Maths at All Saints' C of E Primary School

Here at All Saints', we have a Mastery approach to the teaching of mathematics. At the centre of this approach is the belief that all pupils have the potential to succeed. Through developing a child's ability to attain mathematical fluency, problem-solving and reasoning skills, they can make further sense of the ever-changing world around them. Accordingly, children should appreciate relationships in all facets of mathematics, as they work towards a greater depth of understanding.

Mastering maths means pupils of all ages acquiring a deep, long-term, secure, and adaptable understanding of the subject. The phrase 'teaching for mastery' describes the elements of classroom practice that give pupils the best chances of mastering maths. Achieving mastery means acquiring a solid enough understanding of the maths that's been taught to enable pupils to move on to more advanced material.

Mastery:

Every pupil can achieve.

The answer is just the beginning.

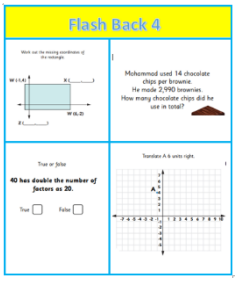
A positive teacher mindset and strong subject knowledge are key to student success in mathematics.

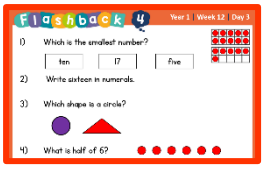
Carefully structured teaching is planned in small steps. This provides both the necessary scaffold for all to achieve, and the necessary detail and rigour of all aspects of the maths to facilitate deep thinking. The small steps are connected, and concepts are built upon. This leads to generalisation of the maths, and the ability to apply it to multiple contexts and solve problems.

At All Saints' maths lessons are designed to incorporate 5 stages: Teacher led using representations, Fluency, Probing questions, further extensions, and rich tasks.

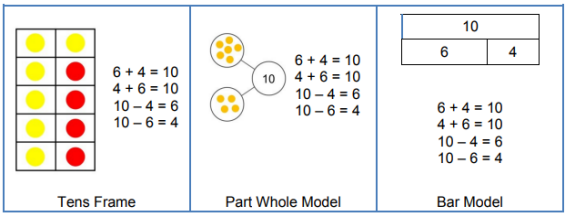
Representations. Teacher led input. Pupils establish conceptual understanding. Multiple representations are used to expose mathematical structure. Work is developed under teacher's guidance to support learning.

Lessons begin with retrieval practice, revisiting prior learning from last lesson, last week, last topic and last term. Children are given tasks where they retrieve an answer from their long-term memory. Each time pupils try and do this, that memory becomes stronger and a little easier to find next time.





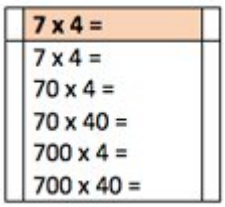
Concrete materials, contexts, drawings, diagrams, and equations all play a role in learning. Oracy skills and discussion play a central role in deepening understanding.

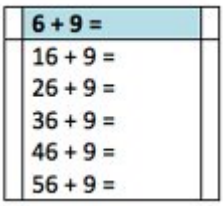


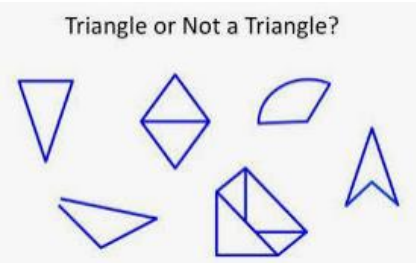
Teachers provide opportunities for pupil-pupil and pupil-teacher talk, to develop reasoning, flexibility, and adaptability in mathematical thinking. Precise questioning is the key to success in all our mathematics lessons, and open questioning techniques, often concentrating on the theme of 'why', will be continuously adapted by the teacher based on assessment for learning.

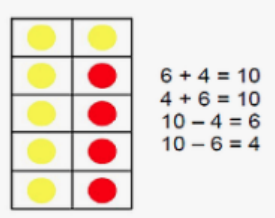
Fluency: Pupils independently complete questions using procedural variation, helping focus attention on the structure of the maths.

Carefully selected questions provide intelligent practice that develops and embeds fluency and declarative knowledge. Intelligent Practice involves noticing things that stay the same, things that change, providing the opportunities to make connections.









Fluency demands more of students than memorisation of a single procedure or collection of facts. It encompasses a mixture of efficiency, accuracy, and flexibility. Fluency also demands the flexibility to move between different contexts and representations of mathematics. Conceptual variation and procedural variation are used throughout lessons to present the mathematics in ways that promote procedural knowledge.

Probing Questions: Pupils independently justify, reason and convince. Good answers often include pupils acting as teachers

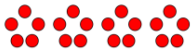
Children are provided with opportunities to reason about what they already know. This enables them to work out what is unknown. For example, if I know what 12 × 12 is, I can apply reasoning to work out 12 × 13. The ability to reason also supports the application of mathematics and an ability to solve problems set in unfamiliar contexts. Throughout lessons children are supported in the development of problem-solving skills.

True or False?

$5 + 5 = 2 + 2 + 2 + 2 + 2$

Draw an image or use cubes to help you explain your answer.

Amir is making this flower pattern with counters.



Annie says,

If you make 9 flowers, you will use 43 counters.

Do you agree with Annie?
Explain your answer.

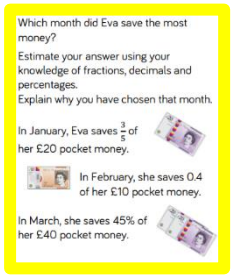
Eva says,

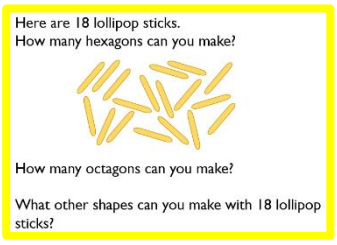
To multiply 23 by 57 I just need to calculate 20 × 50 and 3 × 7 and then add the totals.

What mistake has Eva made?
Explain your answer.

Further Extension: Pupils independently apply their knowledge in familiar and unfamiliar contexts or explain typical misconceptions. Pupils can interleave their conceptual understanding and prior learning to answer questions in less familiar contexts.

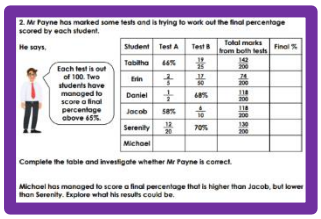
Children are provided with opportunities to develop their ability to reason, and problem solve. When completing this stage of learning, useful combinations of declarative and procedural knowledge are transformed into strategies as pupils learn to match the problem types that they can be used for.

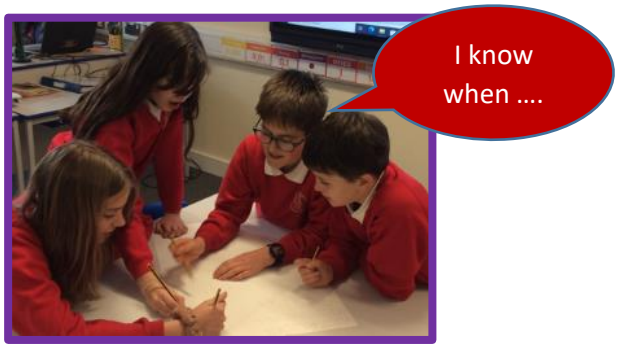


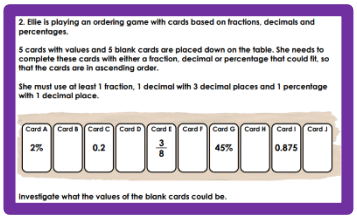


Rich Tasks: Pupils independently apply learning in unfamiliar contexts. Pupils can devise their own approach to explore unfamiliar contexts and reflect on their responses.

Children are provided with rich math tasks which take time to solve, and lend themselves to collaboration and multiple perspectives. Robust use of these tasks creates the context in which students build multiple representations and communicate their reasoning.







Early Years

Number sense is fundamental for children in the early years and is the key to mastering mathematical concepts in the future. Children learn to have a deep understanding of numbers to 10 and develop automaticity to fluently recall number bonds to 10. There is a strong emphasis on understanding number patterns, which can be built on further in year 1. Children are provided with opportunities to use a wide range of practical resources in order to develop the conceptual understanding of maths, its structures and its relationships. This is built on and developed further throughout school

Mastering Number

Aims: To develop fluency in number facts and develop number sense – a flexibility with number that employs reasoning about mathematical structure and relationships.

Daily mastering number sessions are delivered to secure firm foundations in the development of good number sense for all children from Reception through to Year 1 and Year 2. The aim over time is that children will leave KS1 with fluency in calculation and a confidence and flexibility with number. Attention will be given to key knowledge and understanding needed in Reception classes, and progression through KS1, which is fundamental for future mathematical learning.

Children who have a strong Number Sense see the connections and the structures and don't revert to counting. This will support them as they progress to Key Stage 2 and beyond.

The Mastering Number programme is designed to provide a structured approach to teaching **all** children to have the Number Sense and understanding of structures that are adopted by higher order thinkers.

We want all children to have automaticity in key number facts. Automaticity will reduce cognitive load and enable children to use their working memory on: new learning; applying their knowledge to problem solving and reasoning; critical thinking.

Times Tables

In lower key stage 2 time is devoted to learning times tables. In lessons children explore the patterns and connections within the new times table. Three or more times a week in every class there is a five- to ten-minute 'retrieval practice' session. Times table knowledge is built upon in upper key stage 2, ensuring the reduction of 'cognitive load' and essentially 'freeing up' space to focus brain activity on the application of the facts, not the facts themselves.

How we teach times tables.

A whole school approach to learning the times tables**:-**

• Aims to break down the learning of the times tables into manageable chunks, learning a times table at a time.

• Importance of the commutative law and the relationship with division facts.

• Rote learning in which children learn the number facts AND a sound pattern (this is important).

• 40 questions in each test. The children have two minutes to complete the test. An average of 3 seconds per question.

Our Rationale:-

• We don’t want maths to be all about ‘passing’ tests.

• We do want our children to LOVE maths and SUCCEED within the maths curriculum.

• Time and time again, our children who can recall facts enjoy, and are able to secure the maths curriculum easier than the children who can’t recall these facts.

• The reality is the children who can’t recall these facts inevitably fall behind because these facts are the building blocks of so many other aspects of maths.

• E.g. If I don’t know 7 x 3 then I won’t know 70 x 3, 17 x 3, 21 ÷ 3, 247 x 3 etc.

• There are not many facts: 36 ‘building block’ facts (up to 9 x 9). There are roughly 39 weeks in a school year, equating to essentially 1 fact a week, every year. It is achievable for most children to learn these facts.

2 x 2 = 4							
3 x 2 = 6	3 x 3 = 9						
4 x 2 = 8	4 x 3 = 12	4 x 4 = 16					
5 x 2 = 10	5 x 3 = 15	5 x 4 = 20	5 x 5 = 25				
6 x 2 = 12	6 x 3 = 18	6 x 4 = 24	6 x 5 = 30	6 x 6 = 36			
7 x 2 = 14	7 x 3 = 21	7 x 4 = 28	7 x 5 = 35	7 x 6 = 42	7 x 7 = 49		
8 x 2 = 16	8 x 3 = 24	8 x 4 = 32	8 x 5 = 40	8 x 6 = 48	8 x 7 = 56	8 x 8 = 64	
9 x 2 = 18	9 x 3 = 27	9 x 4 = 36	9 x 5 = 45	9 x 6 = 54	9 x 7 = 63	9 x 8 = 72	9 x 9 = 81