Grimsdyke School
Written Calculations Policy
Year 4

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

Objectives

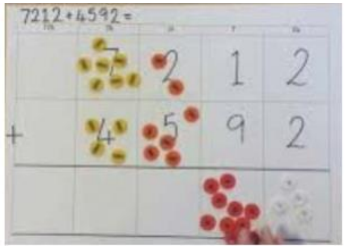
- *To find 1000 more than a given number*
- *To add numbers with up to 4 digits using the formal written methods of columnar addition where appropriate*
- *To estimate and use inverse operations to check answers to a calculation*
- *To solve addition two-step problems in contexts*
- *To add fractions with the same denominator*

Vocabulary

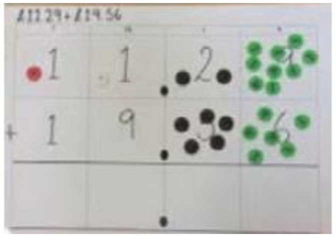
- *Addition*
- *Add*
- *More*
- *Make*
- *Sum*
- *Total*
- *Altogether*
- *Regrouping*
- *Exchanging*
- *Decimal point*

Concrete

Place value chart with counters for addition

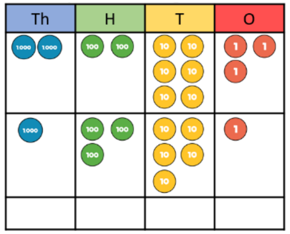


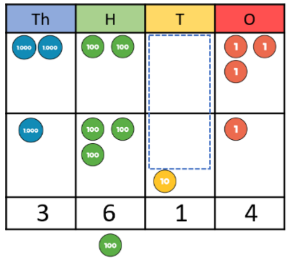
Including decimal addition



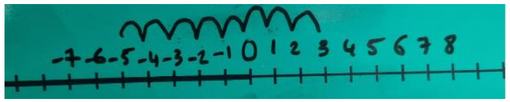
Pictorial

Adding with exchanging



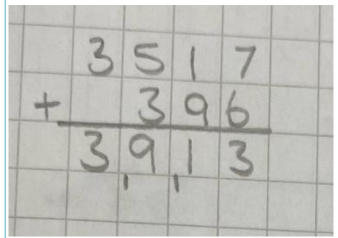


Adding negative numbers

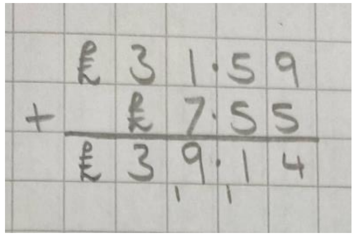


Abstract

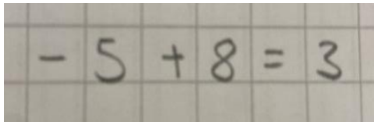
Column addition – formal written method



Adding decimals – money



Adding negative numbers



			Adding fractions with the same denominator $\frac{7}{10}+\frac{2}{10}=\frac{9}{10}$
Vocabulary			
• *Addition* • *Add* • *More* • *Make* • *Sum* • *Total* • *Altogether* • *Regrouping* • *Exchanging* • *Decimal point* • *BODMAS*			

Subtraction

Objectives

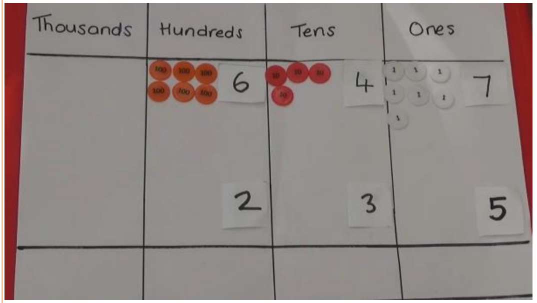
- *To find 1000 more or less than a given number*
- *To count backwards through zero to include negative numbers*
- *To subtract numbers with up to 4 digits using the formal written methods of columnar subtraction where appropriate*
- *To estimate and use inverse operations to check answers to a calculation*
- *To solve subtraction two-step problems in contexts, deciding which operations and methods to use and why*
- *To subtract fractions with the same denominator*

Vocabulary

- *Less than*
- *Fewer than*
- *Subtract*
- *Column*
- *Count on*
- *Partition*
- *Exchanging*

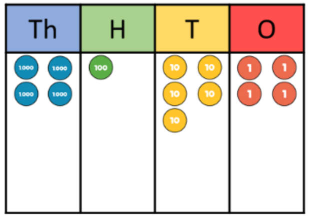
Concrete

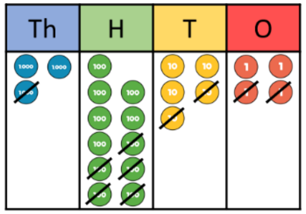
Place value chart with counters for subtraction



Pictorial

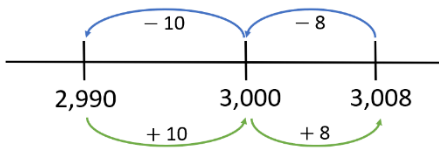
Subtracting with exchanging





Counting on or counting back

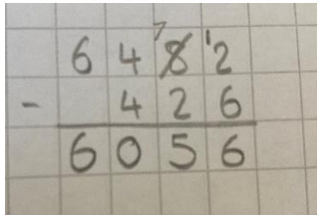
3,008 − 2,990 = 18



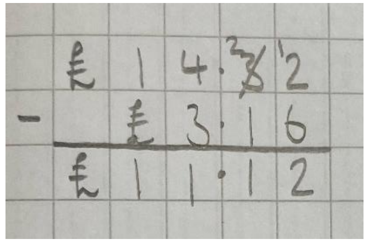
Subtracting negative numbers

Abstract

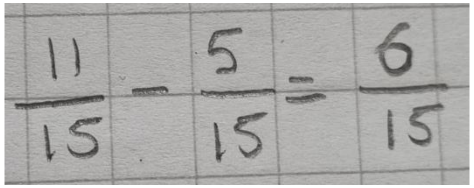
Formal written method

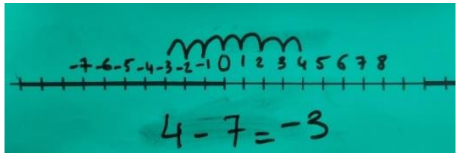


Subtraction with decimals - money



Subtracting fractions with the same denominator



• *Decimal*			

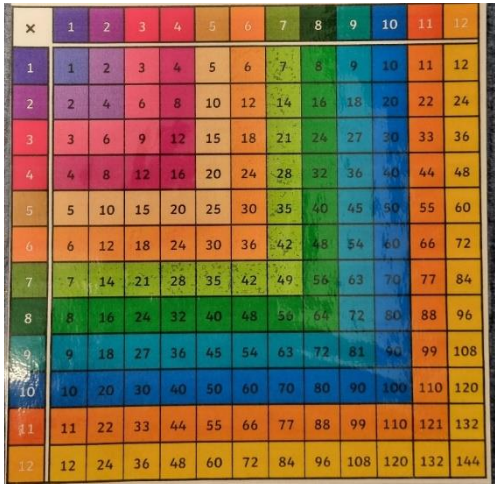
Multiplication

Objectives

- *To recall multiplication facts for multiplication tables up to 12 × 12 including the six, seven and nine times tables*
- *To know that commutativity is when 2 numbers can be added or multiplied & the same answer will be found no matter what order they are in*
- *To know the formal written method for multiplication*
- *To know that when you multiply by zero, the answer is zero*
- *To know that multiplying a number by a group of numbers is the same as doing each multiplication separately (distributed law)*
- *To use place value, known and derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together three numbers*

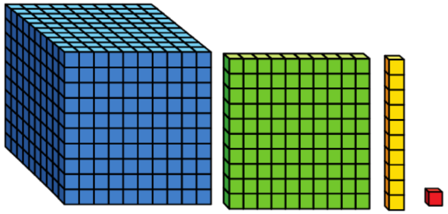
Concrete

Multiplication square



Pictorial

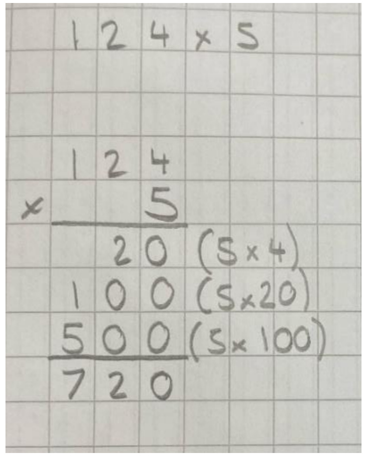
Getting ten times bigger



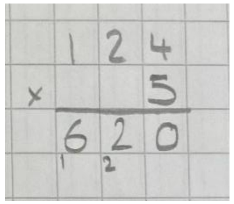
Multiplying by 10

Abstract

Expanded written method



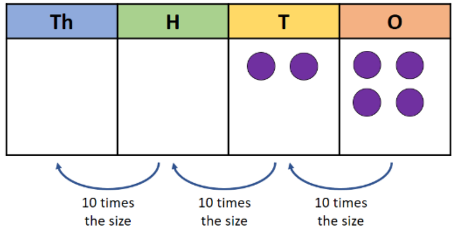
Formal written method



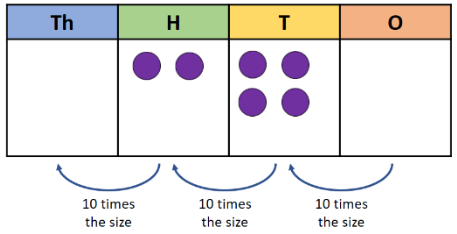
- *To use factor pairs and commutativity in mental calculations*
- *To multiply two-digit and three-digit numbers by a one-digit number using formal written layout*
- *To estimate and use inverse operations to check answers to a calculation*
- *Use mental methods and extend this to three-digit numbers to derive facts, (for example 600 ÷ 3 = 200 can be derived from 2 x 3 = 6*
- *To use knowledge of number facts and rules of arithmetic to solve mental and written calculations for example, 2 x 6 x 5 = 10 x 6 = 60*

Vocabulary

- *Groups of*
- *Lots of*
- *Factor*
- *Multiple*
- *Distributive*
- *Repeated addition*
- *Array*



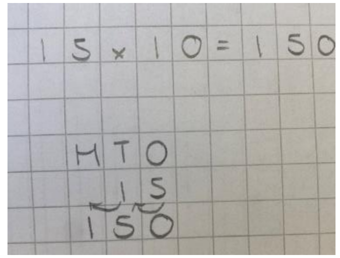
$24 \times 10 =$



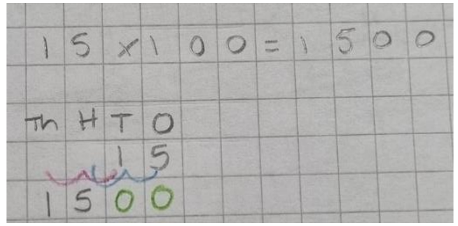
$24 \times 10 = 240$

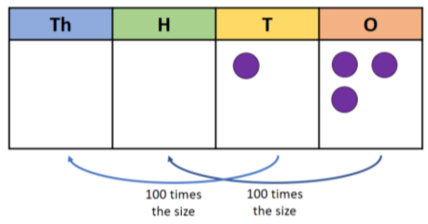
Multiplying by 100

Multiplying by 10

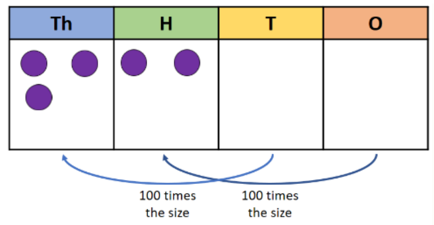


Multiplying by 100





$13 \times 100 =$



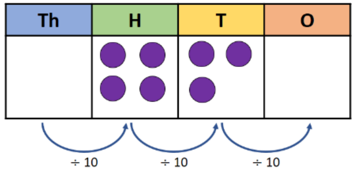
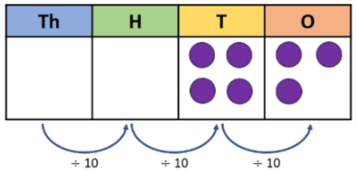
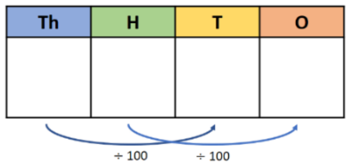
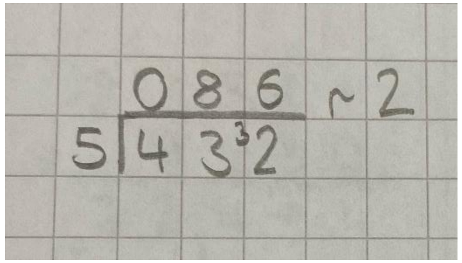
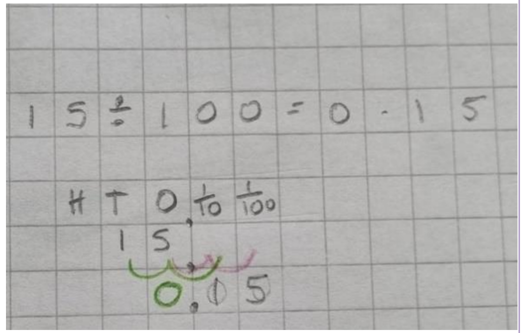
$32 \times 100 = 3{,}200$

Multiplying 3-digits by 1-digit

$123 \times 4 =$

$123 \times 4 = 492$

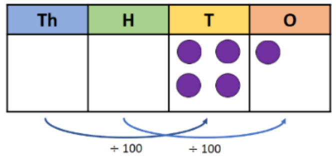
Division

Objectives	*Concrete*	*Pictorial*	*Abstract*
• *To recall division facts for multiplication tables up to 12 × 12 including the six, seven and nine times tables* • *To know that when you divide by 1, the answer is the same* • *To know the formal written method of division* • *To know that hundredths arise when dividing an object by one hundred and dividing tenths by ten* • *To use place value, known and derived facts to multiply and divide mentally, including multiplying by 0 and 1; dividing by 1; multiplying together three numbers*		Dividing by 10  430 ÷ 10 =  430 ÷ 10 = 4 Diving by 100  4,100 ÷ 100 =	Formal written method with remainders  Dividing by 10 Dividing by 100 
Vocabulary			
• *Quotient* • *Divisor* • *Dividend* • *Divisible by* • *Inverse* • *Remainder*			

<table>
<tr>
<td>

- *Equation*
- *Share*
- *Share equally*
- *Group*
- *Groups of*
- *Lots of*
- *Array*
- *Divide*
- *Divided by*
- *Divided into*
- *Left*
- *Left over*

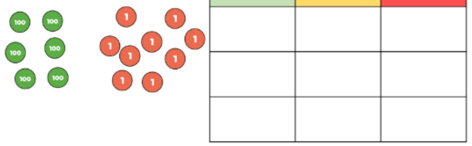
</td>
<td></td>
<td>



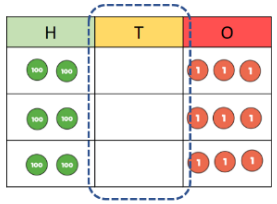
4,100 ÷ 100 = 41

Diving 3-digits by 2-digits

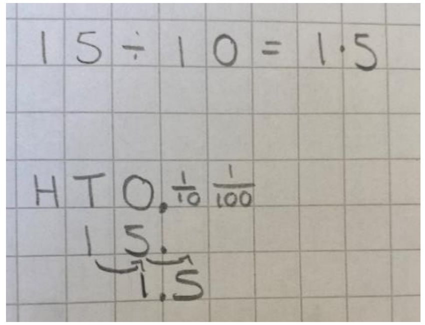
609 ÷ 3 =



609 ÷ 3 = 203



</td>
<td>



</td>
</tr>
</table>

Written – May 2022

Next Review – May 2024