



Written Calculations Policy Year 3

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Approved By:	Full Governing Body
Last reviewed on:	May 2024
Next review on:	May 2026

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 $12 \times 2 = 24$.

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

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

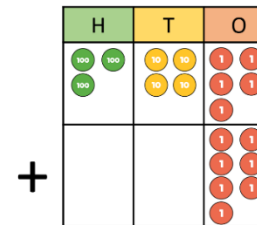
Concrete

Place value chart addition with counters



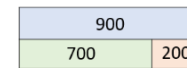
Pictorial

Partitioning numbers to complete addition



Bar model

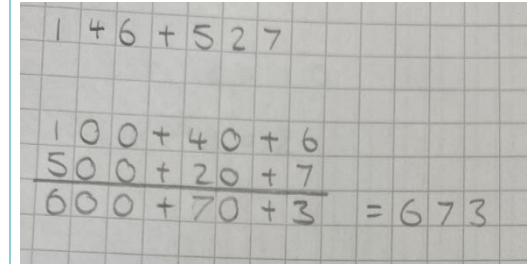
Using diene representations and number lines



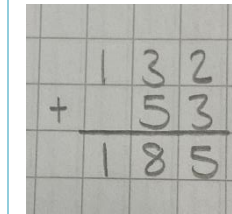
$$\begin{array}{l}
 700 + 200 = 900 \\
 200 + 700 = 900 \\
 900 = 700 + 200 \\
 900 = 200 + 700
 \end{array}
 \qquad
 \begin{array}{l}
 900 - 200 = 700 \\
 900 - 700 = 200 \\
 700 = 900 - 200 \\
 200 = 900 - 700
 \end{array}$$

Abstract

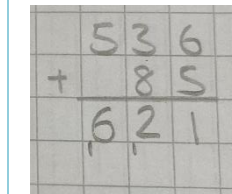
Adding by partitioning



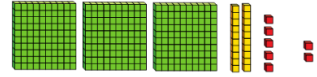
Formal written method



With exchanging

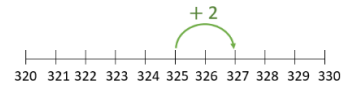


Calculate $325 + 2$

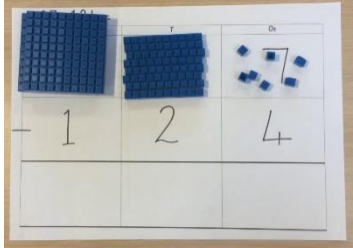
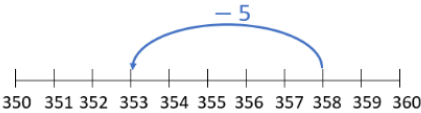
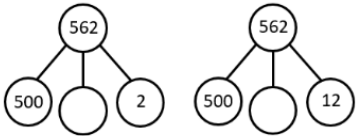
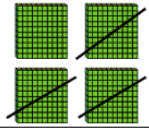
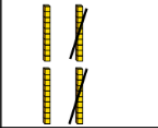

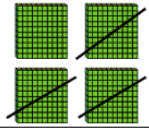
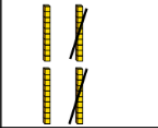

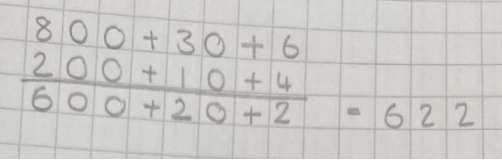
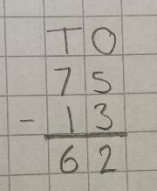
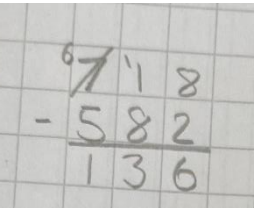
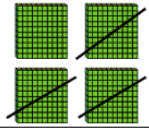
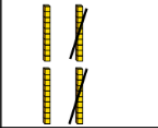



$$5 + 2 = 7$$

$$325 + 2 = 327$$



Subtraction

Objectives	Concrete	Pictorial	Abstract						
<ul style="list-style-type: none"> To know the formal written methods of columnar subtraction To subtract numbers mentally, including: <ul style="list-style-type: none"> 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 	<p>Using base 10 resources in formal column method</p> 	<p>Using number lines for subtraction</p> $358 - 5 = 353$  <p>Part-whole models</p>  <p>Place value chart for subtraction</p> <table border="1" data-bbox="1093 986 1579 1157"> <thead> <tr> <th>Hundreds</th> <th>Tens</th> <th>Ones</th> </tr> </thead> <tbody> <tr> <td></td> <td></td> <td></td> </tr> </tbody> </table>	Hundreds	Tens	Ones				<p>Subtraction with partitioning</p>  <p>Formal standard written method</p>  <p>Formal written method with exchanging</p> 
Hundreds	Tens	Ones							
									
<p>Vocabulary</p> <ul style="list-style-type: none"> Hundreds Thousands Less Less than Fewer Fewer than Take away Subtract Column Count on Partition 									

Multiplication

Objectives

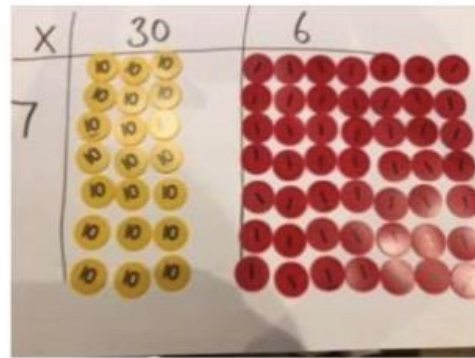
- To recall multiplication facts for the 3, 4 and 8 multiplication tables
- To know the formal written method for multiplication
- To use multiplication facts for the 3, 4 and 8 multiplication tables
- To write and calculate mathematical statements for multiplication and division using the multiplication 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 multiplication

Vocabulary

- Multiply
- Repeated addition
- Product
- Equation

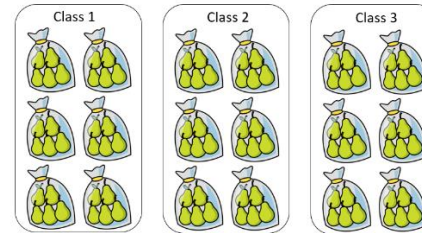
Concrete

Place value counters









Pictorial

Arrays



Place value chart to support formal written method
Partitioning

$$3 \times 31$$

T	O
	
	
	

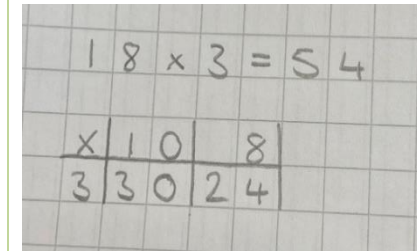
T	O
3	1
x	3
9	3

$$\begin{array}{r}
 24 \\
 4 \times 20 = 80 \quad 4 \times 4 = 16 \\
 \hline
 96
 \end{array}$$

4 × 24 = 96
There are 96 rolls in total.

Abstract

Multiplication with partitioning


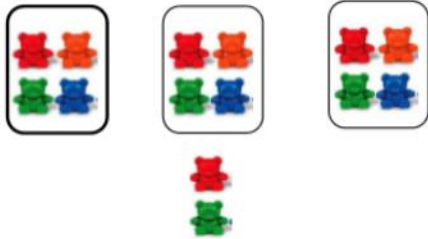
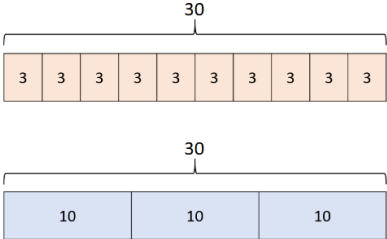
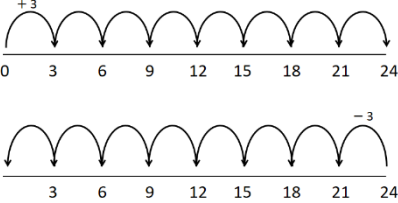
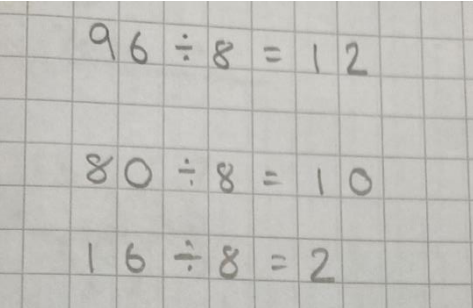
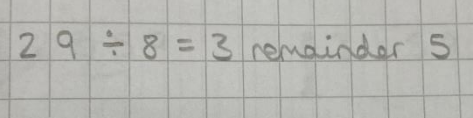


- *Inverse*
- *Commutative*

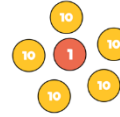
Vocabulary

- *Factor*
- *Multiple*
- *Square number*
- *Prime number*
- *Repeated addition*
- *Inverse*
- *Factor pairs*
- *Composite numbers*
- *Prime number*
- *Squared*
- *Cubed*

Division

Objectives	Concrete	Pictorial	Abstract
<ul style="list-style-type: none"> 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 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 	<p>Arrays</p>  <p>Diving with remainders $14 \div 3 = 4r2$</p> 	<p>Different ways of dividing by 3/4/8 etc</p>  <p>Dividing by counting up or back</p>  <p>Dividing 2-digits by 1-digit</p> <p>$51 \div 3$</p>	<p>Dividing with partitioning</p>  <p>Dividing with remainders</p> 
<p>Vocabulary</p>			
<ul style="list-style-type: none"> Remainder Equation Share Share equally Group 			

- *Groups of*
- *Lots of*
- *Array*
- *Divide*
- *Divided by*
- *Divided into*
- *Left*
- *Left over*



Tens	Ones

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