





Grimsdyke School Written Calculations Policy Year 3

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





<u>Rationale</u>

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)





	on

Bar model

lines

Objectives

- To know the formal written methods of columnar addition.
- To solve number problems and practical problems involving place value
- To add numbers mentally, including:
 - a three-digit number and ones
 - a three-digit number and tens
 - a three-digit number and hundreds

Vocabulary

- Addition
- Add
- More
- Make
- Sum
- Total
- Altogether
- Regrouping
- Exchanging

Place value chart addition with counters

Concrete



Partitioning numbers to complete addition

Pictorial

Using diene representations and number

200

900 - 200 = 700

900 - 700 = 200

700 = 900 - 200

200 = 900 - 700

900

700

700 + 200 = 900

200 + 700 = 900

900 = 700 + 200

900 = 200 + 700



Adding by partitioning 1 + 6 + 5 2 7 1 0 0 + 4 0 + 6 5 0 0 + 2 0 + 76 0 0 + 7 0 + 3 = 6 7 3

Abstract

Formal written method



With exchanging







	Calculate 325 + 2	
	5 + 2 = 7 325 + 2 = 327	
	320 321 322 323 324 325 326 327 328 329 330	





		Sub	traction	
	Objectives	Concrete	Pictorial	Abstract
•	 To know the formal written methods of columnar subtraction To subtract numbers mentally, including: a three-digit number and ones a three-digit number and tens a three-digit number and hundreds To subtract numbers with up to three digits, using formal written methods of columnar subtraction 	Using base 10 resources in formal column method	Using number lines for subtraction $358 - 5 = 353$ -5 $350 \ 351 \ 352 \ 353 \ 354 \ 355 \ 356 \ 357 \ 358 \ 359 \ 360$ Part-whole models 562 562 500 562 500 12	Subtraction with partitioning
•	Vocabulary Hundreds Thousands Less		Place value chart for subtraction Hundreds Tens Ones	- 582
• • • • • •	Less than Fewer Fewer than Take away Subtract Column Count on			
•	Partition			6



•

Product

Equation



	Multi	plication	
Objectives	Concrete	Pictorial	Abstract
To recall multiplication	Place value counters	Arrays	Multiplication with partitioning
facts for the 3, 4 and 8 multiplication tables To know the formal written method for multiplication To use multiplication facts for the 3, 4 and 8 multiplication tables To write and calculate mathematical statements		Class 1 Class 2 Class 2 Class 3 Class 3 Cla	$ \begin{array}{c cccccccccccccccccccccccccccccccccc$
for multiplication and		3 × 31	
division using the		ТО	
they know, including for two-digit numbers times			
one-digit numbers, using mental and progressing to formal written methods		93	
To solve problems, including missing number			
problems, involving multiplication			
Vocabulary		24 $4 \times 24 = 96$	
Multiply Repeated addition		20 4 There are 96 rolls in total.	

 $4\times 20=80 \quad 4\times 4=16$





Inverse
Commutative
Vocabulary
• Easter
• Fuctor
Multiple
Square number
Prime number
Repeated addition
Inverse
 Eactor pairs
Composite numbers
Prime number
 Squared
• Cubed





		Di	vision	
	Objectives	Concrete	Pictorial	Abstract
•	To know that tenths arise from dividing an object into 10 equal parts and in dividing one – digit numbers or quantities by 10. To use division facts for	Arrays	Different ways of dividing by 3/4/8 etc	Dividing with partitioning $96 \div 8 = 12$ $80 \div 8 = 10$
•	the 3, 4 and 8 multiplication tables To write and calculate mathematical statements for division using the multiplication tables that they know, including for two-digit numbers times one-digit numbers, using mental and progressing to formal written methods To solve problems, including missing number problems, involving division	Diving with remainders $14 \div 3 = 4r^2$	Dividing by counting up or back $ \underbrace{\stackrel{+3}{0}}_{0 \ 3 \ 6 \ 9 \ 12 \ 15 \ 18 \ 21 \ 24} $ $ \underbrace{\stackrel{-3}{0}}_{3 \ 6 \ 9 \ 12 \ 15 \ 18 \ 21 \ 24} $ Dividing 2-digits by 1-digit 51 ÷ 3	Dividing with remainders
	Vocabularv			
• • •	Remainder Equation Share Share equally			





• Group			_	
Groups of		Tens	Ones	
• Lots of				
• Array	💿 💛			
• Divide				
• Divided by				
Divided into				
• Left				
• Left over	I.			

Written – May 2022

Next Review – May 2024