Maths Calculation Policy

October 2023

Maths Subject Leader
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This calculation policy sets out the methods used to help our pupils with calculations and has been devised to meet the requirements of the National Curriculum 2014 for the teaching and learning of mathematics. It complements the '2023-24 CCPS - Maths Policy' and is designed to give pupils a consistent and smooth progression of learning in calculations across the school, using the Concrete ➡ Pictorial ➡ Abstract steps of the 'mastery' approach to mathematics.

On a daily basis, pupils are taught systematic strategies to count forwards and backwards and in steps, learn number bonds and times tables, as these form the basis of so much of primary level Maths. Children are also given opportunities to practise these skills, thereby developing and strengthening their mental numerical agility, through a variety of age and ability-appropriate activities, discrete from Maths lessons, such as Maths Minutes, Maths Meetings, Times Tables Rock Stars and NumBots. They also need to be able to apply written calculation skills, in order to:
• represent work that has been done practically
• support, record and explain mental calculation
• keep track of steps in a longer task
• work out calculations that are too difficult to perform mentally

While the use of mastery resources (specifically the 'White Rose Maths' planning and resources, and 'Target Your Maths' books) will form the basis of whole class teaching and resourcing, it is essential that teachers tailor their planning and delivery of lessons to meet the different needs of the Most Able, Least Able and SEND children in their class. This will necessarily include differentiation, whether it be by questioning, a variety of resources or targeted support.

The Calculation Policy shows methods that pupils will be taught within their respective year group. It is shown in teaching order. Children should be confident in choosing and using a strategy that they know will enable them to arrive at the correct answer as efficiently as possible; pupils are free to choose their preferred method to solve calculations.
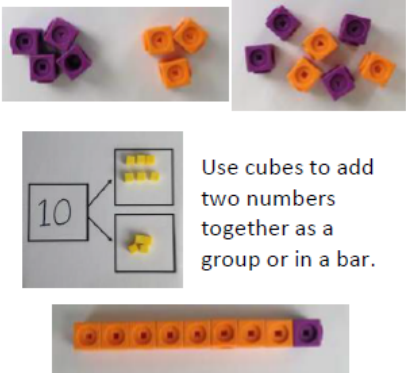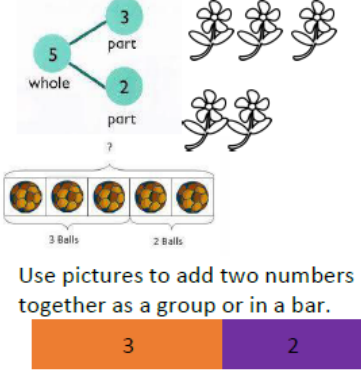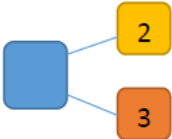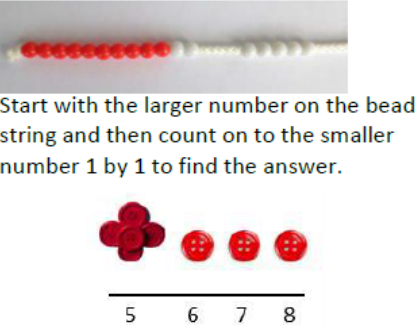
Early Learning Goals
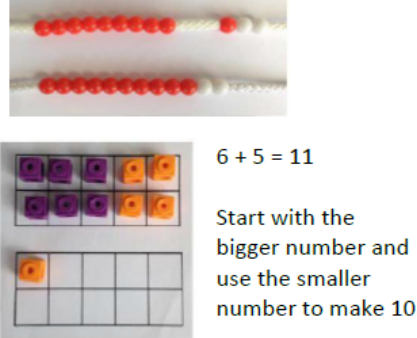
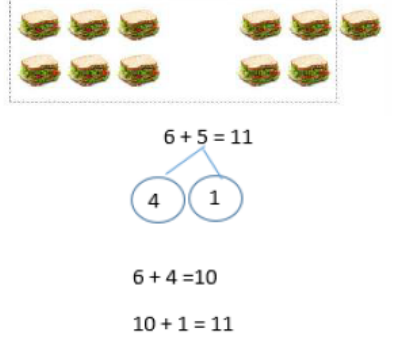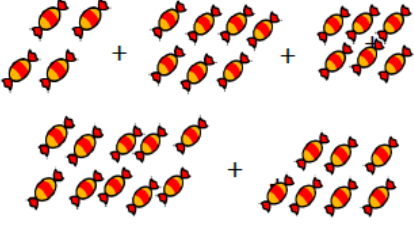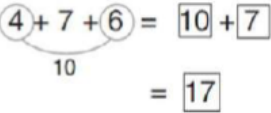ELG Number - Children at the expected level of development will:
- Have a deep understanding of number to 10, including the composition of each number
- Subitise (Recognise quantities without counting) up to 5;
- Automatically recall (without reference to rhymes, counting or other aids)number bonds up to 5 (including subtraction facts) and some number bonds to 10 , including double facts.

ELG Numerical Patterns - Children at the expected level of development will:
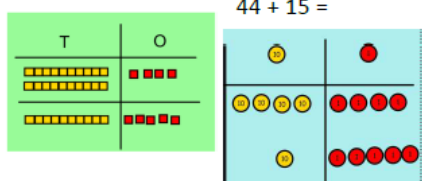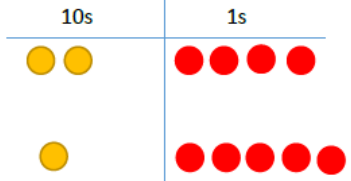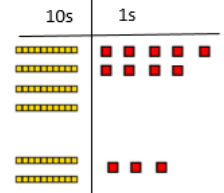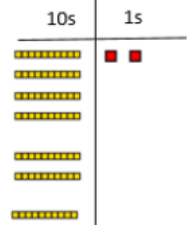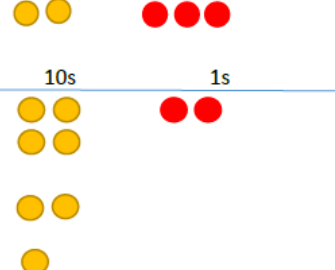- Verbally count beyond 20, recognising the pattern of the counting system;
- Compare quantities up to 10 in different contexts, recognising when one quantity is greater than, less than or the same as the other quantity;
- Explore and represent patterns within numbers up to 10, including evens and odds, double facts and how quantities can be distributed equally
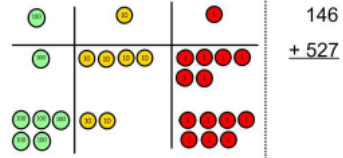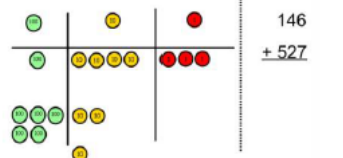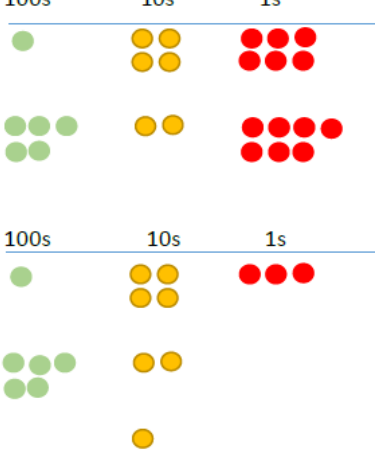
ADDITION

	Objective	Concrete	Pictorial	Abstract
Year 1	**Number bonds of 5, 6, 7, 8, 9 and 10**	Use cubes to add two numbers together as a group or in a bar.	Use pictures to add two numbers together as a group or in a bar.	$2 + 3 = 5$ $3 + 2 = 5$ $5 = 3 + 2$ $5 = 2 + 3$ Use the part-part-whole diagram as shown above to move into the abstract.
Year 1	**Counting**	Start with the larger number on the bead string and then count on to the smaller number 1 by 1 to find the answer.	Use a number line to count on in ones.	$5 + 3 = 8$

	Objective	Concrete	Pictorial	Abstract
Year 1	**Regrouping to make 10**	$6 + 5 = 11$ Start with the bigger number and use the smaller number to make 10.	$6 + 5 = 11$ $6 + 4 = 10$ $10 + 1 = 11$	$6 + 5 = 11$
Year 2	**Adding 3 single digit numbers**	$4 + 7 + 6 = 17$ Put 4 and 6 together to make 10. Add on 7. Following on from making 10, make 10 with 2 of the digits (if possible) then add on the third digit.	Add together three groups of objects. Draw a picture to recombine the groups to make 10.	Combine the two numbers that make 10 and then add on the remainder.

ADDITION (continued)

	Objective	Concrete	Pictorial	Abstract
Year 2	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 = 44 + 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	24 + 15 = 39 24 + 15 39
Year 2	Column method with regrouping	Make both numbers on a place value grid. 10s 1s Add up the units and exchange 10 ones for 1 ten. 10s 1s	Using place value counters, children can draw the counters to help them to solve additions. 10s 1s 10s 1s	40 + 9 20 + 3 60 + 12 = 72
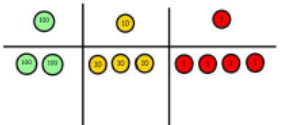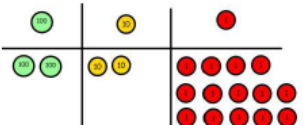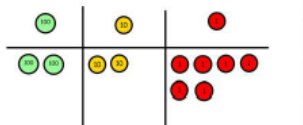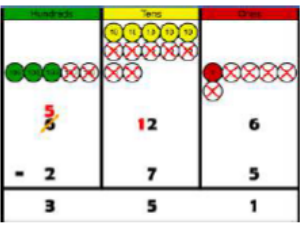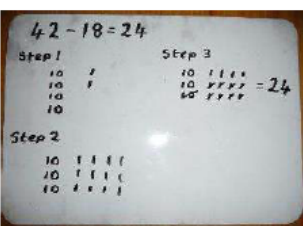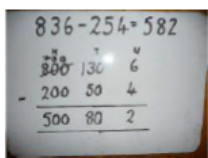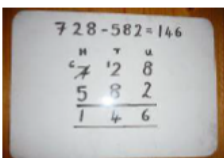
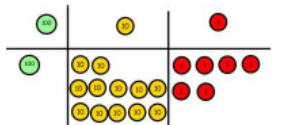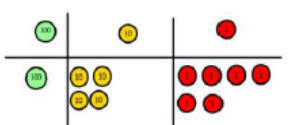|	Objective	Concrete	Pictorial	Abstract
Year 3/4	Column method with regrouping	Make both numbers on a place value grid. 146 + 527 Add up the units and exchange 10 ones for 1 ten. 146 + 527 As children move on to decimals, money and decimal place value counters can be used to support learning. NB By Year 4 children will progress on to adding four digit numbers.	100s 10s 1s 100s 10s 1s Children can draw a pictoral representation of the columns and place value counters to further support their learning and understanding. NB Addition of money needs to have £ and p added separately.	100 + 40 + 6 500 + 20 + 7 600 + 70 + 3 = 673 As the children progress, they will move from the expanded to the compacted method. 146 + 527 673 1 As the children move on, introduce decimals with the same number of decimal places and different. Money can be used here.
Year 5/6	Column method with regrouping	Consolidate understanding using numbers with more than 4 digits and extend by adding numbers with up to 3 decimal places.		

SUBTRACTION

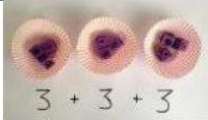|	Objective	Concrete	Pictorial	Abstract
Year 1	**Taking away ones**	Use physical objects, counters, cubes etc. to show how objects can be taken away. 4 – 2 = 2	Cross out drawn objects to show what has been taken away. 4 – 2 = 2	4 – 2 = 2
	Counting back	Make the larger number in your subtraction. Move the beads along your bead string as you count backwards in ones. 13 – 4 = 9	Count back on a number line or number track 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.	Put 13 in your head, count back 4. What number are you at? Use your fingers to help.
	Find the difference	Compare amounts and objects to find the difference. 8 goldfish 3 goldfish ? Use cubes to build towers or make bars to find the difference. Use basic bar models with items 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 old. Find the difference in age between them.* 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.
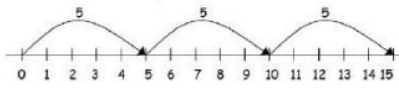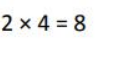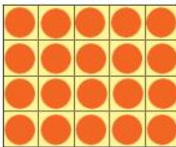
	Objective	Concrete	Pictorial	Abstract
Year 2	**Column method without regrouping**	75 – 42 = 33 Tens Ones Use Base 10 to make the bigger number then take the smaller number away. Show how you partition numbers to subtract. Again make the larger number first. 36 – 14 = 22	Calculations 54 -22 32 Draw the Base 10 or place value counters alongside the written calculation to help to show working. Calculations 176 - 64 = 176 - 64 112	47 – 24 = 23 40 + 7 – 20 + 4 20 + 3 This will lead to a clear written column subtraction. 32 – 12 20
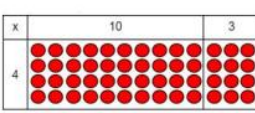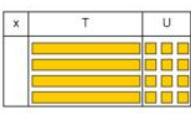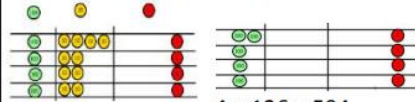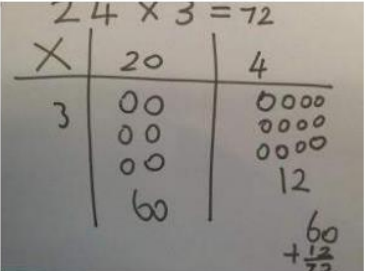
SUBTRACTION (continued)

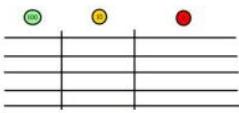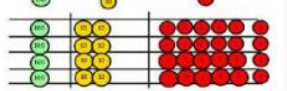|	Objective	Concrete	Pictorial	Abstract
Year 3 onwards	Column method with regrouping	Use Base 10 to start with before moving on to place value counters. Start with one exchange before moving onto subtractions with 2 exchanges. Make the larger number with the place value counters Calculations 234 - 88 Start with the ones, can I take away 8 from 4 easily? I need to exchange 1 of my tens for 10 ones. Calculations 234 - 88 Now I can subtract my ones. Calculations 234 - 88	 Draw the counters onto a place value grid and show what you have taken away by crossing the counters out as well as clearly showing the exchanges you make. When confident, children can find their own way to record the exchange/regrouping. Just writing the numbers as shown here shows that the child understands the method and knows when to exchange/regroup. 	836 - 254 = 582 Children can start their formal written method by partitioning the number into clear place value columns. 728 - 582 = 146 Moving forward the children use a more compact method. This will lead to an understanding of subtracting any number including decimals.

	Objective	Concrete	Pictorial	Abstract
Year 3 up	Column method with regrouping	Now look at the tens, can I take away 8 tens easily? I need to exchange 1 hundred for 10 tens. Calculations 234 - 88 Now I can take away 8 tens and complete my subtraction. Calculations 234 - 88 146 Show children how the concrete method links to the written method alongside your working. Cross out the numbers when exchanging and show where we write our new amount.		

MULTIPLICATION

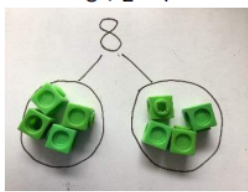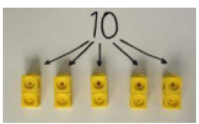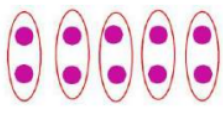|	Objective	Concrete	Pictorial	Abstract
Year 1/2	Repeated addition	$3 + 3 + 3$ Use different objects to add equal groups.	There are 3 plates. Each plate has 2 star biscuits on. How many biscuits are there? $2 + 2 + 2 = 6$ $5 + 5 + 5 = 15$	Write addition sentences to describe objects and pictures. $2 + 2 + 2 = 6$
	Arrays- showing commutative multiplication	Create arrays using counters/cubes to show multiplication sentences.	Draw arrays in different rotations to find **commutative** multiplication sentences. $4 \times 2 = 8$ $2 \times 4 = 8$ $2 \times 4 = 8$ $4 \times 2 = 8$ Link arrays to area of rectangles.	Use an array to write multiplication sentences and reinforce repeated addition. $5 + 5 + 5 = 15$ $3 + 3 + 3 + 3 + 3 = 15$ $5 \times 3 = 15$ $3 \times 5 = 15$
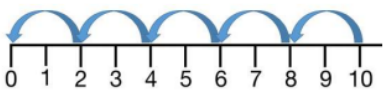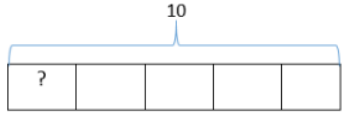
	Objective	Concrete	Pictorial	Abstract
Year 3/4	Grid method	Show the link with arrays to first introduce the grid method. 4 rows of 10 4 rows of 3 Move on to using Base 10 to move towards a more compact method. 4 rows of 13 Move on to place value counters to show how we are finding groups of a number. We are multiplying by 4 so we need 4 rows. Calculations 4 x 126 Fill each row with 126. Calculations 4 x 126 Add up each column, starting with the ones making any exchanges needed. $4 \times 126 = 504$	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. $24 \times 3 = 72$	Start with multiplying by one digit numbers and showing the clear addition alongside the grid. $210 + 35 = 245$ Moving forward, multiply by a 2 digit number showing the different rows within the grid method.

Abstract (Year 3/4) tables:

×	30	5
7	210	35

	10	8
10	100	80
3	30	24

X	1000	300	40	2
10	10000	3000	400	20
8	8000	2400	320	16
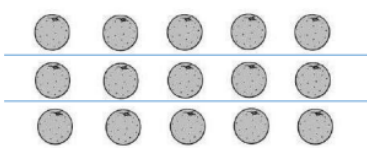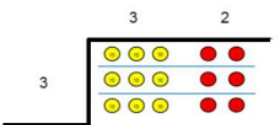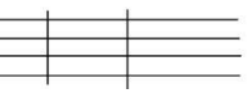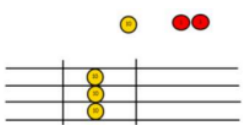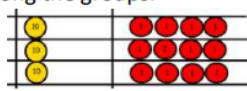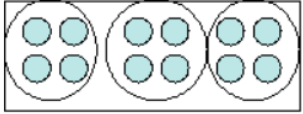
Objective		Concrete	Pictorial	Abstract

	Expanded method	Show the link with arrays to first introduce the expanded method.		Start with long multiplication, reminding the children about lining up their numbers clearly in columns.
				
				     18
				 x 13
				   24 (3 x 8)
				   30 (3 x 10))
				   80 (10 x 8)
				 100 (10 x 10)
				 234

Year 5/6	Compact method	Children can continue to be supported by place value counters at the stage of multiplication. It is important at this stage that they always multiply the ones first and note down their answer followed by the tens which they note below.	Bar modelling and number lines can support learners when solving problems with multiplication alongside the formal written methods.	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
				   x 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.
				
				   1342
				 x 18
				 10736
				 13420
				 24156
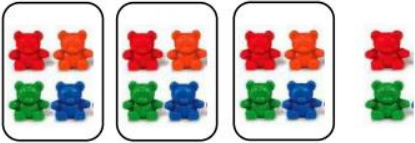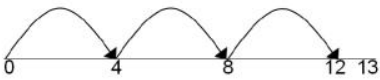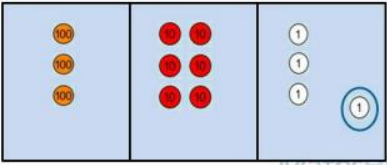
DIVISION

	Objective	Concrete	Pictorial	Abstract
Year 1/2	Sharing	I have 8 cubes, can you share them equally between two people?	Children use pictures or shapes to share quantities. $8 \div 2 = 4$	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. Think of the bar as a whole. Split it into the number of groups you are dividing by and work out how many would be within each group. 10 ? $10 \div 5 = ?$ $5 \times ? = 10$	$10 \div 5 = 2$ Divide 10 into 5 groups. How many are in each group?

	Objective	Concrete	Pictorial	Abstract
Year 3/4	Division with arrays	Link division to multiplication by creating an array and thinking about the number sentences that can be created. Eg $15 \div 3 = 5$ $5 \times 3 = 15$ $15 \div 5 = 3$ $3 \times 5 = 15$	 Draw an array and use lines to split the array into groups to make multiplication and division sentences.	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. $96 \div 3$ $42 \div 3$ 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.	Students can continue to use drawn diagrams with dots or circles to help them divide numbers into equal groups. Encourage them to move towards counting in multiples to divide more efficiently.	Begin with divisions that divide equally with no remainder.

DIVISION (continued)

	Objective	Concrete	Pictorial	Abstract
Year 5/6	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. 0 4 8 12 13 Draw dots and group them to divide an amount and clearly show a remainder. remainder 2	Complete written divisions and show the remainder using r. $29 \div 8 = 3$ REMAINDER 5 dividend divisor quotient remainder
	Short division with remainders	$364 \div 3 =$ $$3 \overline{)364} = 121 \text{ rem } 1$$		Move onto divisions with a remainder. Once children understand remainders, begin to express as a fraction or decimal according to the context. $$5 \overline{)432} = 86 \text{ r } 2$$ $$5 \overline{)9\,^43\,^31} = 186\tfrac{1}{5}$$ $$35 \overline{)511.0} = 14.6$$

	Objective	Concrete	Pictorial	Abstract
Year 6	Long division			Children will use long division to divide numbers with up to 4 digits by 2 digit numbers. $$\begin{array}{r} 015 \\ 32\overline{)487} \\ -0 \\ \hline 48 \\ -32 \\ \hline 167 \\ -160 \\ \hline 7 \end{array}$$ $$\begin{array}{r} 17 \text{ r } 19 \\ 31\overline{)546} \\ 31\downarrow \\ \hline 236 \\ 217 \\ \hline 19 \end{array}$$