Grimsdyke School
Written Calculations Policy
Year 2

Approved by:	Governing Body	**Date:** 06.05.22
Last reviewed on:	May 2022	
Next review due by:	May 2024	

Rationale

This policy contains the key pencil and paper procedures that will be taught within our school. It has been written to ensure consistency and progression throughout the school and reflects a whole school agreement. The calculation policy has been devised to meet requirements of the National Curriculum 2014 for the teaching and learning of mathematics, and is also designed to give pupils a consistent and smooth progression of learning in written calculations across the school. Please note that early learning in number and calculation in Reception follows the 'Development Matters' EYFS document, and this calculation policy is designed to build on progressively from the content and methods established in the Early Years Foundation Stage.

Teaching and Learning

This calculation policy should be used to support children to develop a deep understanding of number and calculation. At Grimsdyke School, we use 'White Rose' as a format as a basis for our planning and use the philosophy of: fluency, reasoning and problem solving. White Rose also follows the Concrete – Pictorial – Abstract approach to teaching maths. This policy has been designed to teach children through the use of concrete, pictorial and abstract representations. It is important that conceptual understanding, supported by the use of representation, is secure for all procedures. Reinforcement is achieved by going back and forth between these 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. This helps children make the connection between the physical object and abstract levels of understanding, which is the stage they move onto next.
- Abstract representation - The abstract stage brings in mathematical symbols, for example +, -, x, ÷ to indicate addition, subtraction, multiplication and division. This is used when a pupil is secure in their understanding of representing problems by using mathematical notation, for example 12 x 2 = 24.

Planning, Progression and Continuity

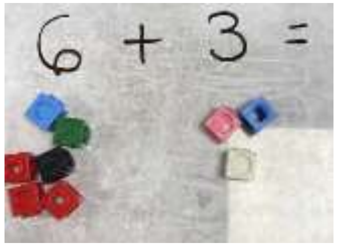
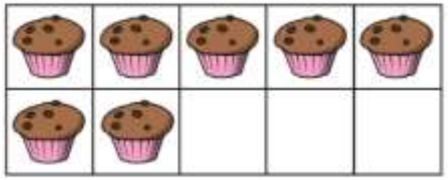
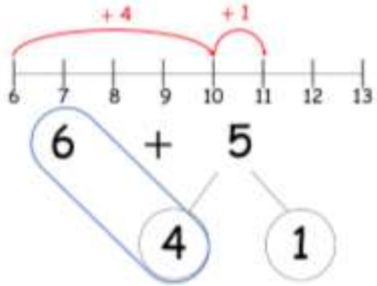
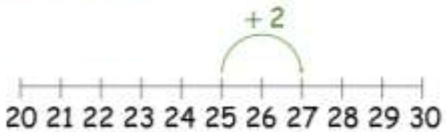
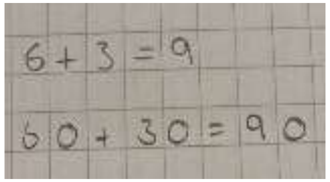
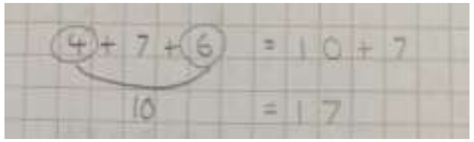
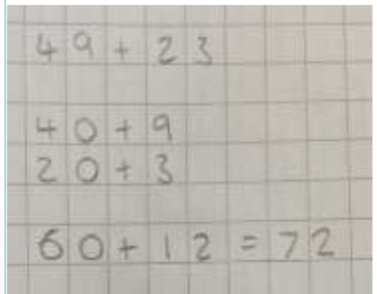
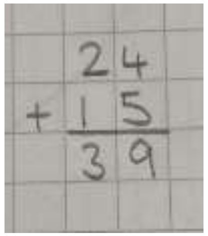
The calculation policy is organised according to age stage expectations as set out in the National Curriculum 2014, however it is vital that pupils are taught according to the year group that they are currently working at and then given 'mastery' opportunities within their age-related expectations in order to fully embed the concepts learned. Furthermore, if a teacher feels a child is ready to move onto the next stage of a calculation which is in the next year group's expectations, then this should be facilitated.

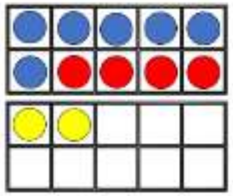
At the centre of the mastery approach to the teaching of mathematics is the belief that all children have the potential to succeed. They should have access to the same curriculum content and, rather than being extended with new learning, they should deepen their conceptual understanding by tackling challenging and varied problems. Similarly, with calculation strategies, children must not simply rote learn procedures but demonstrate their understanding of these procedures through the use of concrete materials and pictorial representations. This policy outlines the different calculation strategies that should be taught and used in Year 1 to Year 6 in line with the requirements of the 2014 Primary National Curriculum. Each operation is broken down into skills for the year group and shows recommended models and visuals to support the teaching of the corresponding concepts alongside.

'Real things and structured images enables children to understand the abstract. The concrete and the images are a means for children to understand the symbolic so it's important to move between all modes to allow children to make connections'. (Morgan, D. 2016)

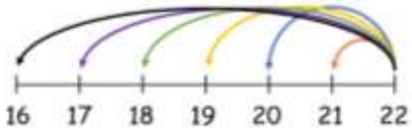
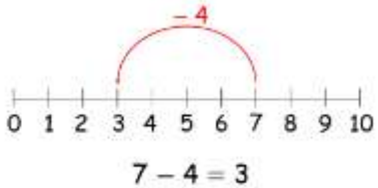
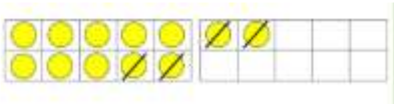
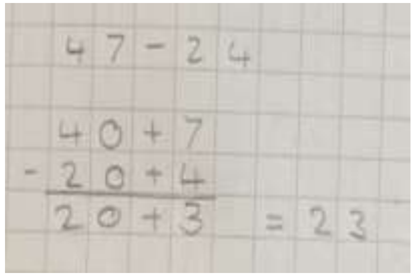
Addition

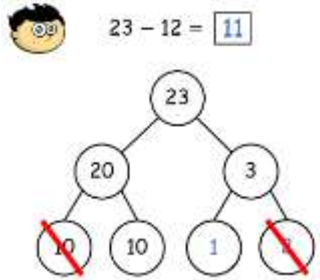
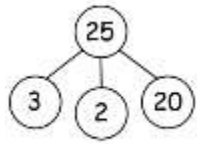
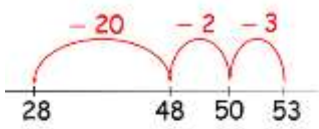
	Concrete	***Pictorial***	***Abstract***

• *To know and recall addition facts to 20 fluently*
• *To know that addition of two numbers can be done in any order (commutative)*
• *To know that there is a relationship between addition and we call this the inverse*
• *To use addition facts to 20 to derive related facts up to 100*
• *To add and subtract numbers using concrete objects, pictorial representations, and mentally, including:*
  * *a two-digit number and ones*
  * *a two-digit number and tens*
  * *two two-digit numbers*
  * *adding three one-digit numbers*
• *To show that addition of two numbers can be done in any order*
	Using multilink cubes
	
	Using number bonds to make 10 and then add on.
	
	
		Adding two, 1-digit numbers
		
		Adding by partitioning
		
		Adding on a number line
		
			Using addition facts to derive related facts up to 100
			
			Addition using number bonds
			
			Addition by partitioning
			
			Record addition in columns
			

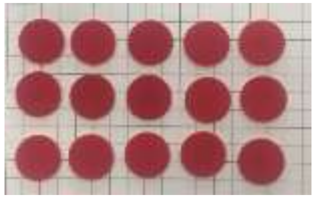
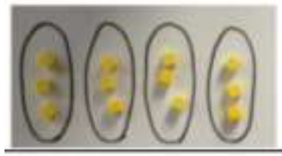
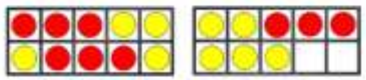
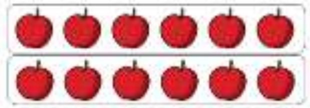
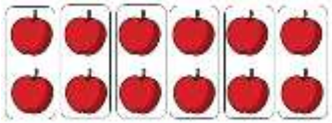
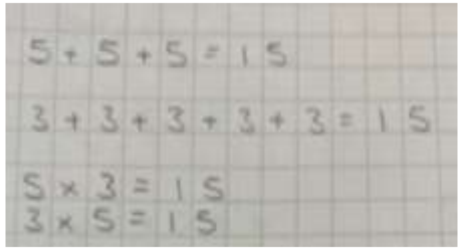
• *To solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures* • *To apply their increasing knowledge of mental and written methods* • *To record addition in columns* ***Vocabulary*** • *Add* • *More* • *Plus* • *Make* • *Altogether* • *Total* • *Equal to* • *Equals* • *Count on* • *Number line* • *Sum* • *Partition* • *Addition* • *Column* • *Partition*		Adding across ten  	

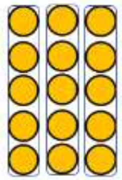
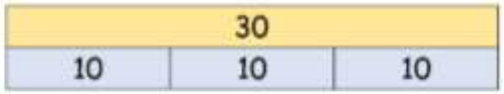
Subtraction

Objectives	*Concrete*	*Pictorial*	*Abstract*
• *To know and recall addition subtraction facts to 20 fluently* • *To know that subtraction is not commutative* • *To know that there is a relationship between subtraction and we call this the inverse* • *To know that when we subtract using columns, the place value of digits need to be lined up* • *To use subtraction facts to 20 to derive related facts up to 100* • *To subtract numbers using concrete To show that addition of two numbers can be done in any order (commutative) and subtraction of one number from another cannot* • *To use the inverse relationship between addition and subtraction to check calculations and*	Subtracting cubes  	Subtracting ones   Subtracting across tens   Subtracting a two digit number from a two digit number	Subtraction by partitioning 

solve missing number problems. • *To solve problems with addition and subtraction using concrete objects and pictorial representations, including those involving numbers, quantities and measures* • *To apply their increasing knowledge of mental and written methods* • *To record subtraction in columns* ***Vocabulary*** • *Subtraction* • *Take away* • *Difference between* • *Less* • *Less than* • *Fewer* • *Fewer than* • *Minus* • *Count backwards*		Part-whole model  Partitioning for subtraction  Using a number line 	

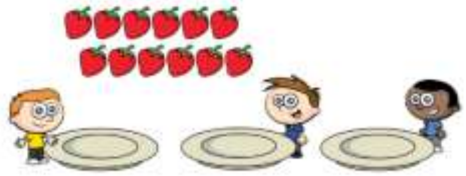
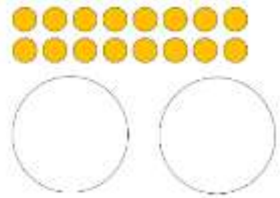
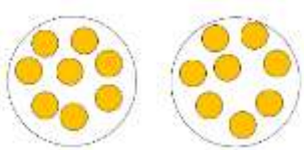
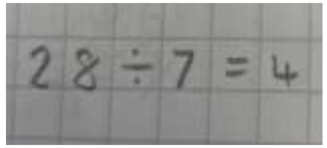
Multiplication

Objectives	*Concrete*	*Pictorial*	*Abstract*
• *To recall multiplication facts for the two, five and ten multiplication tables, including recognising odd and even numbers* • *To know that multiplication of two numbers can be done in any order (commutative)* • *To know the multiplication (×)* • *To know that an array is an arrangement of objects, numbers or pictures in equal columns or rows* • *To know that multiplication are the inverse of each other (for example, 4 × 5 = 20 and 20 ÷ 5 = 4)* • *To use multiplication facts for the 2, 5 and 10 multiplication tables* • *To show that multiplication of two numbers can be done in any order (commutative)*	Counters for arrays  Counters to show that multiplication is commutative  	Groups of  Counting in groups  Arrays   Multiplying by 2  Multiplying by 5	Repeated addition 

• *To calculate mathematical statements for multiplication within the multiplication tables and write them using the multiplication (×),* • *and equals (=) signs* • *To solve problems involving multiplication, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts* • *To connect the 5 multiplication table to the divisions on the clock face* • *To relate multiplication to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition* ***Vocabulary*** • *Lots of* • *Groups of* • *Times* • *Multiply* • *Multiplied by multiple of* • *Repeated addition* • *Array* • *Row*		 Multiplying by 10 – repeated addition 	

• *Column* • *Commutative*			

Division

Objectives	*Concrete*	*Pictorial*	*Abstract*
• *To recall and division facts for the two, five and ten multiplication tables, including recognising odd and even numbers* • *To know that division is not commutative* • *To know that an array is an arrangement of objects, numbers or pictures in equal columns or rows* • *To know that division are the inverse of each other (for example, 4 × 5 = 20 and 20 ÷ 5 = 4)* • *To know that a fractions is splitting a whole (number/shape etc.) into parts* • *To use division facts for the 2, 5 and 10 multiplication tables* • *To show that of two numbers can be done in any order (commutative) and division of one number by another cannot* • *To calculate mathematical statements for division*		Sharing    Grouping 	Notation of division facts 

<table>
<tr>
<td>within the multiplication tables and write them using the multiplication (×), division (÷) and equals (=) signs

To solve problems involving division, using materials, arrays, repeated addition, mental methods, and multiplication and division facts, including problems in contexts
To relate division to grouping and sharing discrete and continuous quantities, to arrays and to repeated addition
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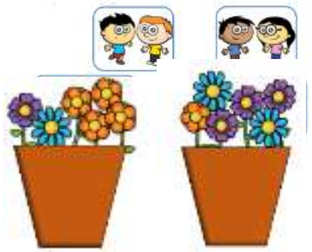
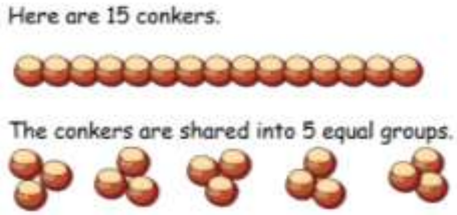
<td rowspan="3">
Dividing by 2

Dividing by 5


Dividing by 10
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<tr>
<td>Vocabulary</td>
</tr>
<tr>
<td>
Share
Share equally
Group
Groups of
Lots of
Array
Divide
Divided by
Divided into
Division
Grouping
Left
Left over
</td>
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		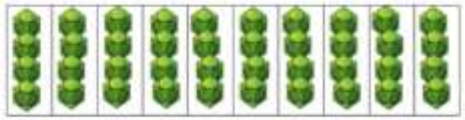	

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