



Byfleet Primary School - Mathematics at Byfleet Primary

Intent

Mathematics is at the core of our curriculum and it is through our teaching in this subject that pupils learn crucial life skills, including resilience and problem solving. They also have opportunities to lead, teach, support and mentor each other. Based on the National Curriculum and a model by Maths No Problem, we are ensuring children gain an in-depth understanding of maths by teaching fluency, reasoning and problem solving on the children's journey to mastery of the curriculum. *Depth not acceleration...* The old curriculum, measured in terms of levels, encouraged undue pace. Children were accelerated onto more complex concepts before really mastering earlier ones. The new curriculum, and the teaching of Maths at Byfleet Primary School, encourages the study of fewer skills in greater depth, with a focus on the application of the skill in different scenarios. This is what we call mastery. Teaching methods in maths today are very different to how many adults were taught. Now we try to help the children understand 'why', rather than just telling them 'how'. In this way, the children will be much better placed to apply their learning in a variety of situations.

Implementation

There are three elements that are critical on the journey towards mastery that we aim to develop in our children - Fluency, Reasoning and Problem Solving. Without one, the next cannot follow and it is only by developing these three skills that children can move towards mastery. Each of the daily maths lessons are differentiated through the use of support and extending prompts.

Maths No Problem lessons are broken down into 3 main steps.

- The first is the In Focus or the Anchor task. During this step, children are given a problem that they work in groups to solve. These problems require children to access previous learning and apply it to a new concept that they will use throughout the rest of the lesson.
- The next step is known as Guided Practice. During this stage, children use the methods they have discussed during the In Focus and apply it to different problems. They are encouraged to work in pairs during this stage to encourage discussion and develop the ability to explain why they are using the methods. The teacher will then go through the answers with the children to pick up any misconception.
- The final stage is the independent work. Children are encouraged to work on their own through the questions in their workbook. Challenges are made available to any children who complete the independent task and these challenges further their understanding of the topic.

Fluency

The first aim of the National Curriculum in England (DfE 2014) is that all children will *'become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately'*. As this suggests, fluency is the ability to know different mathematical strategies and to understand how to use them at an appropriate time.

Here is an example of fluency in action for the Year 5 objective 'multiplying 3-digit numbers by 2-digit numbers:



$$132 \times 18 = \boxed{?}$$

$$\begin{array}{r} 132 \\ \times 18 \\ \hline \end{array}$$

$$132 \times 18 = \boxed{}$$

$$\begin{array}{r} \\ \\ \hline \end{array}$$

Reasoning

The second aim of the National Curriculum is that all children can '*reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language*'. Reasoning is a child's ability to explain their understanding of a mathematical concept. In being able to articulate their knowledge, a child is building a secure understanding of a concept, rather than a superficial one which may later lead to misconceptions.

Here is an example of reasoning in action for the Year 5 objective 'multiplying 4 digit numbers by 2 digit numbers':

Spot the Mistakes

Can you spot and correct the errors in the calculation?

		2	5	3	4
×				2	3
		₁ 7	5	₁ 9	2
		₁ 5	0	6	8
	1	2	₁ 6	₁ 6	0

Problem solving

The third aim of the new National Curriculum is that all children '*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*'. This is where children are applying their knowledge in different contexts, which enables a greater depth of learning.

Here is an example of problem solving in action for the Year 5 objective 'multiplying 4 digit numbers by 2 digit numbers':



Using all of these numbers, form a 2-digit and a 3-digit number.



- (a) Which 2-digit number and 3-digit number give the smallest product?
Fill in the blanks and show your work clearly.

$$\boxed{} \times \boxed{} = \boxed{}$$

The concrete-pictorial-abstract approach

In order to help the children develop a deep conceptual understanding, we try to build solid foundations using the concrete-pictorial-abstract approach.

Concrete: In this stage, the children are first introduced to an idea or skill by acting it out with real objects. For example, in division this might be done by separating balls into colour groups.

Pictorial: When a child has sufficiently understood the hands-on experiences, they can progress to relating them to different representations, such as a diagram or picture of the objects. With our division example, this could be done by the action of circling groups of objects.

Abstract: This is the symbolic stage, where the children are able to represent problems using mathematical notations e.g. $10 \div 5 = 2$. The children will only progress to the abstract stage when they have enough context to understand what they mean, as this is the 'final' and most challenging of the three stages.

Impact

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.

During the children's time at Byfleet Primary School, their mathematical skills are progressed over time using the Maths No Problem schemes of learning. If you would like to look at this in more detail (as well as what topics are covered when in each year group), attached at the bottom of this page is the National Curriculum Progression document that Byfleet Primary School uses.

144 club and Doodle Maths

To ensure that we are providing our children the best opportunity to succeed in their maths, we have



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Parental Involvement

Parents often ask how they can best support their child's learning in maths when the methods we teach are so different to those they are familiar with from their own schooling. We would like our parents to demonstrate a positive attitude towards maths and to be 'cheerleaders' when supporting their children in practicing and consolidating skills. Applying maths in as many real-life contexts as possible is a vital part of home learning and we appreciate you taking the opportunities when 'out and about' to apply the children's learning. This includes telling the time, using money, calculating percentage increases and decreases and using scaling when working through a recipe.

Maths Fluency Approaches

- Counting sticks
- Times Table Songs