

WOOD FOLD PRIMARY SCHOOL

MATHS POLICY

Policy agreed (date):	September 2022
Policy published (including on website) (date):	September 2022
Next review (date):	Ongoing to reflect practice

Rationale

‘Mathematics is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.’ (National Curriculum, 2014)

Aims

At Wood Fold we aim to provide the pupils with a mathematics curriculum and high-quality teaching to produce individuals who are numerate, creative, independent, inquisitive, enquiring and confident. We also aim to provide a stimulating environment and adequate resources so that pupils can develop their mathematical skills to the full.

The National Curriculum (2014) for mathematics aims to ensure that all pupils:

- Become **fluent** in the fundamentals of mathematics, including the varied and regular practice of increasingly complex problems over time.
- **Reason mathematically** by following a line of enquiry, understanding relationships and generalisations, and developing an argument, justification or proof using mathematical language.

- Can **solve problems** by applying their mathematics to a variety of problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Planning and Teaching structure for Mathematics

We are committed to ensuring that all pupils achieve mastery in the key concepts of mathematics, appropriate for their age group, in order that they make genuine progress and avoid gaps in their understanding. Teachers predominantly follow the White Rose Maths scheme of work, but this is adapted to suit the children at Wood Fold. The materials within White Rose Maths and Focus Maths help teachers to plan and deliver mathematics teaching and learning in a way which is challenging and aligned with end of year curricular expectations. We break down the White Rose curriculum to ensure that all units are covered more than once during the year. This allows for opportunities for rigorous retrieval practice to ensure previous learning is regularly recalled and activated before new learning is accessed allowing strong mathematical schema to be built.

The mathematics curriculum is broken down so that teachers can plan for units of work in a progressive way. Children are taught to seek connections between prior and new learning to avoid compartmentalized learning.

Pre- Learning task

For each mathematical objective a ‘pre-learning task’ is produced. The pre-learning task will be designed to help assess whether children have the relevant prior knowledge to access the new learning. These are aligned with the end of year expectations. From this pre-learning task, the children are grouped according to their specific next steps of learning.

Autumn 1: Week 4: Addition and Subtraction Pre-Learning Task (Y5)					
The pre-learning task below could be used to assess pupils' starting points within this objective. It needs to be completed by all/ or some of the pupils in advance of the main teaching.					
Name					
2345	7451		2345	7451	
+ 3462	+ 2374		- 1432	- 2324	
<hr/>	<hr/>		<hr/>	<hr/>	
6784	4657		6384	4257	
+ 4536	+7563		- 4536	- 2563	
<hr/>	<hr/>		<hr/>	<hr/>	
167844	65465		167844	654657	
+ 243536	+565563		- 143536	- 565563	
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Mastery Approach

Concrete, pictorial, abstract (CPA) is a highly effective approach to teaching that develops a deep and sustainable understanding of maths.'

Concrete is the “doing” stage, using concrete objects to model problems. The CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Where applicable, each new abstract concept is learned first with a “concrete” or physical experience. For example, if a problem is about adding up four baskets of fruit, the pupils might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit.

Manipulating concrete resources allows children to make sense of the processes involved in the four operations. It helps them visualise what is happening to the whole and the parts and understand the commutativity of addition and multiplication.

Pictorial is the “seeing” stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem. Building or drawing a model makes it easier for pupils to grasp concepts they traditionally find more difficult, such as fractions, as

it helps them visualise the problem and make it more accessible. The children are taught to understand a wide range of pictorial representations during our maths lessons. Initially they are presented with models and representations appropriate to the problem but are then encouraged to use and apply this understanding to draw their own models or representations when solving word problems or more complex abstract problems. Understanding how to use a blank number line or bar model gives children the power to unpick a complex word problem and represent it visually in order to solve it step by step. Some examples of pictorial representations include:

Part-Whole Model

Bar Model

Number lines (complete, partially complete, blank)

Place Value Charts

Abstract is the “symbolic” stage, where pupils are able to use abstract symbols to model problems (Hauser). Only once a child has demonstrated that they have a solid understanding of the “concrete” and “pictorial” representations of the problem, can the teacher introduce the more “abstract” concept, such as mathematical symbols. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, −, x, / to indicate addition, subtraction, multiplication, or division

Using the CPA approach ensures the children at Wood Fold develop the declarative, procedural and conditional knowledge required to become confident and competent mathematicians.

Declarative knowledge: ‘I know that...’ this refers to the facts and formulae that children learn in their mathematics lessons such as times tables, number bonds, fact families etc.

Procedural knowledge: ‘I know how...’ this is knowing how to work through a written strategy or method.

Conditional knowledge: ‘I know when...’ this is being able to select the appropriate procedural knowledge to match the declarative knowledge needed to solve problems involving reasoning and logic.

For example:

Children learn multiplication facts up to 12 x 12. **Declarative knowledge**

Children can apply these facts to multiplication of 3- and 4-digit numbers multiplied by 1- or 2-digits using column multiplication. **Procedural knowledge**

Children can solve a multi-step word problem identifying the key vocabulary that shows they need to use a formal written method of multiplication. **Conditional knowledge.**

Deepening Understanding

Children working at this stage of learning take learning beyond evidence of concrete, pictorial and abstract into evidence of deeper understanding of the mathematical objective. The focus at this stage is Problem Solving and Reasoning. Children are exposed to a variety of the '5 types of problem solving' (Finding all possibilities; Logic; Visual; Rules & Patterns; Word Problems) to ensure they are able to apply their understanding when faced with different types of problems.

Working at Greater Depth

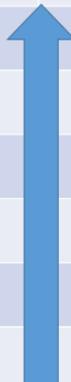
At this stage of learning, children are working at a 'deeper' level. This means that children are able to transfer their learning and apply it to different contexts, explain their reasoning and draw upon higher level thinking skills. Activities provided at this stage are all designed to deepen understanding of the end of year expectation rather than move pupils on to learning from the year group above. A range of different kinds of activities are included throughout to provide variety and opportunity to assess learning in different ways.

Pupil and Teacher Assessment Ladder

As children progress through the teaching sequence of a particular objective, both pupil and teacher can use the assessment ladder to date when they have achieved a particular element. These ladders are intended to be used by pupils and teachers to assess current learning against

the end of year expectation. For each expectation, the learning steps are listed (bottom to top) in child appropriate language.

Autumn 1: Week 4: Addition and Subtraction Assessment		
The grid below helps to identify the journey pupils make towards mastering this objective. It can be used by the teacher to keep an on-going check on progress or more likely placed in the pupils' books so that they can keep their own checks.		
Place Value: Count forwards or backwards in steps of powers of 10 for any given number up to 1,000,000.	Me	My Teacher
I can Subtract whole numbers with more than four digits using the column method.		
I can Subtract 2 four digit numbers with more than one exchange.		
I can subtract 2 four digit numbers with one exchange.		
I can add whole numbers with more than four digits using the column method.		
I can add 2 four digit numbers with more than one exchange.		
I can add 2 four digit numbers with one exchange.		



Teaching & Learning

- The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress will always be based on the security of pupils' understanding and their readiness to progress to the next stage.
- Pupils who grasp concepts rapidly will be challenged through being offered rich and sophisticated problems before any acceleration through new content.
- Effective use of formative assessment will ensure that groupings are fluid and dependent upon the emerging needs or next steps of each group of learners. Therefore, there are no set groupings as they will change on a day-to-day basis.
- Those who are not sufficiently fluent with earlier material will consolidate their understanding (using concrete and pictorial approaches), before moving on.
- In addition, pre-teaching will also be provided to children who have shown to struggle on the same area of mathematics the previous year.

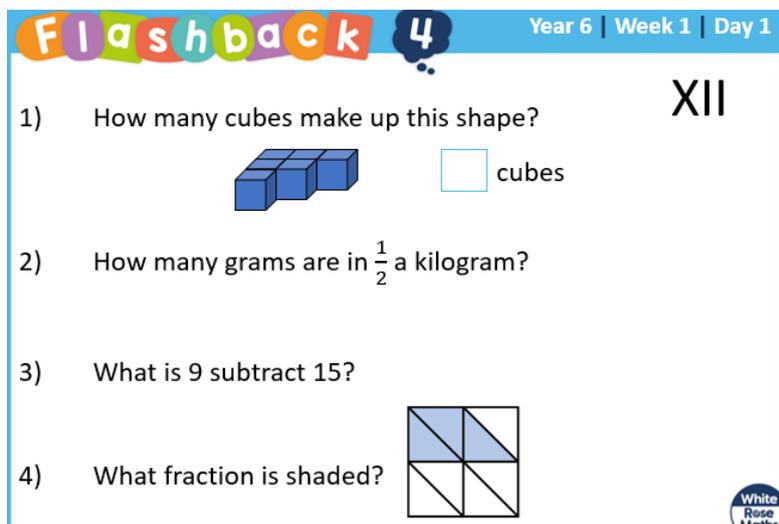
Lesson Structure

In addition, each lesson has the following structure:

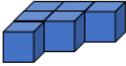
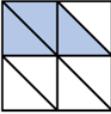
1. Flash back 4
2. Times Tables
3. Arithmetic session
4. Main Lesson
5. Problem of the day

Flash back 4

To start each session the children will recall prior learning through a selection of problems either through pictorial or symbolic representation.



The slide is titled 'Flashback 4' in colorful letters, with 'Year 6 | Week 1 | Day 1' in the top right. It contains four questions:

- 1) How many cubes make up this shape? XII
 cubes
- 2) How many grams are in $\frac{1}{2}$ a kilogram?
- 3) What is 9 subtract 15?
- 4) What fraction is shaded?


White Rose Maths logo is in the bottom right corner.

Times tables

Particular attention is placed on the children having security and fluency with times tables. Each child will be exposed to at least two times table quizzes per week. The expectation for each year group are as follows:

Year 1 – x2, x5, x10

Year 2 – x2, x3, x4, x5, x10

Year 3 – x2, x3, x4, x5, x6, x8, x10, x12

Year 4 – x2, x3, x4, x5, x6, x7, x8, x9, x10, x11, x12

Years 5 and 6 - x2, x3, x4, x5, x6, x7, x8, x9, x10, x11, x12 (including inverse)

Pupils will learn how to count in multiples initially e.g. 3, 6, 9, 12, 15, but then learn to say the times table in full e.g. 1 times 3 is 3, 2 times 3 is 6 etc. This promotes a connection between the factor pairs and the multiple and allows for immediate recall of facts, easing the progression to understanding and recalling the inverse. It also reduces the reliance on counting up on fingers and always having to start at zero.

Arithmetic

As with Times Tables, arithmetic forms part of the daily mathematics session. Each child will complete a variety of questions covering the four operations in a set amount of time. These questions will recap prior learning and will ensure that the children are encouraged to apply their declarative knowledge with fluency, along with the deeper knowledge learnt through concrete, pictorial and abstract approaches.

Problem of the day

To conclude the lesson all children will complete a problem of the day task, this will involve them solving a reasoning problem that consolidates their understanding from the lesson. They will use technical vocabulary and show they understand the need to use their conditional knowledge to explain the problem accurately.

Marking and Feedback

(Please see Marking and Feedback Policy)

Early Years Foundation Stage (EYFS)

We follow EYFS curriculum guidance for Mathematics. However, we are committed to ensuring the confident development of number sense and put emphasis on mastery of key early concepts. Pupils initially explore numbers to 20 and the development of models and images for numbers as a solid foundation for further progress.

Equal Opportunities

As a school we endeavour to maintain an awareness of, and to provide for equal opportunities for all our pupils in mathematics. We aim to take into account cultural background, gender

and Special Needs, both in our teaching attitudes and in the published materials we use with our pupils.

Children with special educational needs

All children receive high quality inclusive teaching. We aim to fully include SEN pupils in the daily mathematics lessons so that they benefit from the emphasis on oral and mental work and by listening and participating with other children in demonstrating and explaining their methods. There are high expectations for all pupils. Resources are provided to encourage children to learn independently and support their learning. Specialist resources, such as numicon are also used, where appropriate.

Where necessary teachers will, in consultation with the Inclusion Leader and members of the SLT, draw up programme of support for a child. If a child's needs are particularly severe they will work on an individualised programme written in consultation with the appropriate staff.

Homework

(Please see Homework Policy)