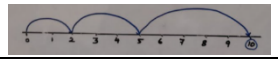
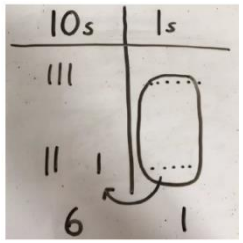
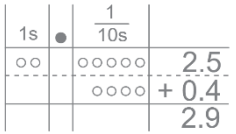
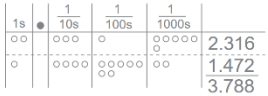
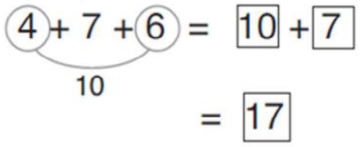
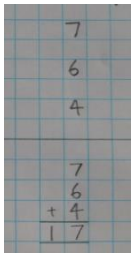
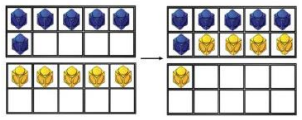
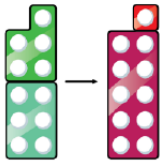
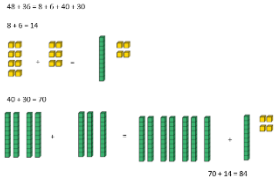
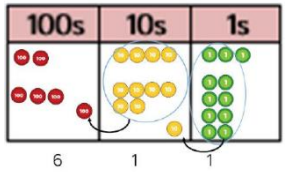
Introduce symbols involved in addition (+ and =). It is important that children understand that the number sentence is commutative:

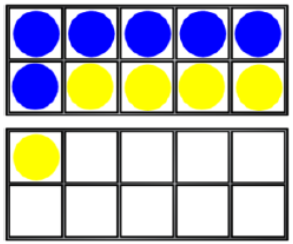
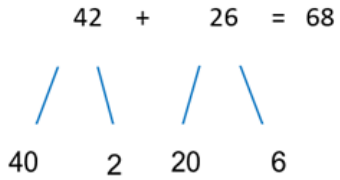
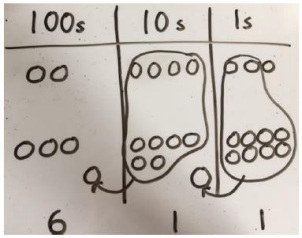


6 + 3 = 9 3 + 6 = 9 9 = 6 + 3 9 = 3 + 6

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Combining two parts to make a whole: part whole model. Example 3 + 4 = 7	Combine two numbers – a two-digit number and ones Example 41 + 8 = 49	Column method- No regrouping Example 62 + 32 = 95	Column method- regrouping (up to 4 digits)	Column method- regrouping	Column method- regrouping
Concrete	 The children can count all of the cubes to begin with but they will start to subatize start value and count on the number of cubes added to the group.	 +1 +1 +1 +1 +1 +1 +1 +1 41 42 43 44 45 46 47 48 49	 10s 1s 9 5	 146 + 527	Use of base 10 or place value counters to represent numbers in columns (as Year 3 & 4) if required.	
Pictorial	 'What has been added to 3 to make 12?' 7 3 ?	 10s 1s 4 9	 10s 1s 9 5	 7 1 5 1	Use of base 10 or place value counters to represent numbers in columns (as Year 3 & 4) if required.	

Abstract	 4 + 3 = 7 7 – 3 = ?	41 + 8  1 + 8 = 9 40 + 9 = 49 	T O 6 3 + 3 2 9 5 'What digit is in the ones column?' 'What digit is in the tens column?' Use the language of place value to ensure understanding: 'Three ones add two ones equals five. Write five in the ones column. Six tens add three tens equals nine tens. Write 9 to represent 90 in the tens column.'	Use the language of place value to ensure understand-ing: 2634 +4517 7151 1 1 'Seven add four equals 11. Write one in the units column and 'carry' one across into the tens column (10). 30 add 10 and the ten that we carried equals 50 Write 5 in the tens column (50). 600 add 500 equals 1100. Write 1 in the hundreds column (100) and 'carry' the 1 across into the thousands column (1000). 2000 add 4000 and the thousand that we 'carried' equals 7000. Write 7 in the thousands column (7000) **The digits that have been 'carried' should be recorded under the line in the correct column.** **Continue to develop with addition of two four-digit numbers and with decimals (in the context of money or measures).**	3 1 2 1 3 7 + 1 4 8 3 3 0 6 1 1 Continue to use the language of place value to ensure understanding. Ensure that the digits that have been 'carried' are recorded under the line in the correct column. 	
	Starting at the bigger number and counting on. Example 4 + 2 = 6	Adding three single digits. Example 7 + 6 + 4 = 17 2 + 3 + 5 = 10	Column method- regrouping Example 36 + 25 = 61		Column method for adding decimals.	Column method for adding decimals.
Concrete	 Put your finger on 4.  Count on (count forwards) 2	Use bead strings, unifix cubes, numicon, counters etc. to represent the 3 numbers 	 6 1		Use of base 10 or place value counters to represent numbers in columns on a place value mat with T, U, ., 1/10, 1/100, if required. With base 10, unit/ones = 1/100 10s = 1/10 100s = unit 1000s = tens 	

Pictorial		 				
Abstract	 Children to use their fingers where they hold start number in their head and their fingers to count on.	  2 + 3 + 5 = 10	**Formal Method** Use the language of place value to ensure understand -ing: 'Six add five equals 11. Write one in the units column and 'carry' one (10) across into the tens column. 30 add 20 and the ten that we 'carried' equals 60. Write 6 (60) in the tens column. 61 is the answer. **The digit that has been 'carried' should be recorded under the line in the correct column.** 36 +25 61 1		3 . 5 6 + 2 . 4 7 6 . 0 3 1 Continue to use the language of place value to ensure understanding. Ensure that the decimal points line up.	2 3 . 3 6 1 9 . 0 8 **0** 5 9 . 7 7 **0** + 1 . 3 **0** **0** 9 3 . 5 1 1 2 1 2 Continue to use the language of place value to ensure understanding. Ensure that the decimal points line up. Use 'ghost' zeros to help guide children in lining decimal numbers correctly in columns (where necessary)
	Regrouping to make 10 using ten frame. Example 6 + 5 = 11	Use partitioning method to add two two-digit numbers. Examples 42 + 26 = 68 48 + 36 = 84 (bridging ten)	Addition of 3-digit numbers Example 243 + 368 = 611			
	 	'Partition the numbers into tens and ones/units. Add the tens together and then add the ones/units together. Recombine to give the answer'.  Bridge the tens (exchange ten ones for one ten) 				

						
	$6 + \square = 11$ $6 + 5 = 5 + \square$ $6 + 5 = \square + 4$	**42 + 26 = 68** 40 + 20 = 60 2 + 6 = 8 60 + 8 = 68 **48 + 36 = 84** 48 + 36 = 8 + 6 + 40 + 30 8 + 6 = 14 40 + 30 = 70 70 + 14 = 84	Use the language of place value to ensure understanding: 'Three add eight equals 11. Write one in the units column and 'carry' one (10) across into the tens column. 40 add 60 and the ten that we 'carried' equals 110. Write 1 (10) in the tens column and 'carry' one (100) across into the hundreds column (100). 200 add 300 and the hundred that we 'carried' equals 600. Write 6 (600) in the hundreds column 243 +368 611 1 1			

Subtraction

Key Vocabulary
take away, less than, the difference, subtract, minus, fewer, decrease.

EYFS

Children will engage in a variety of counting songs and rhymes and practical activities.
In practical activities and through discussion they will begin to use the vocabulary associated with subtraction.

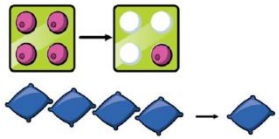
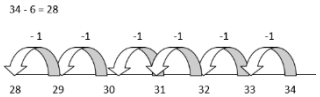
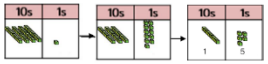
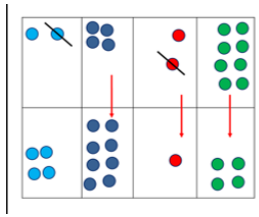
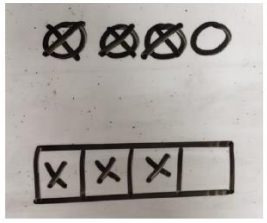
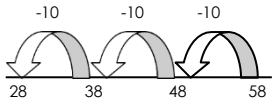
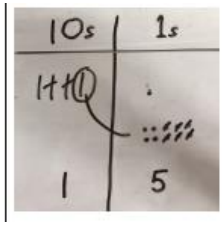
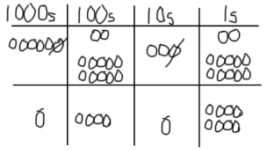
They will find one less than a given number.

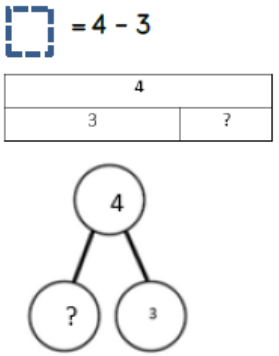
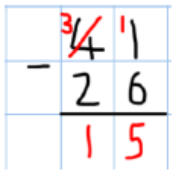
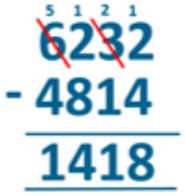
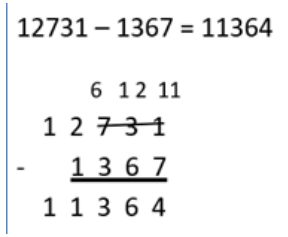
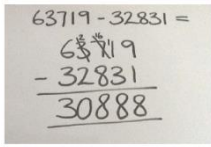
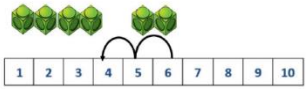
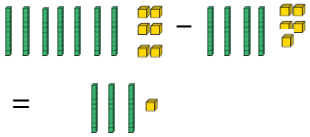
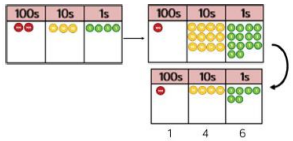
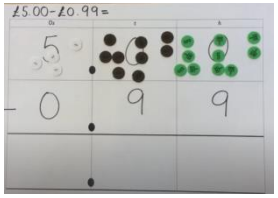
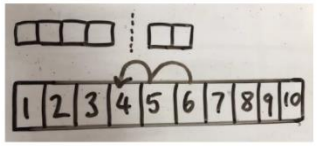
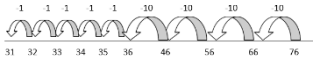
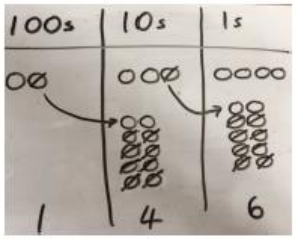
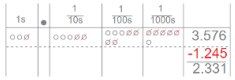
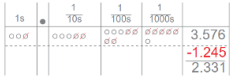
They will begin to relate subtraction to 'taking away' using objects to count 'how many are left' after some have been taken away.

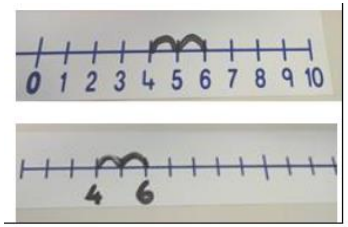
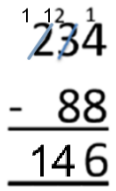
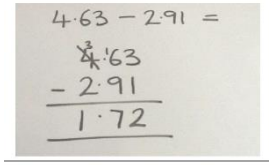
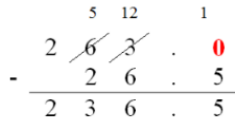
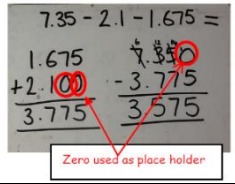
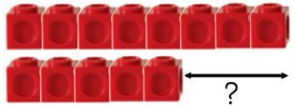
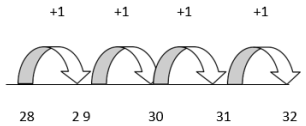
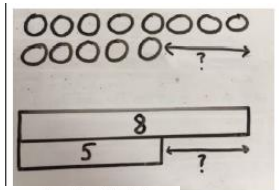
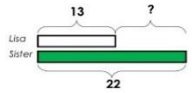
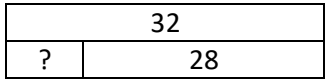
6 – 2 = 4 

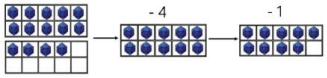
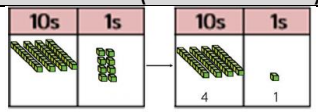
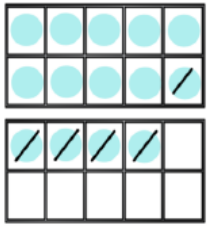
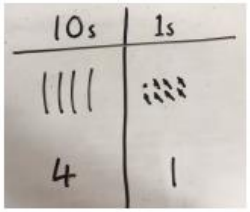
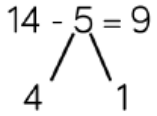
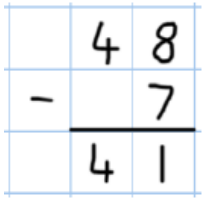
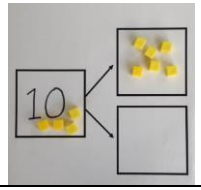
'Take two apples away. How many are left?'

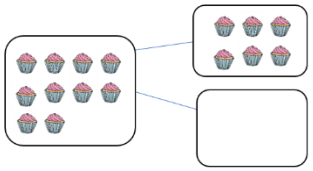
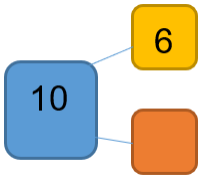
Children will begin to count back from a given number supported by number lines, physical objects and pictures.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Physically taking away and removing objects from a whole Example 4 - 3 = 1	Counting back within 100, in ones, tens	Column method- regrouping Example 41 - 26 = 15	Column method- regrouping (up to 4 digits) Example 6231 – 4814 =1418	Column method- regrouping	Column method- regrouping
Concrete			 Use the language of place value to ensure understanding: 'We can't subtract six from one, so we need to exchange a ten for ten ones to give us 30 + 11.'		Use of base 10 or place value counters to represent numbers in columns (as Year 3 & 4) if required.	
Pictorial		58 – 30 = 28 			Use of diagrams to represent numbers in columns (as Year 3 & 4) if required.	

Abstract		Same as EYFS/Y1 using larger numbers		 Use the language of place value to ensure understanding.	 In this example it has been necessary to exchange from the tens and the hundreds columns.	
	Counting back Example 6 – 2 = 4	Subtraction using partitioning Example 76 – 45 = 31	Formal written method involving decomposition/ exchange with 3 digits Example 234 – 88 = 146	Column subtraction with decimals – in context of money and measure	Column subtraction with decimals- the same amount of decimal places.	Column subtraction with decimals- with different amounts of decimal places.
Concrete	Multilink – 'Here I have 6 ones to start. If I take away (subtract) 4 ones. What do I have left?' 				Use of place value counters to represent numbers in columns (as Year 3 & 4) if required.	
Pictorial		76 – 45 = 31 				

Abstract	Use marked number line: 6 - 2 = 4  'Put your finger on number 6 and count back 2.'	Same as EYFS/Y1 using larger numbers	 Use the language of place value to ensure understanding. In this example it has been necessary to exchange from the tens and hundreds column.		£166.25 – £83.72 = £82.53 16 5 12 1 6 6· 2 5 - 8 3· 7 2 8 2· 5 3 Ensure the decimal points line up.	 
	Finding the difference Example 8 – 5 = 3	Finding the difference Example 32 – 28 = 4				
Concrete	Finding the difference is finding the number between the largest and smallest number. Children should recall finding the difference as subtraction. Calculate the difference between 8 and 5.  Count up from the smallest number to the largest to find the difference using resources, e.g. cubes, beads, number lines/lines	See Year 1 modelling and methods. Continue to use and solidify understanding. Finding the difference = largest number – smallest number OR counting on 32- 28 = 4  'The difference between 28 and 32 is 4.'				
Pictorial	Introduce complementary addition to find differences (only use for small differences).  **Comparison Bar Models** *Lisa is 13 years old. Her sister is 22 years old. Find the difference in age between them.*  The use of models is extreme - ly import- ant here to under- stand the idea of "difference".	 32 ? | 28				

	'Lets check by adding the 3 cubes back on.' Showing manipulation of resources will ensure secure understanding. 'How many more cubes did I have to start with?'					
Abstract	8 – 5, the difference is □ Children to explore why 9 - 6 = 8 – 5 = 7 – 4 have the same difference.	32 – 28 = □				
	Making 10 Example 14 – 5 = 9	Subtraction using base 10 (in columns)				
Concrete						
Pictorial						
Abstract	 14 – 4 = 10 10 – 1 = 9					
	Part part whole model Example 10 – 6 = 4					
Concrete						

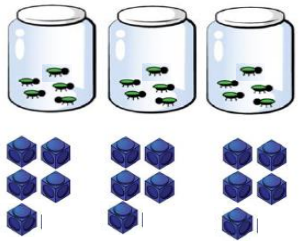
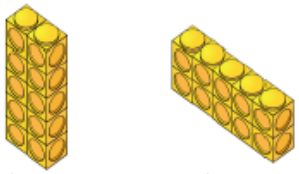
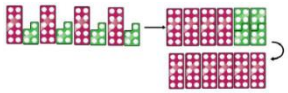
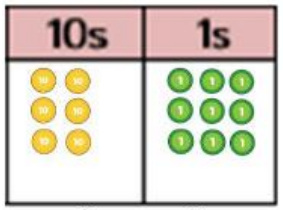
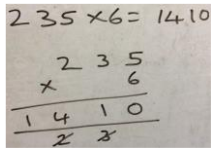
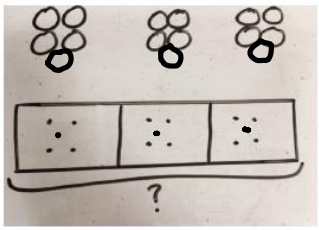
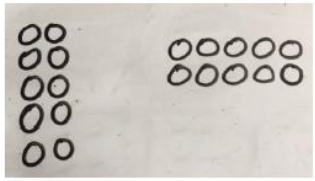
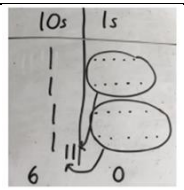
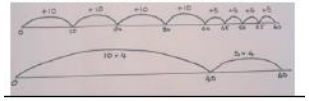
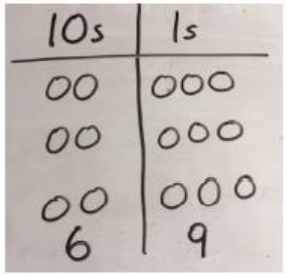
Pictorial						
Abstract	 10 – 6 = 4					

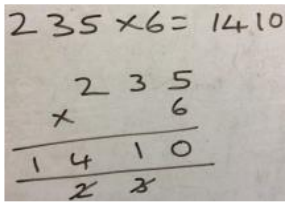
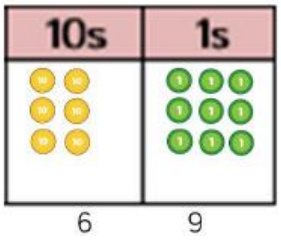
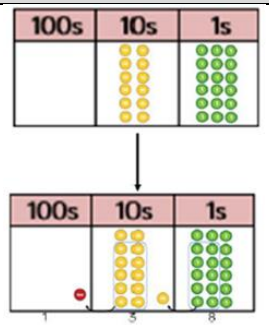
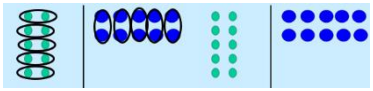
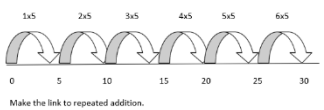
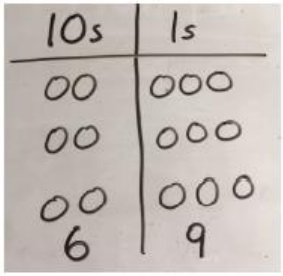
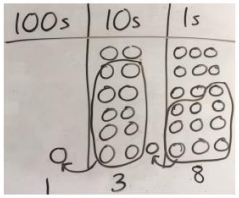
Multiplication

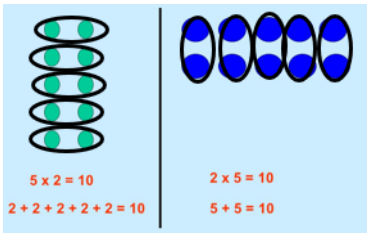
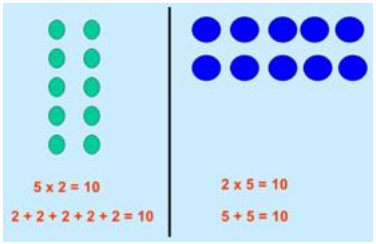
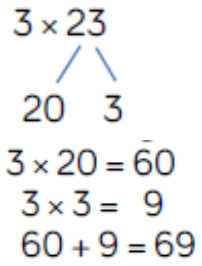
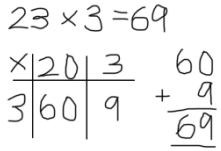
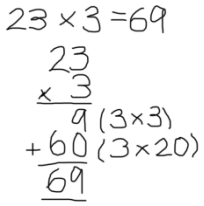
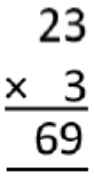
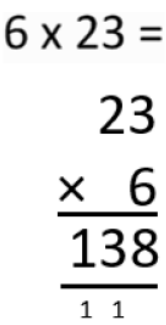
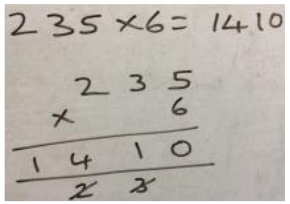
Key Vocabulary
double, times, multiplied by, the product of, groups of, lots of, equal groups, repeated addition.

EYFS

Children will engage in a wide variety of songs and rhymes, games and activities. **In practical activities and through discussion they will begin to solve problems involving doubling.** 🍎🍎🍎🍎🍎🍎 'Three apples for you and three apples for me. How many apples altogether?'	Clear language and consistent language is essential at this stage. 'lots of' = multiply 2 lots of = double = 2x

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Repeated grouping/repeated addition Example 3 x 5/5 + 5 + 5 = 15	Combining groups (repeated addition) to illustrate commutativity. Example 2 x 5 = 5 x 2	Partition to multiply a teen number. Example 4 x 15 = 60	Formal column method (2 digit by 1) Example 3 x 23 = 69	Formal column method (up to 4-digits by a one-digit) Example 235 x 6 = 1410	Short Multiplication and long multiplication
Concrete		 2 lots of 5 5 lots of 2 '2 groups of 5 cubes' or '5 groups of 2 cubes'	 (Partition 15 into 10 + 5) Initially show supported by dienes blocks or numicon.	 6 9	Use of place value counters to represent numbers in columns (as Year 4) if required.	**Abstract** Short Multiplication 
Pictorial	 	'How many altogether?' '5 + 5 = 10' or ' 2 + 2 + 2 + 2 + 2 = 10  '2 groups of 5' '2 times five' Or '5 groups of 2 ' ' 5 times two'	 A number line can also be used 	 	Use of diagrams to represent numbers in columns (as Year 4) if required.	Long Multiplication 124 x 26 = 3224

Abstract	3 x 5 = 15 5 + 5 + 5 = 15 'Three pots of five insects. How many insects altogether? 5, 10, 15'	10 = 2 × 5 5 × 2 = 10 2 + 2 + 2 + 2 + 2 = 10 10 = 5 + 5	4 x 15 10 5 10 x 4 = 40 5 x 4 = 20 40 + 20 = 60	3 × 23 20 3 3 × 20 = 60 3 × 3 = 9 60 + 9 = 69 23 × 3 69		124 X 26 744 + 2480 3224 1 1 Use the language of place value to ensure understanding. Add the partial products.
	Arrays or number lines to support early multiplication Example 5 x 2 = 10	Arrays or number lines to support early multiplication Example 6 x 5 = 30	Formal column method (2 digit by 1) Example 3 x 23 = 69	Formal column method (2- and 3-digit) Example 6 x 23 =138	Long Multiplication (expanded leading to compact) Example 23 x 13 = 299	Short and Long multiplication with decimals Example 53.2 x24
Concrete	 'Five groups of two faces. How many faces altogether? 2, 4, 6, 8, 10' Two groups of five faces. How many faces altogether? 5, 10'		 10s 1s 6 9	 100s 10s 1s 100s 10s 1s	**Abstract** Demonstrate expanded long multiplication when first introduced but always use compact method thereafter. 2 3 X 1 3 9 (3 x 3) 6 0 (3 x 20) + 3 0 (10 x 3) 2 0 0 (10 x 20) 2 9 9 This leads into compact long multiplication (formal method):	**Abstract** Children are taught to use place value to complete multiplication with whole numbers E.g Below, the 53.2 would be x10 to be 532. When the answer is calculated, it would be divided by 10. 53·2 X 24·0 212·8 (53·2 x 4) + 1064·0 (53·2 x 20) 1276·8
Pictorial	 '2 groups of 5' '2 lots of 5' '2 multiplied by 5' OR '5 groups of 2' '2 lots of 5' 5 multiplied by 2' 'How many altogether?' '5 + 5 = 10' Double five is ten	 Using an empty number line: 6 x 5 = 30 1x5 2x5 3x5 4x5 5x5 6x5 0 5 10 15 20 25 30 Make the link to repeated addition.	 10s 1s 6 9	 100s 10s 1s		

Abstract	 	6 X 5 = 30 '5 + 5 + 5 + 5 + 5 + 5 = 30 ' '6 rows of 5' '6 groups of 5' '5 groups of 6'	 Grid Method  Expanded Method Use the language of place value to ensure understanding. Include an addition symbol when adding partial products.  Formal Method Use the language of place value to ensure understanding. 	Formal Method – 2-digit  Use the language of place value to ensure understanding. Ensure that the digit carried over is written under the line I the correct column. Formal Method – 3-digit 	2 3 X 1 3 6 9 (3 x 23) + 2 3 0 (10 x 23) 2 9 9 Use the language of place value to ensure understanding. Add the partial products. The prompts (in brackets) can be omitted if children no longer need them.	Include ·0 to support aligning of place value. The prompts (in brackets) can be omitted if children no longer need them. **OR 53.2 x 10 to perform the calculation 532 x 24 then divide the answer by 10** 532 X 24 2128 (53·2 x 4) + 10640 (53·2 x 20) 12768 12768 divided by 10 = 1276.8

Division

Key Vocabulary
share, group, divide, divided by, half.

EYFS

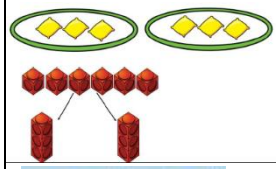
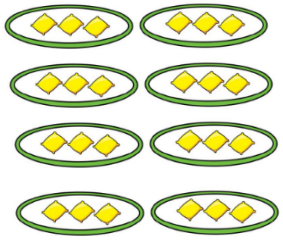
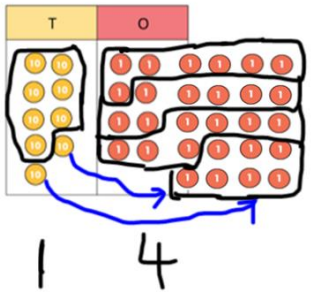
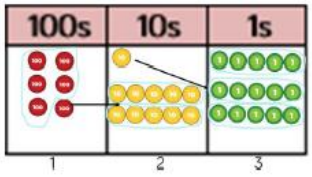
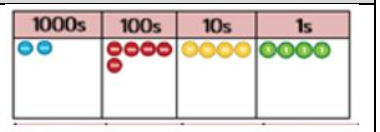
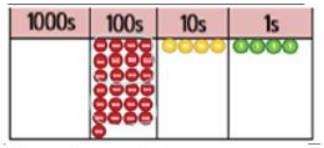
Children will engage in a wide variety of songs and rhymes, games and activities.

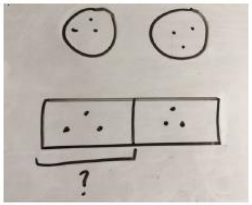
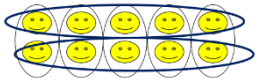
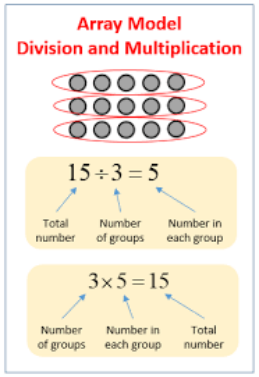
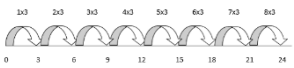
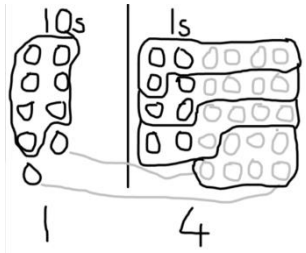
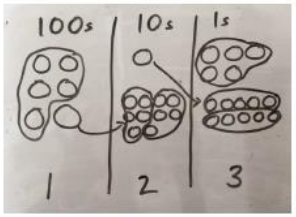
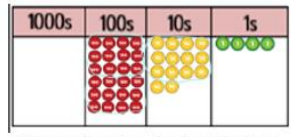
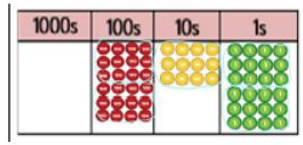
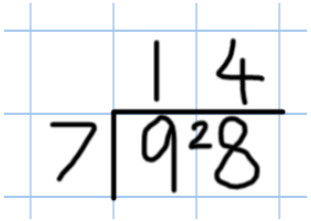
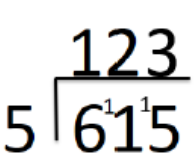
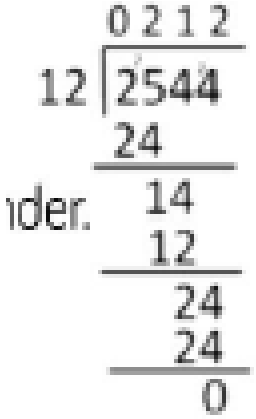
In practical activities and through discussion they will begin to solve problems involving halving and sharing.

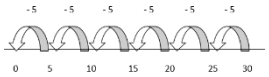
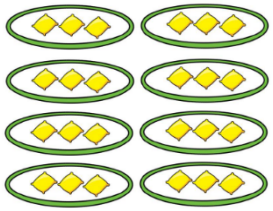
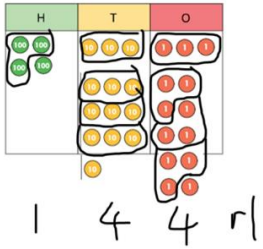
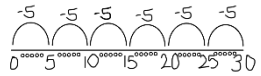
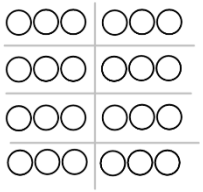
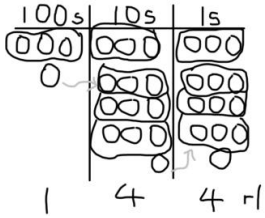
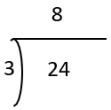
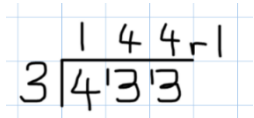
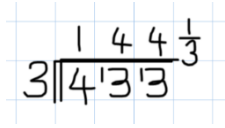
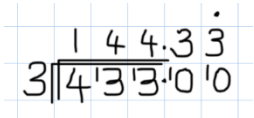
Share the apples between two people.

'Half of the apples for you and half of the apples for me.'


Visual groupings of physical objects to show equal sharing.

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
	Sharing objects into equal groups Example 6 shared between 2 equals 3	Division statements using the division (÷) and equals (=) signs Example 15 ÷ 3 = 5	Division using empty number line to count forward and jump back Example 24 ÷ 3 = 8	Short division Example 98 ÷ 7 = 14	Short division Example 615 ÷ 5 = 123	Long division Example 2544 ÷ 12 =
Concrete	  'Share these six apples equally between two children. How many apples will each child have?'	Sharing and grouping:  '15 crayons shared equally between three pots.' (Sharing) 'We have 10 crayons and put five crayons in each pot.'		 1. Make 98 with place value counters 2. How many groups of 7 tens can you make with 9 tens counters? 3. Exchange 2 tens for 20 ones 4. How many groups of 7 ones can you make with 28 ones?	 1. Make 615 with place value counters 2. How many groups of 5 hundreds can you make with 6 hundred counters? 3. Exchange 1 hundred for 10 tens 4. How many groups of 5 tens can you make with 11 ten counters? 5. Exchange 1 ten for 10 ones 6. How many groups of 5 ones can you make with 15 ones?	 We can group 24 hundreds into groups of 12 which leaves with 1 hundred.  We can't group 2 thousands into groups of 12 so will exchange them.

Pictorial	 'Each child has 3. What do you notice?' 2 groups of 3 OR 3 groups of 2 Link division with multiplication to support use of arrays. Children will move from sharing to grouping in a practical way: 'How many faces altogether? How many groups of two?'  'Five groups of two'  'How many groups of 5?' '10 shared equally between 2 people' 'Half of ten is five'		 'How many threes in 24?' Link with language for factors and multiples.  Jump back from 24 to make the link with repeated subtraction	 Use the vocabulary of place value to ensure understanding and make the link to partitioning.	 Use the vocabulary of place value to ensure understanding and make the link to partitioning.	 After exchanging the hundred, we have 14 tens. We can group 12 tens into a group of 12, which leaves 2 tens.  After exchanging the 2 tens, we have 24 ones. We can group 24 ones into 2 group of 12, which leaves no remainder. 12
Abstract	 Children should also be encouraged to use their 2 times tables facts.	'How many pots do we need?' 'How many groups of…' (Grouping) '15 divided by 3 equals 5' – 3 pots and 5 dots in each '15 divided by 5 equals 3' – 5 pots and 3 dots in each (Show by circling the columns instead of rows.) 15 ÷ 3 = 5 15 ÷ 5 = 3	0 3 6 9 12 15 18 21 24 'How many groups of three in 24?'	 98 ÷ 7 = 14		

		Repeated subtraction Example 30 ÷ 5 = 6	Formal layout using multiplication/division facts children know (2x, 3x, 4x, 5x 8x, 10x		Short division with remainders Example 433 ÷ 3 = 144 r1	
Concrete		Jump back to make the link with repeated addition  	 'How many groups of three in 24?'		 	
Pictorial		 'How many groups of five?'	 'How many groups of three in 24?'		 	
Abstract		How many groups of 5 in 30? 30 ÷ 5 = 6	24 ÷ 3 = 8  'Twenty four divided by three equals eight.' 'How many threes are there in twenty four?'		 The remainder can also be expressed as a fraction1/3 (the remainder divided by the divisor): 433 ÷ 3 = 144 1/3  And as a decimal remainder:  Ensure children always place the decimal point after the whole incase of remainders. They must be taught that they can place an infinite number of zeros after the decimal point.	