



Calculation Policy

2022-2023



Calculation Policy 2022

This calculation guidance 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.

This guidance aims to develop, model and explain core understandings and mathematical principles and progression to ensure consistency in the teaching and learning of mathematics in our school. This policy supports the White Rose maths scheme used throughout the school. Progression within each area of calculation is in line with the programme of study in the 2014 National Curriculum. This calculation policy should be used to support children to develop a deep understanding of number and calculation.

This policy has been designed to teach children through the use of concrete, pictorial and abstract representations.

• Concrete representation— a pupil is first introduced to an idea or skill by acting it out with real objects. This is a 'hands on' component using real objects and is a 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 $12 \times 2 = 24$. It is important that conceptual understanding, supported by the use of representation, is secure for all procedures.



EYFS

Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically. Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers (Statutory Framework 2021)

Addition	Subtraction	Multiplication	Division
Children are encouraged to gain a	Children are encouraged to gain a	Children use concrete objects to	Children use concrete objects to
sense of the number system through	sense of the number system through	make and count equal groups of	count and share equally into 2
the use of counting concrete objects.	the use of counting concrete objects.	objects.	groups.
They combine objects in practical ways	They understand subtraction as	They will count on in twos using	They count a set of objects and
and count all.	counting out.	a bead string and number line.	halve them by making two equal
Addition Met 5 3 8	D takeaway 5 leaves 5		groups.
They understand addition as counting	They begin to count back in ones and	They understand doubling as	They understand sharing and
on. They will count on in ones and	twos using objects, cubes, bead string	repeated addition. $2 + 2 = 4$	halving as dividing by 2.
twos using objects, cubes, bead string, and number line.	and number line.		







Addition





Regrouping to make 10	number 1 by 1 to find the answer.		6 + 5 = 11
	6+5=11 Start with the bigger number and use the smaller number to make 10	6+5=11 4 1 6+4=10 10+1=11	



	Objective	Concrete	Pictorial	Abstract
Year 2	Adding 3 single digit numbers.	4 + 7 + 6= 17 Put 4 and 6 together to make 10. Add on 7.	\$ \$ + \$ \$ \$ \$ + \$ \$ \$ \$ \$ \$ \$ \$ + \$ \$ \$ \$	$\begin{array}{r} 4 + 7 + 6 = 10 + 7 \\ 10 = 17 \end{array}$
			Add together three groups of	Combine the two numbers that make 10 and then add on the remainder.
		Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	objects. Draw a picture to recombine the groups to make 10.	
	Column method without regrouping.	Add together the ones first, then add the tens. Use the Base 10 blocks first before moving onto place value counters. 24 + 15 =	After physically using the base 10 blocks and place value counters, children can draw the counters to help them to solve additions. 10s 1s 0	24 + 15 = 39 24 ± 15 39
		44 + 15 =		





	Objective	Concrete	Pictorial	Abstract
Year 3	Column method with regrouping.	Make both numbers on a place value grid.	100s 10s 1s	100 + 40 + 6 500 + 20 + 7 600 + 70 + 3 = 673 As the children progress,
		Image: state Image: state 146 Image: state<		they will move from the expanded to the compacted method.
			100s 10s 1s	146 + 527
		Add up the ones and exchange 10 ones for 1 ten.	Children can draw a pictorial representation of the columns and place value counters to further support their learning and understanding.	673



	Objective	Concrete	Pictorial	Abstract
Year 4	Column method with regrouping.	Same as Year 3 but children will progress on to adding four-digit numbers.	Same as Year 3 but children will progress on to adding four-digit numbers.	Same as Year 3 but children will progress on to adding four-digit numbers.
	Objective	Concrete	Pictorial	Abstract
Year 5 and 6	Column method with regrouping.	Consolidate understanding using numbers with r	nore than 4 digits and extend by adding numbers w	, vith up to 3 decimal places.

Subtraction

	Objective	Concrete	Pictorial	Abstract
Year 1	Taking away Ones.	Use physical objects, counters, cubes etc. to show how objects can be taken away. 4 - 2 = 2	Cross out drawn objects to show what has been taken away.	4 - 2 = 2
			4-2=2	
	Counting back.	Make the larger number in your subtraction. Move the beads along your	Count back on a number line or number track.	13 - 4 = 9



	bead string as you count backwards in ones. 13 - 4 = 9	9 10 11 12 13 14 15 Start at the bigger number and count back the smaller number, showing the jumps on the number line.	
Find the difference.	Compare amounts and objects to find the difference.	+5 0 1 2 3 4 5 6 7 8 9 10 Count on to find the difference. Lisa is 13 years old. Her sister is 22 years of Find the difference in age between ther 13 ? Lisa Sister 22 Draw bars to find the difference between 2 numbers.	Hannah has 8 goldfish. Helen has 3 goldfish. Find the difference between the number of goldfish the girls have. 8-3=5
Objective	Concrete	Pictorial	Abstract



method

without

75 - 42 = 33Use Base 10 to make the bigger number then take the smaller number away. exchanging.



Show how you partition numbers to subtract. Again make the larger number first.



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Draw the Base 10 or place value counters alongside the written calculation to help to show working.

This will lead to a clear written column subtraction.



	Objective	Concrete	Pictorial	Abstract
Year 3 onwards	Column method with exchanging. Year 4,5, 6 using numbers with more than 3 digits and extend by adding numbers with up to 3 decimal places.	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters.	Image: Constraint of the constra	Children can start their formal written method by partitioning the number into clear place value columns.



42-18=24
Step 1 Step 3 10 1 10 1111 10 1 10 10 1111 10 11111 10 11111 10 11111 10 11111 10 11111 10 11111 10 11111 10
Step 2 10 1111 10 1111 10 1111

Multiplication

	Objective	Concrete	Pictorial	Abstract
Year 1 and 2	Repeated addition.	3+3+3	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? 2+2+2=6 $2+2+2=6$ $5+5+5=15$ $5+5+5=15$	Write addition sentences to describe objects and pictures. 2+2+2=6



	Use different objects to add equal groups.		
Arrays-	Create arrays using counters/cubes to show	Draw arrays in different rotations to find	Use an array to write
showing	multiplication sentences.	commutative multiplication sentences.	multiplication sentences and
commutative			reinforce repeated
multiplication.		• • • • • 4 × 2 = 8	addition.
			00000
	888888	2 × 4 = 8	00000
		2×4=8	5 + 5 + 5 = 15
			3 + 3 + 3 + 3 + 3 = 15
	200 - COL (10 - COL (10 - COL)	4 × 2 = 8	5 x 3 = 15
	ZA BAA	Link arrays to area of rectangles.	3 x 5 = 15



	Objective	Concrete	Pictorial	Abstract
Year 3 and 4	Grid method	Show the link with arrays to first introduce the grid method. 4 rows of 10 4 rows of 3 Move on to using Base 10 to move towards a more compact method. 4 rows of 13 X Tens Ones Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows.	Children can represent the work they have done with place value counters in a way that they understand. They can draw the counters, using colours to show different amounts or just use circles in the different columns to show their thinking as shown below.	Start with multiplying by one- digit numbers and showing the clear addition alongside the grid. X 30 5 7 210 35 210 + 35 = 245 Moving forward, multiply by a 2 digit number showing the different rows within the grid method.





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	Objective	Concrete	Pictorial	Abstract
Year 5 and 6	Compact method	Children can continue to be supported by place value counters at the stage of multiplication.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods. $\left[1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+1+$	Start with long multiplication, reminding the children about lining up their numbers clearly in columns. If it helps, children can write out what they are solving next to their answer. 7 4 $\times 6 3$ 1 2 2 1 0 2 4 0 + 4 2 0 0 4 6 6 2 This moves to the more compact method. 13 4 2 x 1 8 1 3 4 2 0 10 7 3 6 2 4 5 6



Division

	Objective	Concrete	Pictorial	Abstract
Year 1 and 2	Sharing	I have 8 cubes, can you share them equally between two people?	Children use pictures or shapes to share quantities. 3 3 3 3 3 3 3 3 3 3	Share 8 buns between two people. $8 \div 2 = 4$
	Grouping	Divide quantities into equal groups. Use cubes, counters, objects or place value counters to aid understanding.	Use a number line to show jumps in groups. The number of jumps equals the number of groups. 0 1 2 3 4 5 6 7 8 9 10 Think of the bar as a whole. Split it into the number of groups you are dividing by and	10 ÷ 5 = 2 Divide 10 into 5 groups. How many are in each group?



			work out how many would be within each group. 10 ? 10 ÷ 5 = ? 5 x ? = 10	
Year 3 and 4	Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 55 \times 3 = 15$ $15 \div 5 = 33 \times 5 = 15$	 Image: Constraint of the second sec	Find the inverse of multiplication and division sentences by creating four linking number sentences. $5 \times 3 = 15$ $3 \times 5 = 15$ $15 \div 5 = 3$ $15 \div 3 = 5$



	Short division	Use place value counters to divide using the short division method alongside. $96 \div 3$ 3 $42 \div 3$ $42 \div 3$ Start with the biggest place value. We are sharing 40 into three groups. We can put 1 ten in each group and we have 1 ten left over. We exchange this ten for 10 ones and then share the ones equally among the groups. We look at how many are in each group.	Short division $642 \div 2 =$ H T 0 3264254254255555555	Begin with divisions that divide equally with no remainder. 2 1 8 3 4 8 7 2
	Objective	Concrete	Pictorial	Abstract
Years 5 and 6	Division with remainders	$14 \div 3 =$ Divide objects between groups and see how much is left over.	Jump forward in equal jumps on a number line then see how many more you need to jump to find a remainder.	Complete written divisions and show the remainder using r. $29 \div 8 = 3$ REMAINDER 5 $\uparrow \uparrow \uparrow \uparrow \uparrow$ dividend divisor quotient remainder



		Draw dots and group them to divide an amount and clearly show a remainder.	
Short division with remainders	$364 \div 3 = \frac{121 \text{ rem } 1}{3 3 6 4}$	Use pictures of place value counters to show grouping and exchanging.	Move onto divisions with a remainder.
	Use place value counters to show grouping and exchanging.	1 2 3	5 4 3 2 Once children understand remainders, begin to express as a fraction or decimal according to the context.
Long division			Children will use long division to divide numbers with up to 4 digits by 2-digit numbers.



		015
		-0
		48
		-32
		-160
		7
		17 10
		31 546
		31↓ 236
		217
		19