Maths Vision

At St Mary's, our vision is 'Enjoy, Explore, Excel together; be amazing.' Therefore, we aim for our children to enjoy their mathematics learning, have the opportunity to explore mathematical concepts with a natural curiosity and achieve their very best.

Our teaching follows the National Curriculum with these aims:

- 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
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof 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

We are on an exciting journey of embedding teaching for mastery to ensure that children of all ages are acquiring a deep, long-term, secure and adaptable understanding of the subject. Our approach is framed around the Five Big Ideas (NCETM) which underpin teaching for mastery. The children are taught through whole-class interactive teaching where the focus is on all children working together on the same lesson content at the same time, as happens in Shanghai and several other regions that teach maths successfully. This means that the children are on a journey together, allowing no child to be left behind, by following a small step sequence which is reviewed daily to respond to the needs of the children. Small group interventions-with the use of Number Stacks- are used to build in smaller steps to minimise the risk of any child falling behind to ensure that misconceptions are overcome and gaps are closed. This enables the children to be ready to progress onto the next concept.

Five Big Ideas in Teaching for Mastery:

Coherence

Lessons are broken down into small connected steps that gradually unfold the concept, providing access for all children and leading to a generalisation of the concept and the ability to apply the concept to a range of contexts.

Representation and Structure

Representations used in lessons expose the mathematical structure being taught, the aim being that students can do the maths without recourse to the representation

Mathematical Thinking

If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student: thought about, reasoned with and discussed with others

Fluency

Quick and efficient recall of facts and procedures and the flexibility to move between different contexts and representations of mathematics

Variation

Variation is twofold. It is firstly about how the teacher represents the concept being taught, often in more than one way, to draw attention to critical aspects, and to develop deep and holistic understanding. It is also about the sequencing of the episodes, activities and exercises used within a lesson and follow up practice, paying attention to what is kept the same and what changes, to connect the mathematics and draw attention to mathematical relationships and structure.

The Five Big Ideas were first published by the NCETM in 2017 - https://www.ncetm.org.uk/teaching-for-mastery/mastery-explained/five-big-ideas-in-teaching-for-mastery/

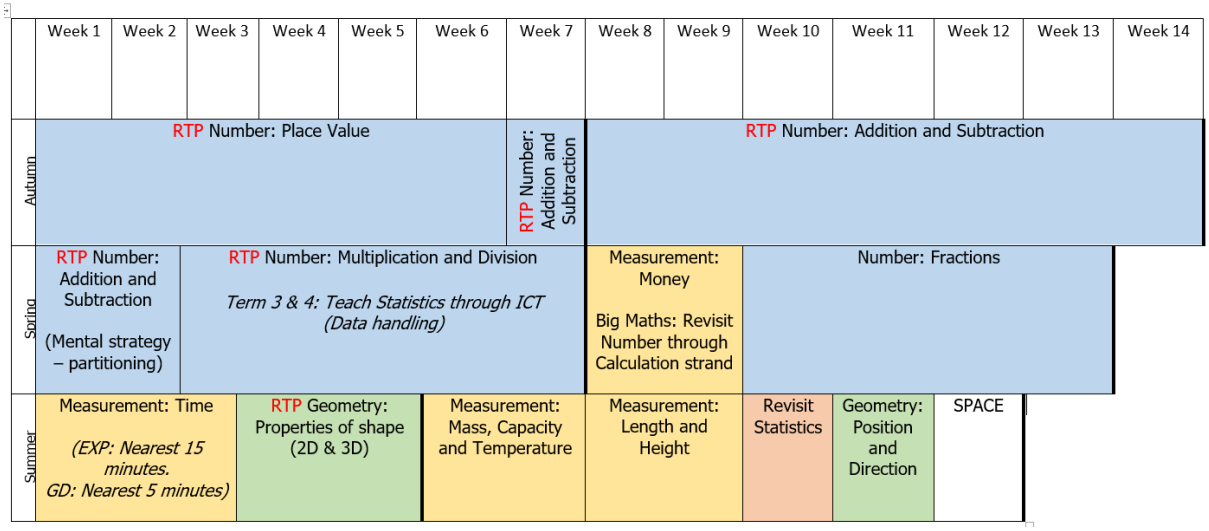
What does 'Coherence' look like at St Mary's?

Yearly overview

At the start of an academic year, teachers map out a yearly overview for maths by using White Rose, NCETM Curriculum Prioritisation and the DfE Ready-to-Progress Guidance. The Ready-to-Progress Guidance can be used to ensure that the most important elements that underpin the curriculum are covered at the right time, and to ensure that there is continuity and consistency for pupils as they progress from one year group to the next. Teachers can use the guidance to inform decisions on how much teaching time to set aside for the different parts of the curriculum.

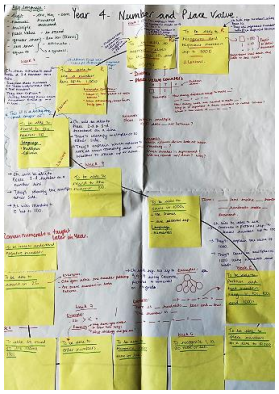
S planning

Prior to a block of learning, S planning is used to think deeply about the small steps needed to be taken ('the journey') to enable all pupils to succeed and meet the year group objectives. It is used as



a professional development opportunity by exploring recommended resources to further enhance teachers' subject knowledge and understanding of ways of teaching concepts. S planning can be approached in the following way:

- Identifying the White Rose Small steps
- Incorporating the NCETM ready to progress documents within the small steps
- Ensuring all staff have an awareness of where the learning has come from and where it is going using our unit progression document.



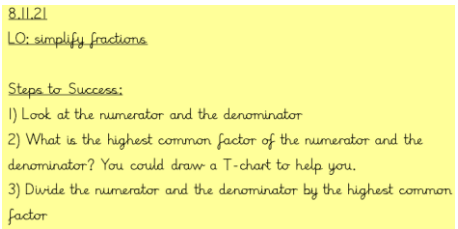
- Staff to identify potential misconceptions which may occur (Misconceptions within key objectives document)
- Consider where to implement CPA (Concrete, Pictorial and Abstract) elements using the calculation progressions
- Implement generalisations (Progression in mathematical vocabulary NCETM document)
- Implement stem sentences to guide mastery with concepts (https://staloysius.co.uk/wp-content/uploads/2024/11/Number-addition-and-subtraction-stem-sentences.pdf)

Assessment (to aid S planning)

At the end of a block of learning, we use the RTP (Ready to Progress) assessments to gauge where the children are with their learning and identify gaps in learning to continue with or add into flashbacks. Three times a year we use the NfER year group assessments for an Autumn, Spring and Summer data drop. This will inform future planning and intervention needed.

Lesson sequence

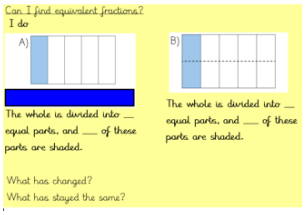
Steps to success:

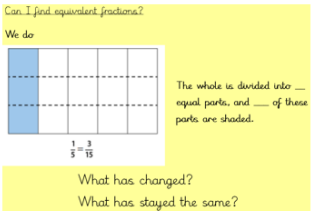

8.11.21
LO: simplify fractions

Steps to Success:
1) Look at the numerator and the denominator
2) What is the highest common factor of the numerator and the denominator? You could draw a T-chart to help you.
3) Divide the numerator and the denominator by the highest common factor

Review:

Explore/ I do-we do-you do:



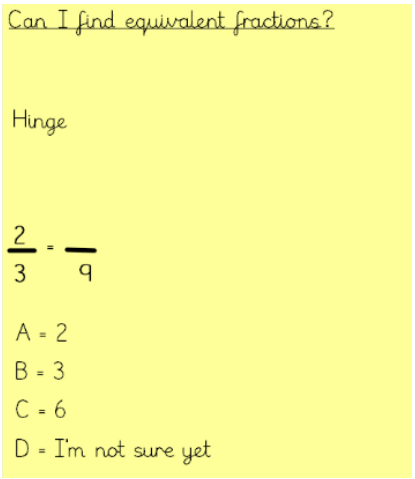


During the explore phase, a concept is broken down into small connected steps with variation included to deepen the children's understanding. The role of the adult is to facilitate mathematical discussion, rather than lead it. The aim of this approach is to ensure that the learning is in the children's hands to promote deep thinking with a goal to achieve concepts embedded in their long-

term memory. There is a real emphasis on the answer being just the beginning so that the children are constantly given the opportunity to develop their verbal and written reasoning skills. Stem sentences and generalisations are used throughout daily maths lessons with an aim that the language focus is understood deeply, not just passively received. This means the language focus is thought about, reasoned with and discussed with others. We have a culture of encouraging the children to ask questions and to not worry if they get things wrong as we all learn from mistakes. Therefore, we aim for mathematical discussion to always be present in the classroom, including when the children are working independently, showing that they are 'being amazing' in maths.

Hinge question:

After the explore phase, a hinge question is used to assess what the children know and identify any misconceptions - this informs what happens next in terms of starting points and the focus of teacher and TA support. The hinge question should involve multiple choice with some responses including misconceptions and an 'I'm not sure yet…' as option D.



Worksheets

Step 1/Fluency – Trying the skill with a scaffold provided e.g. pictorial representation

Step 2/Reasoning – Deepening understanding of the skill, becoming more flexible and fluid through variation and the scaffold removed

Step 3/Problem Solving: Application in a reasoning and problem-solving context

Can I multiply 3 digit by 1?

- Start on the right.
- Multiply each digit by the 1-digit number.
- Carry any extra tens to the next column.
- Check your answer when you're finished.

Fluency

2 × 315 =

4 × 206 =

6 × 111 =

7 × 203 =

8 × 145 =

9 × 321 =

4 × 278 =

3 × 456 =

Reasoning

5) Ben says:

"If I multiply 305 by 7, the answer must end in 5 because 305 ends in 5."

Is this correct?

6) A library shelf holds **128 books**. There are **6 shelves** with the same number of books.

How many books are there altogether?

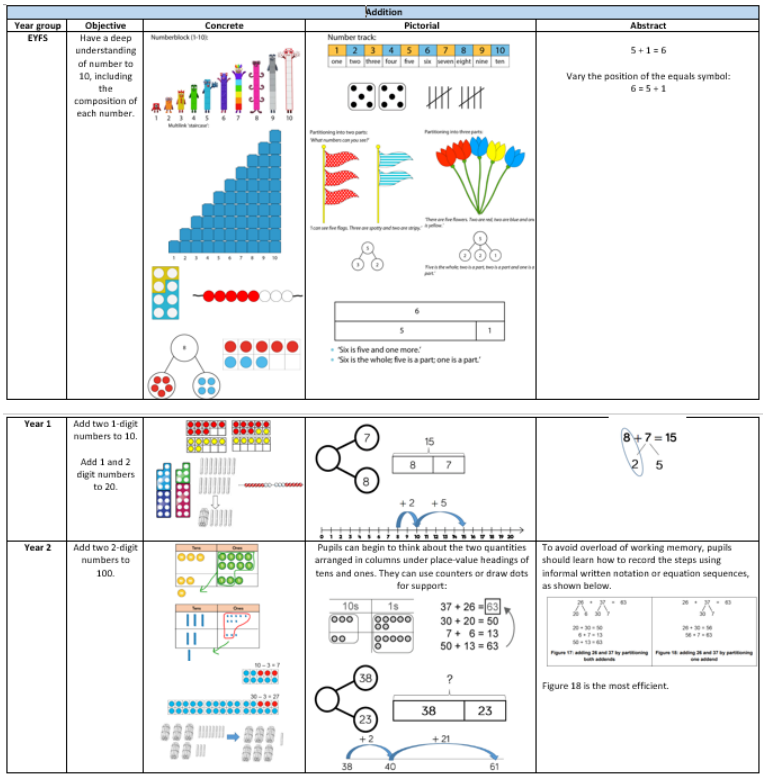
7) A pupil worked out:

314 × 3 = 912

Do you agree? If not, find and explain the mistake.

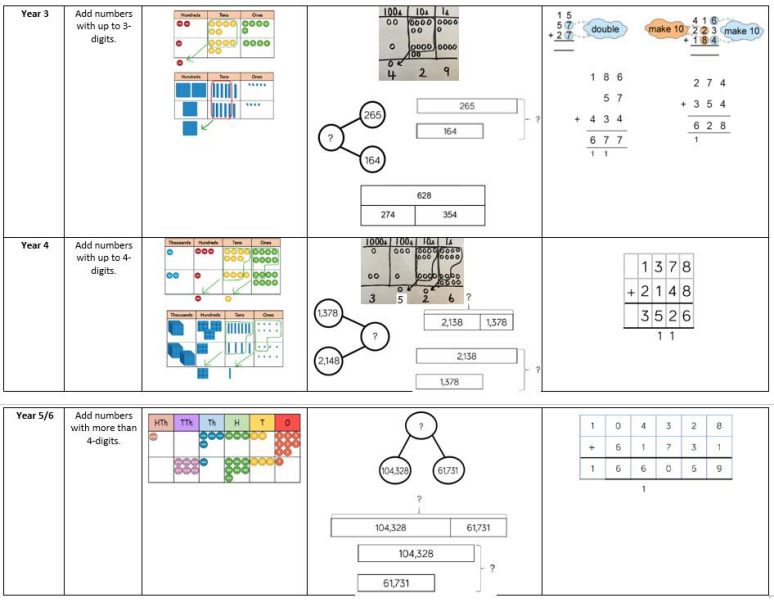
8) Amira has **248 stickers** in one album. She has **4 albums** with the same number of stickers in each.

How many stickers does Amira have altogether?



What does 'Representation and Structure' look like within our partnership?

Please see our calculation policy for Addition, Subtraction, Multiplication and Division which shows the progression from concrete – pictorial – abstract (EYFS-Year 6). Here is a snapshot of Addition:



What does 'Mathematical Thinking' look like at St Mary's?

The NCETM describes **Mathematical Thinking** as one of the **Five Big Ideas** in Teaching for Mastery. It is about pupils actively engaging with mathematics by looking for patterns, making connections, reasoning, conjecturing and generalising, rather than simply following procedures.

The NCETM says:

> "If taught ideas are to be understood deeply, they must not merely be passively received but must be worked on by the student thought about, reasoned with and discussed with others."

- NCETM teaching for mastery questions, tasks and activities
- I see reasoning LKS2 and UKS2
- NCETM reasoning progression document
- NRICH maths

Mathematical vocabulary, stem sentences and generalisations

We expect children to use correct mathematical terminology and to express their reasoning in complete sentences.

The quality of children's mathematical reasoning and conceptual understanding is significantly enhanced if they are consistently expected to use correct mathematical terminology (e.g. saying 'digit' rather than 'number') and to explain their mathematical thinking in complete sentences.

I say, you say, we all say is a technique which enables the teacher to provide a sentence stem for children to communicate their ideas with mathematical precision and clarity. These sentence structures often express key conceptual ideas or generalities and provide a framework to embed conceptual knowledge and build understanding.

For example: '*If the rectangle is the whole, the shaded part is one third of the whole*'.

Having modelled the sentence, the teacher then asks individual children to repeat this, before asking the whole class to chorus chant the sentence. This provides children with a valuable sentence for talking about fractions. Repeated use helps to embed key conceptual knowledge.

Another example is where children fill in the missing parts of a sentence; varying the parts but keeping the sentence stem the same. For example:

There are 12 **stars**. $\frac{1}{3}$ of the **stars** is equal to **4 stars**

Children use the same sentence stem to express other relationships. For example:

There are 12 **stars**. $\frac{1}{4}$ of the **stars** is equal to **3 stars**

There are 12 **stars**. $\frac{1}{2}$ of the **stars** is equal to **6 stars**

When talking about fractions it is important to make reference to the whole and the part of the whole in the same sentence. The above examples help children to get into the habit of doing so. Another example is where a mathematical generalisation or 'rule' emerges within a lesson.

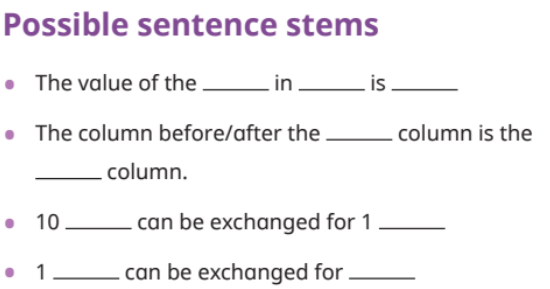
For example: *'When adding 10 to a number, the ones digit stays the same.'*

This is repeated in chorus using the same sentence which helps to embed the concept.

Source: https://www.ncetm.org.uk/media/k20boquz/ncetm-calculation-guidance-october-2015.pdf

Please access the following recommended resources/links to gain an understanding of mathematical vocabulary, stem sentences and generalisations used within each block of learning:

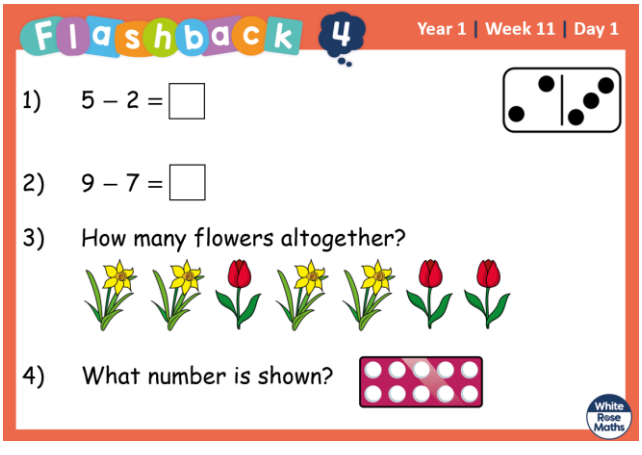
- NCETM Professional Development Materials - https://www.ncetm.org.uk/teaching-for-mastery/mastery-materials/primary-mastery-professional-development/
- Enigma Maths Hub Stem Sentence Banks (Number, Addition and Subtraction/ Multiplication and Division/ Fractions) - https://enigmamathshub.co.uk/primary-tfm-in-practice/
- Ready-to-Progress Guidance 'Language Focus' - https://www.gov.uk/government/publications/teaching-mathematics-in-primary-schools
- NCETM Curriculum Glossary - https://www.ncetm.org.uk/media/hpihrj3s/national-curriculum-glossary.pdf
- New White Rose Scheme of Learning. For example:

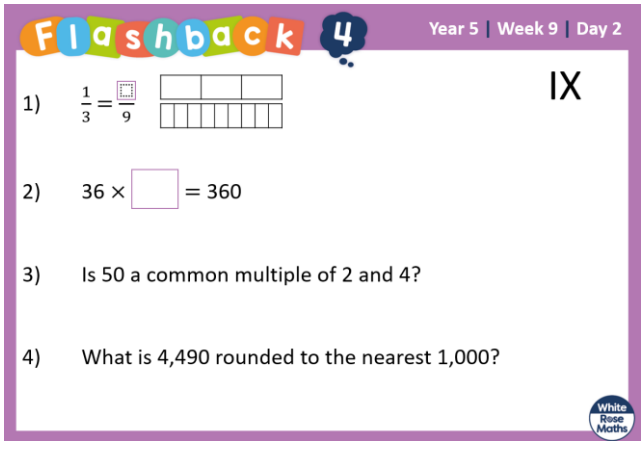


What does 'Fluency' look like?

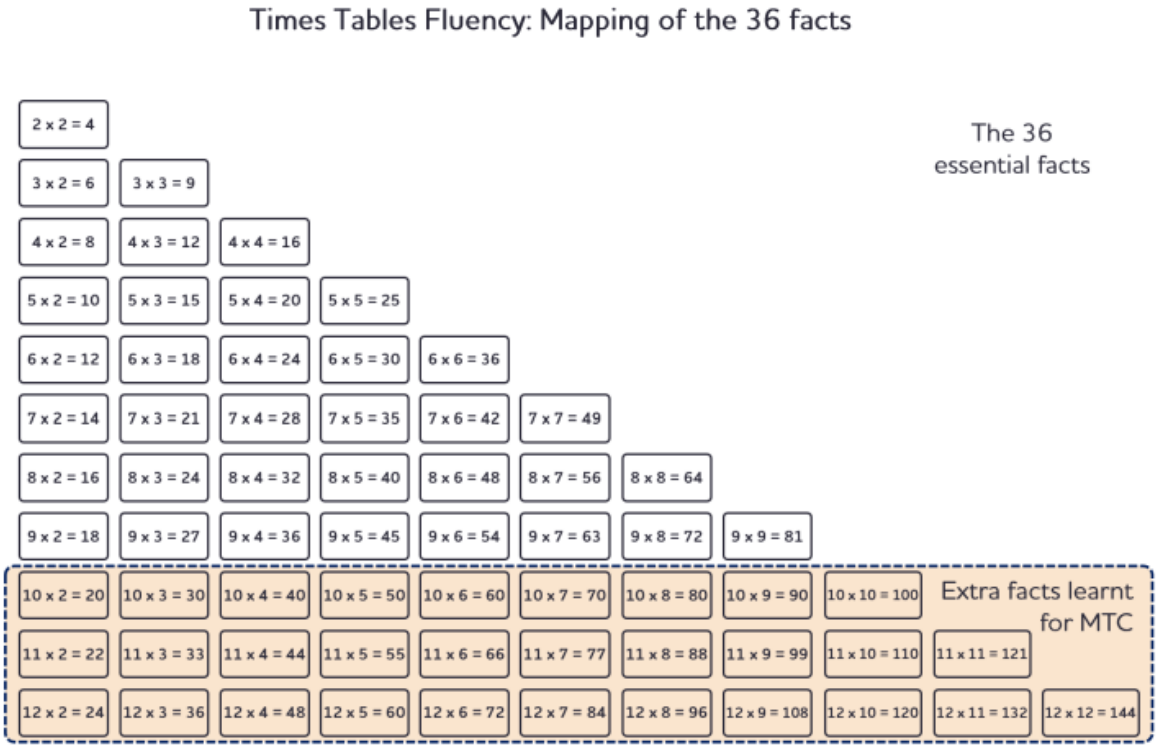
Flashback 4

Each maths lesson at St Mary's, the children engage with Flashback 4 (White Rose or teacher made) which consists of a series of quick questions, covering something from the previous lesson, last week and topics from earlier in the year – maybe even last year! The reason for this is to ensure essential skills are regularly revisited and retrieved to strengthen retention.





Times Tables



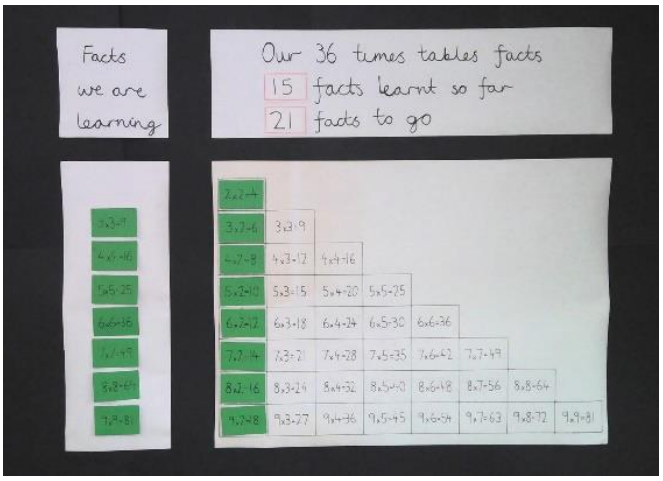
Rather than memorising all 144 multiplication facts individually, pupils learn 36 key facts and use commutativity, inverse relationships and known patterns to derive the remaining facts. Daily retrieval practice develops automaticity and supports success in the Year 4 Multiplication Tables Check.

These are the 36 essential facts children need to know. The 36 facts have been selected because all remaining multiplication facts can be derived using commutativity, doubling or known relationships.

Learn a fact a day and its related facts

7 x 4 = 28	28 ÷ 4 = 7
4 x 7 = 28	28 ÷ 7 = 4

	Autumn 1	Autumn2	Spring1	Spring2	Summer1	Summer2
	2x2	5x3	4x3	6x4	1x11	1x12
	2x3	5x4	6x3	7x4	2x11	2x12
	2x4	5x6	7x3	8x4	3x11	3x12
	2x5	5x7	8x3	9x4	4x11	4x12
	2x6	5x8	9x3		5x11	5x12
	2x7	5x9		6x6	6x11	6x12
	2x8			7x6	7x11	7x12
	2x9			8x6	8x11	8x12
				9x6	9x11	9x12
	3x3				10x11	10x12
	4x4			8x7		
	5x5			9x7	10x10	
				9x8	11x11	
	1x10				12x12	
	2x10					
	3x10			7x7		
	4x10			8x8		
	5x10			9x9		
	6x10					
	7x10					
	8x10					
	9x10					



Each day, one focus multiplication fact is introduced alongside its commutative and inverse relationships. This fact remains visible in the classroom and is revisited regularly through flashback activities to support retention.

Children complete the **Ashley Down Times Tables Booklets** daily. During marking, pupils recall the facts aloud as part of their daily rehearsal. Children are given **two minutes** to complete the activity and may refer to the facts displayed on the front page. This consistent practice helps to build fluency, accuracy, and confidence over time.

Pupils also practise using **TT Rock Stars** each day during an allocated slot (for example, bell work, after lunch, or before the end of the day). This practice is complemented by activities such as **step counting** and **Funky Maths cards**, ensuring that a range of learning styles are supported and all pupils can engage successfully.

Rationale for the Order of Multiplication Facts

The sequence of multiplication facts has been designed to support a mastery approach by building from known patterns and relationships towards increasingly complex facts. Rather than teaching tables in isolation, pupils learn facts in an order that enables them to derive new knowledge from previously secured understanding.

The sequence begins with the ×2 facts because these are closely linked to doubling and are typically the easiest for pupils to visualise and recall. Early introduction of key square numbers (3×3, 4×4 and 5×5) provides memorable anchor facts that can later support related calculations. The ×10 facts are introduced early because they reinforce place value understanding and provide pupils with immediate success.

The ×5 facts follow due to their strong pattern and their links with counting in fives and knowledge of time. Once these foundational patterns are secure, pupils progress to the ×3 facts and then the ×4 facts, with ×4 facts supported by pupils' understanding of doubling twice.

More complex facts are deliberately delayed until pupils have sufficient prior knowledge to derive them efficiently. The ×6 facts build upon previously learned ×3 facts, while square numbers such as 6×6, 7×7, 8×8 and 9×9 provide further anchor points for recall. Difficult facts involving 7, 8 and 9 are introduced later, when pupils are more fluent and can use known relationships and derived fact strategies.

The ×11 and ×12 facts are taught towards the end of the sequence because they rely on secure understanding of earlier multiplication patterns. By this stage, pupils are able to make connections between known facts and apply efficient strategies to support recall.

This progression ensures that pupils experience early success, reduce cognitive overload and develop fluency through connections rather than memorisation alone. The order reflects the principles of mastery, enabling pupils to use known facts to derive unknown facts and build a secure foundation for later mathematical learning.

What does 'Variation' look like at St Mary's?

Our aim is to support children in becoming mathematically observant.

Conceptual variation

As a teacher you need to be clear about:

- varying the representation to extract the essence of the concept
- supporting the generalisation of a concept, to recognise it in any context
- drawing out the structure of a concept – what it is and what it isn't.

Procedural variation

As a teacher are you providing the opportunity:

- for practice (intelligent rather than mechanical)
- to focus on relationships, not just the procedure
- to make connections between problems
- to use one problem to work out the next
- to create other examples of their own.

The questions that are asked are important, as they develop mathematical thinking.

Please see how variation can be included by looking at the flipchart and worksheet examples within the 'Lesson sequence' section.