

The pedagogical approach to teaching mathematics

Why?

At Fishbourne CE Primary School, we want our mathematicians to develop an appreciation of the beauty and power of mathematics. They will be curious mathematicians who think deeply about the world, approaching problems creatively and flexibly, including breaking problems down into a series of simpler steps and persevering in seeking solutions. They will have an understanding of the concepts which underpin procedures, the ability to reason mathematically and to make rich connections between the different mathematical domains. They will 'know' numbers; develop a number sense and be able to recall and apply knowledge rapidly, accurately and efficiently. They will be able to move fluently between different representations of mathematical ideas and will be able to use manipulatives to model their mathematical thinking.

How?

In order to achieve this, we are using a mastery approach to the teaching of mathematics. We recognise the value of the 5 elements of mastery: representation, mathematical thinking, fluency, variation and coherence. We embrace all elements within our lesson design to ensure all learners make maximum progress.

Representations (concrete and pictorial) enable the children to develop their understanding of the structure of maths. This is a vital element in grasping the concepts which underpin all areas of maths and we recognise the importance of this being used throughout the school. Mathematical thinking enables the children to make connections between different areas of maths and apply their knowledge in a variety of contexts. Fluency enables their ability to retrieve facts speedily and calculate efficiently. Planning careful variation enables the children to deepen their conceptual understanding and challenge their thinking.

These four elements are drawn together coherently to provide a rich, structured and thoughtful progression through a sequence of lessons.

The optimal learning environment encourages the use of mathematical talk through peer to peer collaboration and challenge. Stem sentences are used to scaffold the children's use of mathematical language by encouraging them to explain their thinking.

What?

Our mathematical curriculum is designed bespoke for the children in each cohort. We start with the National Curriculum and use the White Rose materials to structure our Long Term Plans and ensure coverage. We weave the NCETM's Spine materials to ensure a broad and rich curriculum. These sources are drawn together in our Mathematical Thinking Planning Tool for each unit taught.

To ensure fluency, with strong conceptual foundations, we recognise the importance of spaced repetition to embed the children's learning. Therefore, in addition to a maths lesson, every class has a daily arithmetic or mastering number session where prior learning is revisited to consolidate understanding and improve fluency. Within maths lessons, we also provide opportunities for interleaving prior learning.

The use of carefully planned open questions (low threshold, high ceiling questions), placed strategically within lessons, encourages the children to think creatively and flexibly using their mathematical knowledge to solve problems.

Formative assessment is built into lesson design and enables adults to provide immediate support to children and informs teachers' planning and interventions. Personalised next steps of learning can be created as appropriate. Formative assessment may include mini-plenaries and conversations throughout a lesson to check understanding and strategies, self-assessment and marking. Teachers may also look at the children's written work and note where there are slips or misunderstandings. These can then be addressed though conversations, written comments or actions. Marking and evidence-recording strategies should be efficient to enable teachers to spend time on lesson design and preparation. Our Planning Thinking Tool has been designed to support teachers in weaving all the components of lesson design together and planning cohesive units of learning.

Maths Planning Thinking Tool - ADD UNIT TITLE



Vocabulary * Words for the children to hang their knowledge on * STEM Sentences Possible Misconceptions * Where might the children make mistakes? * Use 'Ready to Progress' dog to identify prior	
knowledge that should be in place	
Big Questions * Designed to enable all children to access learning	
Learning Opportunities (engaging and exciting) * White Rose Resources * Games * Outdoor Learning	
Aff * Baselines * Mini plenaries/baselines? * Exit Tickets? * Formal? * 'Ready to Progress'?	
Adult Subject Knowledge * Are we confident? * Is there any questions? *White Rose vids to support	

Steps for Learning	Lesson Design
Step 1	
Step 2	



The pedagogical approach to teaching multiplication tables

Why?

At Fishbourne CE Primary School, we recognise that understanding multiplication tables and developing rapid recall of the tables facts and their related divisions, will enable the children to be fluent and efficient mathematicians.

Multiplication tables are fundamental to many maths topics. Fractions and ratio are the most obvious area where learning times tables well is essential. However, every short multiplication and long multiplication method and short division and long division method require speed and instant recall of times tables while at primary school. At secondary school, the needs become even greater. Multiplication Tables are central to KS2 Maths and need to be embedded by Year 4.

Secure knowledge of tables facts also frees up working memory and allows pupils to develop their reasoning and problem solving skills. There are certain mental maths facts and operations children need to be able to carry out quickly and with a degree of automaticity in order to free up their working memory for newer, more challenging tasks at hand. If we can ensure the transition of times tables facts to children's long term memory and times tables can become an instantly recallable fact, the working memory can be freed up for reasoning and problem solving.

How?

In order for children to develop automaticity, we have a whole school approach to the teaching and learning of times tables based on research by Professor Jenny Field. The 5 elements of mastery underpin our teaching of multiplication tables to the same extent as rest of the curriculum.

Representations (concrete and pictorial) enable the children to develop their understanding of the structure of times tables. Arrays are used and real-life examples of 'equal groups of' are explored. Mathematical thinking enables the children to derive those tables they are unsure of, from known tables facts (eg. 8x7 = 8x5 + 8x2). It also enables them to understand the inverse operations and make connections to different areas of maths. Once the conceptual understanding is firmly embedded, frequent practice at home and school helps develop rapid recall.

What?

Teaching multiplication tables begins in Year 1 with the children counting in steps of 1, 2, 5 and 10. By Year 4, the children are confident with tables up to 12 x 12 and in Years 5 and 6 they consolidate knowledge of all factors, primes, square, cube and composite numbers.

In line with the STA and the MTC, we classify multiplication tables by the first number in the question. For example, 8 x 3 would fall within the 8 times table. This reflects what is now considered to be best practice – for example, that 8 x 3 should be thought of as 8, three times rather than 8 lots of 3.

When introducing a new times tables, we systematically build it around what they already know. We link it to the real world and use a display where relevant. As well as using concrete and pictorial representations, we allow the children to explore patterns within the tables.

To ensure fluency, with strong conceptual foundations, we recognise the importance of spaced repetition to embed the children's learning.

A small number (2-4) of discrete times tables lessons are taught each half term. If the main unit is multiplication and division, or in Years 5 and 6 when the children should be confident with their tables, the number of discrete lessons will be less. The children's recall is assessed termly and progress analysed. If a child is not making the progress expected, staff and parents will work in partnership to support the child. Additional teaching and interventions at school will help develop conceptual understanding and the use of a variety of apps or other activities at home will develop recall and automaticity.