



# The Orchard Primary School

*Nurture Learn Grow*

## Mathematics Policy

Date	Review Date	Author	GB Committee
September 2022	September 2023	Yolande O'Callaghan Geerthi Ahilan Demelza Coppin	Curriculum Committee

'Mathematics, a universal language that enables understanding of the world, is an integral part of the curriculum. Beyond the study of numbers, shapes and patterns, it also provides important tools for work in fields such as engineering, physics, architecture, medicine and business. It nurtures the development of a logical and methodical mindset, as well helping to inculcate focus and the ability to solve all manner of problems.'

DFE Research Review Series: Mathematics (May 2021)

### Foundations Stage (Early Years):

Our approach to mathematics in the Foundation Stage (Nursery & Reception) is strongly underpinned by the EYFS Curriculum 2021:

*Developing a strong grounding in number is essential so that all children develop the necessary building blocks to excel mathematically.*

All children should be able to:

- count **confidently**, develop a deep understanding of numbers
- **articulate** relationships between numbers and identify patterns
- Describe and explain their thinking using mathematical vocabulary

Statutory Framework for the Early Years Framework Sept 2021

### Key stages 1 and 2:

Our children continue on this journey as they progress through Key stages 1 and 2, adhering to The National Curriculum requirements for the teaching of mathematics for mastery:

- become **fluent** in the fundamentals of mathematics, through varied and frequent practice with increasingly complex problems over time. This will help children develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and justifying using mathematical language.
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions. Mathematics is an interconnected subject in which children need to be able to move fluently between different representations of mathematical ideas.

## INTENT



At Orchard, we believe that mathematics can help our children develop an understanding of the world and make a **positive** impact on their life chances. Therefore, we endeavour for **all** children to become **confident**, successful and proficient mathematicians who demonstrate **resilience** when facing challenges across the curriculum.

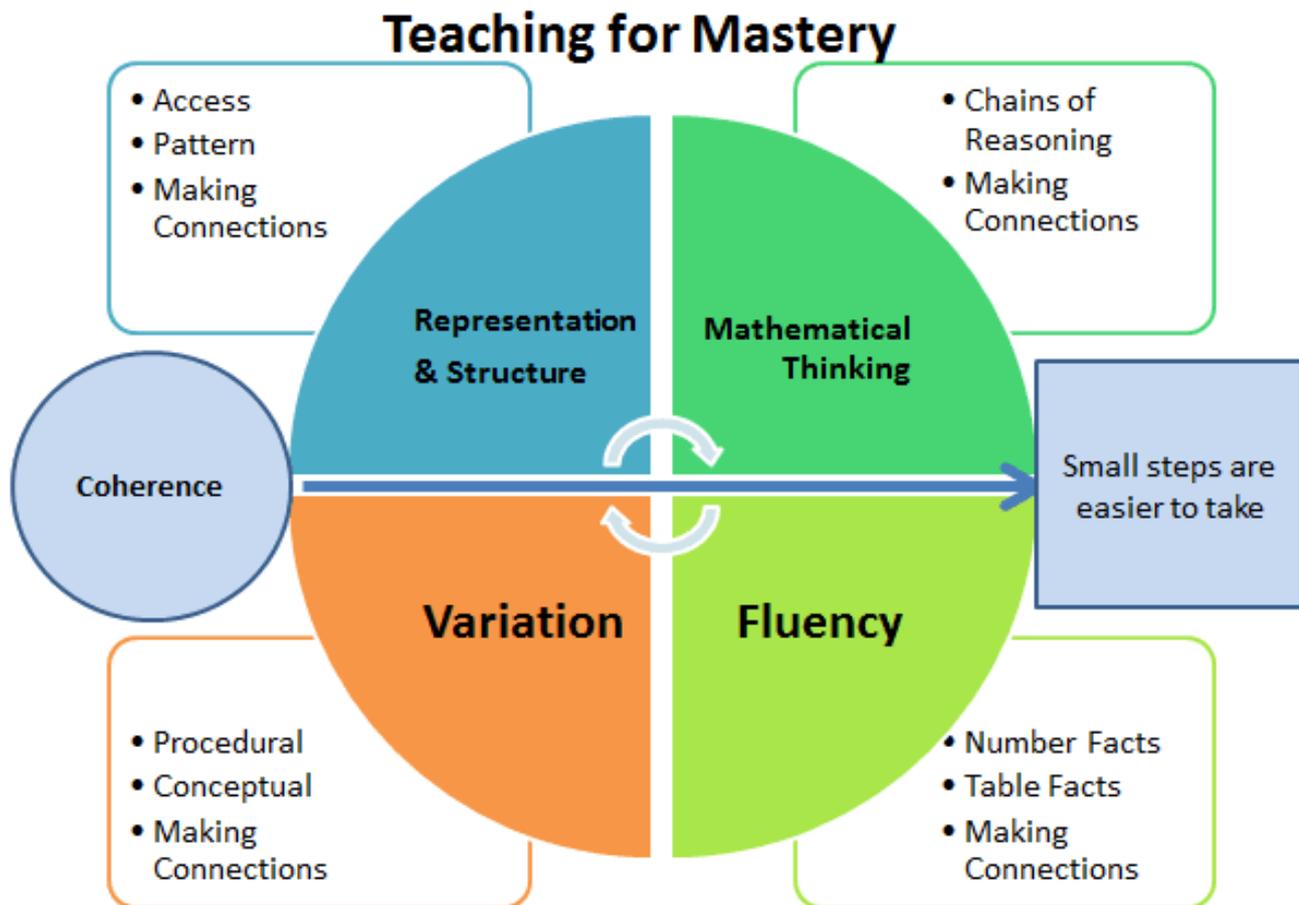
We understand that our learners come from a wide variety of backgrounds with varying exposure to mathematical concepts and practical experiences. They require robust and clear progression through mathematical concepts, vocabulary development and support with building on prior knowledge. Therefore, we use the Concrete-Pictorial-Abstract approach (CPA) to teach mastery mathematics because it is underpinned by evidence-based research.

This systematic, highly-structured whole- class approach to mathematics teaching believes that **all** children can succeed and make progress from their starting points. The emphasis is on how we as teachers enable engagement and achievement. Therefore, new mathematical concepts are introduced using concrete resources, which may include straws, counters or dice, moving on to specific mathematical resources such as dienes, ten-frames, numicon and number lines.

This enables all children to experience hands on learning when discovering mathematical topics, and allowing them to have clear models and images to aid visualisation and understanding. Alongside this, we introduce vocabulary, model and rehearse these to empower **all** children to **confidently** reason and explain their mathematical thinking. This provides our teachers with the opportunity to identify and address any misconceptions and provide immediate feedback, which makes learning more meaningful.

## IMPLEMENTATION

Planning is done **collaboratively** in year teams, following the principles outlined by the mastery model below.



Resources which complement our CPA approach to achieve mathematics mastery at Orchard include:

1. New White Rose Hub (WRH)
2. Maths No Problem
3. NCTEM
4. NRICH
5. Education Endowment Foundation (EEF)

The NEW Primary schemes of learning from the White Rose Maths Hub '*National Curriculum and Ready to Progress Mapping*' (updated for September 2022) are used at Orchard to ensure coverage and progression.

*When planning a new topic, teachers consider clear progression of skills, prior knowledge of children, sequence of lessons, when new learning is to be introduced (including vocabulary and stem sentences) and opportunities for consolidation.*

*To ensure we plan ambitious outcomes for all children regardless of starting points or barriers to their learning, we refer to Richard DuFour's questions:*

- 1. What do I want them to learn?*
- 2. How will I know if they have learned it?*
- 3. What will I do if they already know it?*
- 4. What will I do if they struggle to learn it?*

### **Resources and Displays**

Each classroom will be resourced with materials to support the delivery of Maths; such items might include number lines, multiplication tables, 100 squares, 3D shapes, multilink cubes, dice and other smaller items. Larger materials such as scales, trundle wheels and measuring cylinders will be held centrally in the Maths Cupboard. Children should be encouraged to use whatever resources are available to them in the classroom and which they feel would be beneficial to help them when completing Maths work. Each classroom should have a display dedicated to Maths and should reflect current learning, stem sentences, key vocabulary, methods, etc. This could be in the form of a working wall; strategy board or problem-solving area and pupil voice should be evident.

### **Assessment: Formative and Summative**

The expectation is that the majority of children will move through the programmes of study at broadly the same pace. Through the use of assessment (formative & summative) teachers decide when children are ready to progress to the next stage based on the security of their understanding.

*Teachers will use Assessment for Learning (AFL) throughout the lesson as a means to identify those with a secure understanding of the concept taught and provide them with enrichment tasks. Those identified with misconceptions will be given targeted support.*

*End of Unit assessments (WRM) will help to identify any ongoing gaps in learning that teachers need to address in future planning. Summative assessments take place in Autumn 2 and Summer 2 (KeyStage 1, WRM and KeyStage 2, NFER) to gauge attainment and measure progress.*

## **Inclusion**

Those who are not sufficiently fluent with earlier material will be supported in consolidating their understanding in class or through an intervention, before moving on. By ensuring early and accurate identification of those children who are not working at age-related expectations, children will work on a personalised maths curriculum. This will reflect the targets that children are working towards narrowing the gap. These groups will include SEN, new arrivals to the country and those with social and economic disadvantages.

Children who grasp concepts rapidly are challenged through rich and more sophisticated problems before any acceleration to new content. Teachers will consider how to challenge or extend these pupils by referring to the four characteristics of Greater Depth as outlined in Andrew Jeffrey's 'Greater Depth in Primary Mathematics'.

The four characteristics he refers to are:

### **1. Curiosity**

*"I wonder and am willing and able to explore multiple approaches and outcomes, purely for the sake of exploring them."*

### **2. Metacognition**

*"I am aware of, and able to explain what I am thinking about."*

### **3. Making Connections**

*"Pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems." (NC, 2014)*

### **4. Open Questions**

*"Questions which require more than simply accessing a memory."*

Teachers are skilled and will be accessing a range of strategies to accomplish challenge.

## Lesson Structure:

There are 4 main components to most mathematics lessons:

1. In Focus Task
2. Let's Learn
3. Guided Practice
4. Independent Work

### **In Focus/Anchor Task**

A problem-solving task which generates discussion is used to start most lessons. This problem is designed to provide children with a challenge that can be solved in a number of different ways (Conceptual Variation). During this time, children are supported to **visualise** the problem and work **collaboratively**. Comparing and contrasting different methods for solving the same problem enables learners to connect different areas of knowledge and to deepen their mathematical understanding.

### **Let's Learn**

This is where the teacher will draw on the different approaches that the children have selected from the In Focus/Anchor task in order to model:

- Effective strategies
- Address misconceptions/common errors
- Use of resources and pictorial representations

Teachers will question the children to elicit their understanding. This is the time when new vocabulary/stem sentences are introduced, modelled by the teacher and rehearsed by the children. Children are encouraged to use stem sentences to explain and justify their views. All views are **respected** and mathematically challenged.

*A further problem may be given at the same level of challenge (same problem - different numbers) to enable children to rehearse and consolidate their understanding. All adults in the classroom to circulate in order to elicit children's application and to address any continued misconception. This will provide the children in the moment feedback.*

## Guided Practice

This is a chance for all children to practise what they have learned. The teacher models an effective strategy / method or use of a particular representation (i.e. place value chart, part-whole model, bar model, etc) with children continuing to work with adult or peer support. Those feeling less confident will have the support of the class teacher or teaching assistant.

## Independent Practice /Enrichment

Independent practice allows children to apply their understanding. Some might need additional support; in which case they could have another guided practice before attempting their independent work. This **independent** application is key to ensuring secure understanding.

### The Role of the Teacher is to:

- **Anticipate** strategies children will use and possible misconceptions.
- **Monitor** children's work as they approach the problem in class. Selecting children whose strategies are worth discussing in class. Listening out for and addressing misconceptions that arise. This is the assessment for learning part of the lesson which will inform feedback and the next steps in the teaching and learning.
- **Select & Sequence** which children will present their strategies and reasoning to develop their own and others' learning.
- **Connect** the strategies and ideas in a way that helps children understand the mathematics learned.

## IMPACT

As a result of our approach to mathematics teaching and learning, we will see:

Pupil Voice	Evidence In Knowledge	Evidence In Skills	Outcomes
<p>Through discussion and feedback, children talk <b>enthusiastically</b> about their maths lessons and their love of the subject.</p> <p>They can <b>articulate</b> the context in which maths is being taught and relate this to real life purposes.</p> <p>Children show <b>confidence</b> and believe they can learn new mathematical concepts and apply their knowledge.</p>	<p>Children demonstrate a quick recall of facts and procedures. This includes the recollection of the times table.</p> <p>Mathematical concepts or skills are mastered when children can demonstrate their understanding in multiple ways using mathematical language to explain their thinking.</p> <p>Children can <b>independently</b> apply a mathematical concept to new problems in unfamiliar situations.</p>	<p>Children use acquired vocabulary in maths lessons.</p> <p>They have the skills to use methods <b>independently</b> and show <b>resilience</b> when tackling problems.</p> <p>They have the flexibility and fluidity to move between different contexts and representations of maths.</p> <p>Children show a high level of pride in the presentation and understanding of their work.</p> <p>The chance to develop the ability to recognise relationships and make connections in maths lessons.</p> <p>Teachers plan a range of opportunities to use maths inside and outside of the classroom environment, as well as beyond the school.</p>	<p>Children are happy learners who talk <b>enthusiastically</b> about their learning and eager to further their progress in maths.</p> <p>The impact of 'mastery' and the emphasis on accurate use of mathematical language is more consistent during class observations and during class/pupil discussions.</p> <p>More consistent teaching practices that are well-known to be more effective for pupil progress long term, is evident across school.</p> <p>Achievement at the end of KS1 &amp; KS2 is at least in-line (or better) with that of the national average, as well as an increasing proportion of children demonstrating greater depth, at the end of each phase.</p>

### Health and Safety:

Teachers will consider and ensure the safe use of all resources and equipment.

## **Appendices**

The National Curriculum for England: mathematics programme of study:

<https://www.gov.uk/government/publications/national-curriculum-in-england-mathematics-programmes-of-study/national-curriculum-in-england-mathematics-programmes-of-study>

Early years foundation stage (EYFS) statutory framework

<https://www.gov.uk/government/publications/early-years-foundation-stage-framework--2>

Early Years NCTEM

<https://www.ncetm.org.uk/in-the-classroom/early-years/>

Richard DuFour's Model:

<https://www.sacpta.org/news/a-quick-overview-of-the-dufour-plc-model>

Curriculum Prioritisation in Primary Maths

<https://www.ncetm.org.uk/classroom-resources/cp-curriculum-prioritisation-in-primary-maths/>

Andrew Jeffrey (2019) 'Greater Depth in Primary Mathematics'.

**To be read in conjunction with the following policies:**

**The Orchard Child**

Safeguarding

SEND

SEND Information Report

Pupil Premium

Early Years

Curriculum

English

Health and Safety

British Values