Icknield, Watling and Studham Partnerships Lower School

Calculation Policy to support consistency and clear progression ready to start UKS2

Watling, Icknield Lower and Studham School's Approach to Calculation

This calculation policy will be used alongside the discrete approaches to learning such as the focused use of Numicon at Icknield, and White Rose Maths planning resources at Watling. We have included concepts agreed with Priory Academy, our partnership receiver school and therefore this policy includes concepts up the end of KS2. The calculation policy should be used to support children to develop a deeper understanding of number calculation. This policy has been designed to teach children through the use of concrete, pictorial and abstract methods/representations.

Concrete representation – a pupil is first introduced to an idea or a skill by acting it out with real objects. This is a **'hands on'** component using real objects and it is the foundation for conceptual understanding.

Pictorial representation – a pupil has sufficiently understood the hands –on experiences performed and can now relate them to representations, such as a diagram or picture of the problem.

Abstract representation – a pupil is now capable of representing problems by using mathematical notation, for example $14 \div 2 = 7$.

Context and Rationale

Although the focus of this document is on the use of representations and written methods in line with the curriculum, agility with mental methods lies at the heart of effective calculation. Both written (which include diagrams and pictorial representations) and mental methods should be taught alongside each other to secure real understanding for our children. Maths lessons should be meaningful with an emphasis on the application of mathematics in real life; it is therefore taught through real life experiences and situations as well as cross curricular themes as much as possible.

Our Commitment to Principles of Best Practice

The approach to teaching all mathematical concepts used across the partnership is based upon the following principles:

- Practical activities modelled by the teacher and carried out independently by the children.
- Mental and written methods need to be taught alongside each other
- Rapid recall of mathematical facts including times tables and number bonds is essential and must be taught rigorously and systematically
- Children use mental processing in every representational or written piece of work
- Children must be taught to talk about their mental processing and written methods using appropriate vocabulary. They crystallise their thinking and secure deeper learning by explaining their calculating.
- Pictorial, diagrammatical or written recording help children to clarify their thinking and provide essential insights into children's understanding. It is for this reason that all children must be taught to record independently and outcomes used to inform teacher assessment and planning for next steps.
- All children will be taught to use practical apparatus (especially Numicon and base ten), pictures, diagrams and a mixture of words and symbols to capture learning about calculation. Children should have opportunities to choose how their learning is to be recorded. Often their ideas are more meaningful than the teacher's.
- Standard symbols and conventions must be introduced as soon as the child is able to use them with understanding. There should be a good pace to conceptual development.
- Estimation is a key skill used by numerate adults so they know what to expect after calculating. Children must be taught to estimate at every opportunity so this becomes an automatic part of their approach to mental and written calculations.
- The environment should reflect that we are a school focused on understanding number and calculation.

Early Calculation and Recording

• It is important that children build on their early personal (intuitive) mathematical marks and explore early calculations in their own ways. This helps them develop their mathematical thinking and represent what they understand. It allows them to gradually integrate standard numerals and mathematical symbols with understanding. Within the EYFS, maths in taught as a specific area but also used as a complement to achieve the key characteristics of effective learning.

NSE4561 8POILISIUPIGICI) ATISEN	5 009MM	$\frac{10 \text{ t is p}}{(2 \text{ t is t})}$ (8)	5 - 99 =
Alison: 'Seven toys and seven children' - 5 yrs 1	Fred: adding grapes	Barney: subtracting beans	Alison: multiplying by 99
month	5 yrs 8 months	5 yrs 7 months	7 yrs 3 months

- This meaningful approach to children recording their maths continues throughout the school as they set their work out in exercise books with both plain and squared paper.
- Through the use of practical apparatus, children are expected to develop a mental picture of our number system surrounded by number lines in the environment across Early Years and Key Stage one and two. In Years 3 and 4, number lines represent fractions, decimals and larger numbers in a range of intervals. They explore and learn about calculation in a wide range of play based contexts such as role play, small world, free use of Numicon, Dienes, Multilink, dominoes and construction materials.

Across the partnership, the children move on to their next school at the end of Year 4. However, it is essential all teachers have an understanding of what is expected during each academic year so that we know what the children have been exposed to and what we are preparing them for.

Number, Place Value and Rounding – Statutory Requirements (Also refer to non-statutory guidance in the National Curriculum)						
YR	Y1	Y2	Y3	Y4	Y5	Y6
Count reliably	Count to and across 100	Keep skills sharp	Keep skills sharp	Count backwards	Count forwards or	Keep skills sharp
with numbers	forwards and backwards	learnt previously	learnt previously	through zero to	backwards in steps of	learnt previously
from 1-20	beginning with 1 or 0			include negative	powers to 10 for any given	
	from any given number			numbers	number up to 1,000,000	

	Count, read and write numbers to 100				Interpret negative numbers in context, count forwards and backwards with positive and negative whole numbers through zero	Use negative numbers in context and calculate intervals across zero
	Count in different multiples including 2s, 5s and 10s	Count in steps of 2,3 and 5 from 0 and count in 10s from any number forward and backward	Count from 0 in multiples of 4, 8, 50 and 100	Count in multiples of 6, 7, 9, 25 and 1000	Keep skills sharp learnt previously	Keep skills sharp learnt previously
Say which is 1 more or 1 less than a given number (to 20)	Given a number, identify 1 more and 1 less	Keep skills sharp learnt previously	Find 10 or 100 more or less than a given number	Find 1000 more or less than a given number	Keep skills sharp learnt previously	Keep skills sharp learnt previously
	Identify and represent numbers using concrete objects and pictorial representations including the number line and use the language of 'equal to, more than, less than (fewer), most, least'	Identify, represent and estimate numbers using different representations including the number line	Identify, represent and estimate numbers using different representations	Identify, represent and estimate numbers using different representations	Keep skills sharp learnt previously	Keep skills sharp learnt previously
	Read and write numbers to 100 in numerals Read and write numbers 1-20 in digits and words Example: the numeral 153 is made up of 3 digits ("1", "5" and "3").	Read and write numbers to at least 100 in numerals and words	Read and write numbers to at least 1000 in numerals and words	Keep skills sharp learnt previously	Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit	Read, write, order and compare numbers to at least 10,000,000 and determine the value of each digit
Order numbers 1-20	Keep skills sharp learnt previously	Compare and order numbers 0-100 in numerals and words: use <, > and = signs	Compare and order numbers up to1000	Compare and order numbers beyond1000	Keep skills sharp learnt previously	Keep skills sharp learnt previously

	Recognise the place value of each digit in a 2 digit number	Recognise the place value of each digit in a 3 digit number (hundreds, tens and ones)	Recognise the place value of each digit in a 4 digit number (thousands, hundreds, tens and ones)	Read, write, order and compare numbers to at least 1,000,000 and determine the value of each digit	Keep skills sharp learnt previously
			Round any number to the nearest 10, 100 or 1000	Round any number up to 1,000,000 to the nearest 100, 1,000, 10,000 and 100,000	Round any whole number to a required degree of accuracy
			Read Roman numerals to 100 (1 to C) and understand how, over time, the numeral system changed to include the concept of zero and place value	Read Roman numerals to 1000(M) and recognise years written inRoman numerals	Keep skills sharp learnt previously
	Use place value and number facts to solve problems	Solve number problems and practical problems involving these ideas	Solve number problems and practical problems that involve all of the above and with increasingly large positive numbers	Solve number and practical problems that involve all of the above	Solve number and practical problems that involve all of the above

Place Value	
Developing early understanding of place value:	$\begin{bmatrix} \mathbf{i} \\ \mathbf{i} \\ \mathbf{i} \\ \mathbf{e} \\ \mathbf{k} $
	Progressing to

	Addition and Subtraction – Statutory Requirements (Also refer to non-statutory guidance in the National Curriculum)					
YR	Y1	Y2	Y3	Y4	Y5	Y6
	Read, write and interpret mathematical statements involving + and = signs	Ensure children understand that the = symbol can be in different positions and that it shows equal amounts on both sides. This can be further explored as children work with fractions, decimals and measures.				amounts on both
	Represent and use number bonds and related subtraction facts within 20	Read and use addition and subtraction facts to 20 fluently and derive and use related facts up to 100	Keep skills sharp learnt previously	Keep skills sharp learnt previously	Keep skills sharp learnt previously	Keep skills sharp learnt previously
	Solve one step problems that involve addition & subtraction using concrete objects and pictorial representations and missing number problems	Solve problems with addition & subtraction using concrete objects and pictorial representations and missing number problems Apply their increasing knowledge of mental and written methods	Keep skills sharp learnt previously	Solve addition and subtraction 2 step problems in context, deciding which operations and methods to use and why	Solve addition and subtraction multi step problems in context, deciding which operations and methods to use and why	Solve addition and subtraction multi step problems in context, deciding which operations and methods to use and why
Add and subtract 2 single digit numbers ELG Count on or back to find the answer ELG	Add & subtract 1 digit and 2 digit numbers to 20 including zero	Add & subtract numbers using concrete objects, pictorial representations and mentally including 2 digit no and ones 2 digit number and tens Two 2 digit numbers Adding three 1 digit numbers	Add and subtract numbers mentally including 3 digit no and ones 3 digit no and tens 3 digit no and hundreds	Keep skills sharp learnt previously	Add and subtract numbers mentally with increasingly large numbers	Perform mental calculations including mixed operations and large numbers
			Add and subtract numbers with up to 3 digits using formal written methods of	Add and subtract numbers with up to 4 digits using formal written methods of columnar addition	Add & subtract whole numbers with more than 4 digits including using formal written methods (columnar addition & subtraction)	Use k knowledge of the order of operations to carry out calculations involving 4 operations

		columnar addition & subtraction	& subtraction where appropriate		
Sh nu an (cc su	how that addition of 2 umbers can be done in ny order commutative) and ubtraction cannot	Keep skills sharp learnt previously	Keep skills sharp learnt previously	Keep skills sharp learnt previously	Keep skills sharp learnt previously
Re inv be su to an pro	ecognise and use the overse relationship etween addition and ubtraction and use this o check calculations nd missing number roblems	Estimate the answer to a calculation and use inverse operations to check answers	Estimate and use inverse operations to check answers to a calculation	Use rounding to check answers to calculations & determine in the context of a problem, levels of accuracy	Use estimation to check answers to calculations & determine in the context of a problem, levels of accuracy
		Solve problems including missing number problems, number facts, place value & more complex addition and subtraction	Keep skills sharp learnt previously	Keep skills sharp learnt previously	Solve problems involving addition, subtraction, multiplication and division



Addition Key Language	Sum, total, parts and wholes, plus, add, altogether, more, 'is equal to' ' is the same as'					
Early Addition	Concrete	Pictorial	Abstract			
They can print with and draw Numicon and dominoes	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.	5 = 2+3 2 is a part, 3 is a part and the whole is 5.			
			6+3 is the same as 9			
			4 and 1 is the same as 5			

Early addition guidance notes on concepts introduced - learning outcome breakdown.

- Recite numbers to 10, then 20. Say and use number in songs, rhymes and stories. Count up to objects to 10 in a line, or by moving them. Count out up to 10 objects from a larger set (know when to stop!).
- Begin to match numerals to the number in a set. Order numerals to 10.
- Count on from any number to 10. Say the next number (for example say the number after a given number up to 10 without counting from 1).
- Find different ways to partition sets of five objects
- Count up to 10 objects which can't be moved. Match numerals to the number in a set. Understand zero to describe an empty set
- Recognise £1 and £2 coins. Compare prices in pounds up to £10 (by making lines of pound coins). Use money in role play (for example pound shop).
 Solve practical problems involving counting or role play
- Recite numbers to 20, then 100
- Order numerals to at least 10.
- Count up to 20 objects.
- Ordinal numbers.
- Begin to estimate quantities, for example choose from 5, 10 or 20.
- Count actions and sounds
- Mental addition. Say the next number (without counting from 1). Add 1 to any number. Add 2 to any number up to 10. Read the corresponding addition.
- Find different ways to partition sets of ten objects, number bonds to 10.
- Find one more and two more than any number to 10. One more than numbers to 20. Begin to record the number in a set. To 5, then 10.
- Recognise 1p, 2p, 5p and 10p coins and know the value of each
- Pairs with a total of 6 or 7. Doubles to double 5. Mental addition using counting up
- Count in 2s. (Early multiplication)

Year 1	Counting on using number lines using cubes or Numicon.	A bar model which encourages the children to count on, rather than count all.	The abstract number line: What is 2 more than 4? What is the sum of 2 and 4? What is the total of 4 and 2? 4+2 =
		Start at the larger number on the number line and count on in ones or in one jump to find the answer. 10 11 12 13 14 15 16 17 18 19 20	5+12 = 17 Put the larger number in your head and count on the smaller number to find your answer.
Year 1	Regrouping to make 10; using ten frames and counters/cubes or using Numicon. 6+5	Children to draw the ten frame and counters/cubes	Children to develop an understanding of equality e.g. $6 + \Box = 11$ $6 + 5 = 5 + \Box$ $6 + 5 = \Box + 4$
		Use pictures or a number line. Reg or partition the sin number to make 1 9 + 5 = 14 1 = 4 1 = 1 1 =	



Year 1 addition guidance notes on concepts introduced - learning outcome breakdown.

- Relate counting on to addition. Partition 5 into two groups and record the related addition sentences.
- Relate counting on 1 or 2 to addition
- Know number bonds to 6, 8, 9 and 10;
- Add doubles together recording in a number sentence.
- Add more than two small numbers, spotting pairs to ten and doubles.
- Using mental addition and subtraction to; Find one more/less than any number up to 20. Find two more/less than any number up to 20

- Partition 6, 7 and 10 and record the related addition sentences; begin to find the corresponding subtraction facts. Relate counting on to addition; Add 2, 3 or 4 by counting on. Add a pair of numbers by putting the larger number first.
- Count from 1 to 100, count to 100 from any given number. Find one more and one less than a number up to 100. Know number bonds to 6 and 7. Use ordinal numbers in context. Know number bonds to 10 and finding matching number pairs quickly using mental addition
- Include bar model examples.
- Recognise 1p, 2p, 5p, 10p, £1 coins;
- Find totals using more than two coins up to 10p in value;
- Work out what coins can be used to pay an amount up to 10p;
- Begin to find all possibilities by making an ordered list;
- Know number bonds to 10 and use pairs to ten to bridge ten (8+2, 8+3...) with visual support;
- Add single-digit amounts of pence, bridging 10p;
- Sort calculations according to whether they will bridge ten or not.
- Use place value to count on in tens from single digit numbers and back;
- Use place value to count back from single digit numbers.
- Relate counting on in tens to find 10 more/less than any two-digit number
- Add and subtract 10 or 11 from 2-digit numbers. Mental addition and subtraction using near multiples and place value.
- Use pairs to add to 10 and use pairs to ten to bridge ten when adding visual support.
- Sort calculations according to whether they will bridge ten or not. Mental addition using partitioning and counting on.
- Mental addition and subtraction with money: Find totals to 20p, find totals of different amounts using number facts and partitioning. Add ten and twenty pence to different amounts
- Use pairs to ten to find the complement to the next multiple of ten, using a bead string or beaded number line for support. Add single digit numbers to 2-digit numbers using patterns and number facts including doubles, pairs to 10 and finding numbers that can easily be added together using these facts. Mental addition using partitioning
- Add and subtract single-digit numbers to and from 2-digit numbers using facts. Know which operation to use to work out number sentences. Find totals of money amounts and know the best order to add amounts.





Add/subtract 2-digit numbers by adding/subtracting multiples of ten then one using a 1-100 number square and number lines.

- Add/subtract 2-digit numbers by adding/subtracting multiples of ten then one using a 1-100 number square and n
- Sort calculations according to whether they are known facts or need to be worked out;
- use facts to add four or five small numbers, by spotting pairs to ten/doubles;
- rehearse addition/subtraction of two 2-digit numbers;
- begin to sort number problems into whether addition and subtraction is needed to work them out. Mental addition using partitioning.
- Recognise coins and find totals using a combination of coins; add two 2-digit money amounts together using mental addition by partitioning.



• add 11, 12, 13, 21, 22, 23, 31, 32 and 33 to two-digit numbers (answer less than 100)



- Mental addition using near multiples of 10 from 3-digit numbers
- Know pairs of multiples of 5 totalling 100; Know pairs of 2-digit numbers totalling 100
- Add three 2-digit numbers
- Written addition: Add three-digit numbers using expanded addition (one 'carry')
- use addition to check subtraction
- Word problems, choose to add or subtract.
- Add 3-digit numbers using written compact column addition.
- Written methods to add three or four 2-digit numbers using compact addition. Estimate answers.

Year 4 addition guidance notes on concepts introduced - learning outcome breakdown.

- Mental addition of pairs of 2-digit numbers or 3-digit numbers and 2-digit numbers using partitioning, place value or counting up.
- Use compact written column addition to add amounts of money
- Add single-digit numbers to and from three and four-digit numbers. Add multiples of 10, 100 and 1000 to and from four-digit numbers.
- Add near multiples of 10, 100 and 1000 to or from 3- and 4-digit numbers using place value,
- Choose mental or written methods to add. Solve word problems involving addition.





<u>SUBTRACTION</u>

Subtraction Key Language	Take away, less than, the difference, subtraction, minus, fewer, decrease		
Early Subtraction	Concrete	Pictorial	Abstract



Early subtraction guidance notes on concepts introduced - learning outcome breakdown.

- Early subtraction Guess how many are hiding. Mental subtraction by counting up.
- Rehearse counting back from 10 to 0, including in songs, stories and rhymes. Count actions. Work to counting back to 0 from at least 10, moving to 20
- Compare sets of objects, using the language more and fewer.
- Mental subtraction using counting back.
- Find and one less by counting back. Subtract two by counting back.







Bar model	8	2
	10 = 8 + 2	
5-2 = 3	10 = 2 + 8	
	10-2 = 8	
	10—8 = 2	

Year 1 subtraction guidance notes on concepts introduced - learning outcome breakdown.

- Find one less than any number to 100
- Find 10 less than a given number
- Use place value to count back in tens from single digit numbers
- Relate counting on in tens to find 10 less than any two-digit number
- halve even numbers to 20
- Use mental subtraction to find a difference in height/length by counting up
- Find numbers with a given difference
- Begin to relate addition and subtraction facts
- Using mental subtraction by counting back, subtract 10 and then small multiples of 10 from 2-digit numbers
- Find the difference between amounts of money less than 20p with a difference of 5p or less.
- Children use mental addition by partitioning and mental subtraction by counting up.
- Subtract 10 or 11 from 2-digit numbers.
- Mental subtraction using near multiples and place value
- Use pairs to ten to bridge ten when subtracting with visual support. Sort calculations according to whether they will bridge ten or not.
- Mental subtraction with money. Find change by finding the difference and counting on. Find differences between money amounts.
- subtract single-digit numbers from 2-digit numbers using facts

Year 2	Regroup a ten into ten and ones.	20 - 4 =	20—4 = 16
Year 2	Using base 10 48-7 10s 1s 10s 1s 48-7 4 1	Children to represent the base 10 pictorially.	48-7 = 41
Year 2	Partitioning to subtract without re-grouping. 34—13 = 21	Children draw representations of Dienes and cross off. $1 \qquad 1 \qquad$	43-21 = 22

Year 2 subtraction guidance notes on concepts introduced - learning outcome breakdown.

- Order and compare numbers to 100; say a number between any given neighbouring pairs of multiples of ten; count on in tens from 1 and 2-digit numbers and back again.
- Mental subtraction by partitioning all numbers to 10, then 20 into pairs;
- count on in tens from any 1-digit number then any number, and back again; relate counting on/back in tens to finding 10 more/less
- find change from 20p; subtract 10, 11 and 20 in the context of money.
- Find doubles to double 20 and corresponding halves; add and subtract 10, 20, 11 and 21
- Know pairs with a total of 20 and derive the subtraction facts;
- Recognise the use of a symbol such as to represent an unknown;
- Subtract a single digit from a 2-digit number not crossing tens using number facts and pattern
- subtract a single digit from a 2-digit number by bridging multiples of ten using knowledge of pairs to ten, place value/partitioning and counting up
- Subtract 20, 30, 40, 50 from two-digit numbers (answer less than 100); begin to subtract 11, 12, 21 and 22 from two-digit numbers.
- Subtract a 2-digit number from another by counting back.



Year 4	Whole 6 Part 4^{2} Mithetis for a class Box many gate by many gate by 4^{2} T 1.5 girlsReduction 4^{2} Comparison 4^{2} And 4^{2} -32 Comparison 4^{2} -32 Comparison 4^{2} Comparison 4^{2} Comparison 4^{2} And								
Year 3 and Year 4	Year 3 subtraction guidance notes on concepts introduced - learning outcome								
guidance	breakdown.								
notes:	 Know number bonds to 20 and use them in subtraction. 								
	 Mental subtraction of pairs of two-digit numbers by counting up; Find change from £1 								
	• Understand and use place value to subtract; Use place value in money to subtract; Subtract 1, 10 and 100 from any 3-digit number.								
	 Use place value to subtract 1s, 10s, 100s to/from 2 and 3-digit numbers; Mental subtraction using near multiples of 10 from 3-digit numbers. 								
	 Subtract numbers on either side of 100 by counting up 								
	 subtract pairs of 2-digit numbers using partitioning and near multiples 								
	• Mental subtraction of 1-digit numbers to and from 3-digit. Mental subtraction of multiples of 10 and 100 to and from 3-digit numbers.								
	• Word problems, choose to add or subtract. Children use number facts, partitioning and counting up and counting back.								
	Use mental subtraction to count back to find change from £5, £10 and £20.								
	 Subtract 2-digit numbers using compact column written subtraction 								
	Year 4 subtraction guidance notes on concepts introduced - learning outcome								
	breakdown.								
	 Find change from £5 or £10. Find a difference between prices. 								
	• Written subtraction of pairs of 3 and then 4 digit numbers using column decomposition (two 'carries'). Check subtraction with								
	addition.								
	Mental subtraction using place value and number facts:								
	Subtract single-digit numbers to and from three and four-digit numbers.								
	 Subtract multiples of 10, 100 and 1000 to and from four-digit numbers. 								

	Written subtraction using decomposition to subtract any pair of four-digit numbers, including those needing 3 moves							
	 Choose mental or written methods to subtract. Solve word problems involving subtraction. 							
Voor Cond								
Year 6								
	$\begin{array}{r} 6 \\ 7 \\ 7 \\ 5 \\ 2 \\ \hline 2$							
Year 5 and	- Learning objective breakdown examples:							
Year 6	- Understand place value in numbers with two decimal places; count on and back in steps of 0.1 and 0.01; add and subtract multiples							
notes:	of 0.1 or 0.01 without crossing multiples of 0.1 or 1; find a difference between a number with one or two decimal places and whole							
	number by counting up, e.g. 5 – 3.6 or 5 – 3.65; subtract decimals with one or two decimal places by counting up from the smaller to							
	the larger number e.g. 4.2 – 2.65. Subtract fractions with related denominators. Subtract mixed numbers.							
	- decimals with up to three decimals places including numbers that have different place values such as 13.2 – 4.68							
	- Find change from £20, £50 and £100 using counting up; find a difference between two amounts of money by counting up; use column							
	subtraction to subtract pairs of 4-digit numbers and to subtract 3-digit numbers from 4-digit numbers; choose whether to use							
	counting up or column subtraction to subtract pairs of four-digit numbers. Methods used include expanded decomposition, compact							
	decomposition and counting up subtraction.							









Repeated grouping/repeated addition 3×4 4 + 4 + 4 There are 3 equal groups with 4 in each group	
There are 3 equal groups, with 4 in each group.	

Year 1 multiplication guidance notes on concepts introduced - learning outcome breakdown.

- Mental multiplication: Use counting in 2s, 5s or 10s to solve a practical problem involving repeated addition.
- Begin to use a penny number line to work out multiplication by finding how many sets of.
- Double and halve.
- Understand multiplication as repeated addition. Use multiplication sentences to describe a practical problem and begin to make some links to division (how many sets of). Understand grouping as one model of division.

Year 2 Understanding arrays	Use objects laid out in arrays to find the an- swers to 2 lots 5, 3 lots of 2 etc.	Draw representations of arrays to show under- standing	3 x 2 = 6 2 x 5 = 10
			12 = 3 × 4 12 = 4 × 3

	Create arrays using counters and cu-	Use representations of arrays to show different	Use an array to write
	bes and	calculations and explore commutativity.	multiplication sentences and
	Numicon.		$0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\$
	Pupils should understand that an array can		3 + 3 + 3 + 3 + 3 = 15
	represent different equations and that, as multiplication is commutative, the order of		5 x 3 = 15
	the multiplication does not affect the answer.		3 x 5 = 15
Year 2	Number lines to show repeated groups. 3x4	Represent this pictorially alongside a number line e.g.:	Abstract number line showing three jumps of four.
		and the second second	3 × 4 = 12
		1000010000100001	0 4 8 12
	Cuisenaire rods can be used too.		
Using the		^	2x4=8
inverse		8	4 x 2 = 8
This should be			8 ÷ 2 = 4
taught alongside			8÷4=2
nunils learn how			8 = 2 x 4
they work			8 = 4 x 2
alongside each			2 = 8 ÷ 4
other.		. ÷ . = .	4 = 8÷ 2
			Show all 8 related fact family sentences.

Year 2 multiplication guidance notes on concepts introduced - learning outcome breakdown.

- Find doubles to double 20 and corresponding halves
- Twos, Fives and Tens: count from any number to 100, recognise multiples.
- Use grouping to count larger groups; investigate a statement about familiar numbers by finding examples which satisfy it.
- Find, describe and continue patterns
- Understand multiplication as repeated addition
- Use multiplication to describe an array
- Understand how to read an array; know that multiplication can be done in any order; use beaded lines and grouping, then hops to work out division problems
- Sort and solve multiplication word problems
- halve or double a 2-digit number

Year 3 Partition to multiply	Partitition to multiply using Numicon, base 10 or Cuisenaire rods. 4x15	Children to represent the concrete manipulatives pictorially.	Children to be encouraged to show the steps they have taken. 4 × 15 10 5 10 × 4 = 40 5 × 4 = 20 40 + 20 = 60 A number line can also be used
Year 3 Formal method	Formal method with place value counters (base 10 can also be used.) 3×23 Formal column method with place value counters (base 10 can also be used.) 3×23	Children to represent the counters pictorially. 10s 1s 00 000 00 000 00 000 6 9	Children to record what it is they are doing to show understanding. 3×23 $3 \times 20 = 60$ $/ 3 \times 3 = 9$ 20 3 $60 + 9 = 6923\times 369$

Year 3 multiplication guidance notes on concepts introduced - learning outcome breakdown.

- Use mental multiplication to double 2-digit numbers. Know × and ÷ facts for 2, 5 and 10 times tables. Understand that multiplication is commutative. Recognise multiples of 2, 5 and 10. Mental multiplication and division:
- Know multiplication facts for the 3 and 4 times tables up to the 12th multiple, derive corresponding division facts;
- Understand place value in 3-digit numbers, including money; Mental multiplication and division: multiply and divide numbers by 10 and 100 and understand the effect; understand that division is the inverse of multiplication.
- Use the 4 times table to learn the 8 times table; recall x2, 3, 4, 5, 8, 10 tables; Choosing which calculation to use to solve a word problem.
- Mental multiplication and division by 4 by doubling or halving twice; find unit and non-unit fractions of numbers using x2, 3, 4, 5, 8, 10.
- Double numbers to 50 using partitioning
- Begin to use formal written multiplication of 2-digit numbers by 1-digit numbers.

Year 4 Formal column	Formal column method with place value counters.	Children to represent the counters/base 10, pictorially e.g. the image below.	Formal written method $6 \times 23 =$ check the carrying over 23 $\frac{\times 6}{138}$ 1 1
Year 4	When children start to multiply 3dx3d and 4dx2d etc., they should be confident with the alphabet. To get 744 children have solved 6 x 124. To get 2480 they have solved 20 x 124.		
<u>Year 4 mu</u>	Itiplication guidance notes	s on concepts introduced - le	earning outcome breakdown.

- Formal written multiplication to multiply a 2-digit number by a 1-digit.
- Mental multiplication of 1-place decimals to give whole numbers.
- Know multiplication and division facts for the 9 times table.
- Begin to know multiplication and division facts for the 7 times table. Revise all times tables up to 12 × 10. Find factors of numbers up to 40. Use tables facts and place value to multiply multiples of 10 and 100 by single-digit numbers.
- Know the 11 and 12 times tables.
- Find factors of numbers less than 50. Use factors to carry out mental multiplication.
- Find the product of 3 single-digit numbers using commutativity to help.
- Solve scaling problems (by whole number factors). Convert from centimetres to metres. Solve correspondence problems.

23	23 23 23 23 23 23						product of	6 and 2	What is the ca What is the pro	lculation? oduct?	
						6 × 23 =			100s	10s	1s
Mai had a week. How ma one wee	? Mai had to swim 23 lengths, 6 times a week. How many lengths did she swim in one week?				=6 6 × <u>23</u>	23 23 <u>× 6</u>			000000000000000000000000000000000000000	000 000 000 000	
With the = 138	e cour	nters,	prove	that 6	x 23						

Year 5	1 2 4 × 2 6 .7 4 4 2 4 2 4 2 4 3 2 2 4 1 1 Answer: 3224	
Year 5 and Year 6 notes:	Multiplying Fractions $\frac{6}{10} \times \frac{16}{10}^{3} = \frac{3}{6} = \frac{1}{2}$ Cross cancel where possible	



Division Key Language	Share, group, divide, divided by, half		
Early Division	Concrete	Pictorial	Abstract
	Sharing using a range of objects. 6 + 2	Represent the sharing pictorially.	6 + 2 = 3 3 Children should also be encouraged to use their 2 times tables facts.
Early d • Sha	ivision guidance notes on cor re concreae objects into two groups within role p	Cepts introduced - learning play or context.	outcome breakdown.



Year 1 division guidance notes on concepts introduced - learning outcome breakdown.

- Work out simple division problems by finding how many sets in a given number.
- Double and halve.
- Understand multiplication as repeated addition. Use multiplication sentences to describe a practical problem and begin to make some links to division (how many sets of). Understand grouping as one model of division.



- Find doubles to double 20 and corresponding halves
- understand grouping as a model of division; understand that division can leave some left over; \ Sort and solve division and multiplication word problems
- Know that division is the inverse of multiplication. Introduce mental multiplication and division
- Understand division as the inverse of multiplication and use beaded lines to divide by 2, 5, and 10.
- halve or double a 2-digit number.



Year 3 division guidance notes on concepts introduced - learning outcome breakdown.

- Understand place value in 3-digit numbers, including money; Mental multiplication and division: multiply and divide numbers by 10 and 100 and understand the effect; understand that division is the inverse of multiplication.
- Halve small even numbers. Know × and ÷ facts for 2, 5 and 10 times tables.
- Know multiplication facts for the 3 and 4 times tables up to the 12th multiple, derive corresponding division facts;
- Divide by 2, 3, 4, 5 and 10, including giving remainders.
- use times tables to divide with remainders. Choosing which calculation to use to solve a word problem.
- Mental multiplication and division by 4 by doubling or halving twice; find unit and non-unit fractions of numbers using x2, 3, 4, 5, 8, 10.
- Halve numbers to 100 using partitioning
- Divide numbers just beyond the times tables (no remainders). Divide numbers just beyond the times tables (with remainders).



Year 4 division guidance notes on concepts introduced - learning outcome breakdown.

- Mental division using place value to divide whole 2-digit numbers to give 1-place decimals.
- Written division of 2-digit numbers by 1-digit numbers, just above the 10th multiple with remainders (see photo)
- Use written division to divide 2-digit numbers by 1-digit numbers, including those divisions which give a remainder
- Use times tables and place value for mental division of multiples of 10.



	And with decimals				
	503.5 ÷ 5 100.7 51503.35	$\begin{array}{r} 336\\ 155025\\ -45\\ 52\\ -45\\ -75\\ 75\\ 75\\ 00\\ \end{array}$	Divide Multiply Subtract Bring down	0) 0 × − ≯	1,5 30 45 60 75 90 105 120 135 150
Vers	$\frac{Dividing}{S} \frac{Fractions}{S}$ $\frac{4}{S} \div \frac{1}{S}$ $\frac{Keep}{S}$ $\frac{Flip}{S}$ $\frac{Flip}{S} = \frac{12}{S} = \frac{2}{S}$	5)9 	heep Change Flip 536		
Year 5 and Year 6 notes:					
Conceptual va	riation; different ways to ask children to solve 615÷5=				

Using the part whole model below, how can you divide 615 by 5 without using short division?	I have £615 and share it equally between 5 bank accounts. How much will be in each account?	5 615	What is the cal What is the ans	culation? wer?	0
615	615 pupils need to be put into 5 groups. How many will be in each group?	615 ÷ 5 =	100s	10s	1s
500 100 15		= 615 ÷ 5	0000	*****	00000 00000 00000