Mathematics

Southville Primary School

Intent

At Southville Primary School, the aims of our mathematics teaching align with those of the National Curriculum. We strive to help children make meaningful connections between mathematical procedures and concepts, fostering fluency, mathematical reasoning, and problem-solving skills not only in maths lessons but also across other areas of the curriculum. Our aim is for:

- Every child and every adult to get excited about maths
- Children to see evidence of maths happening in every aspect of their lives
- Children to share observations, spot patterns, explore changes, and investigate whether things are always, never or sometimes true.
- Children to ask questions, reason, develop fluency and have a full toolkit of ways to approach problems.

Growth Mindset:

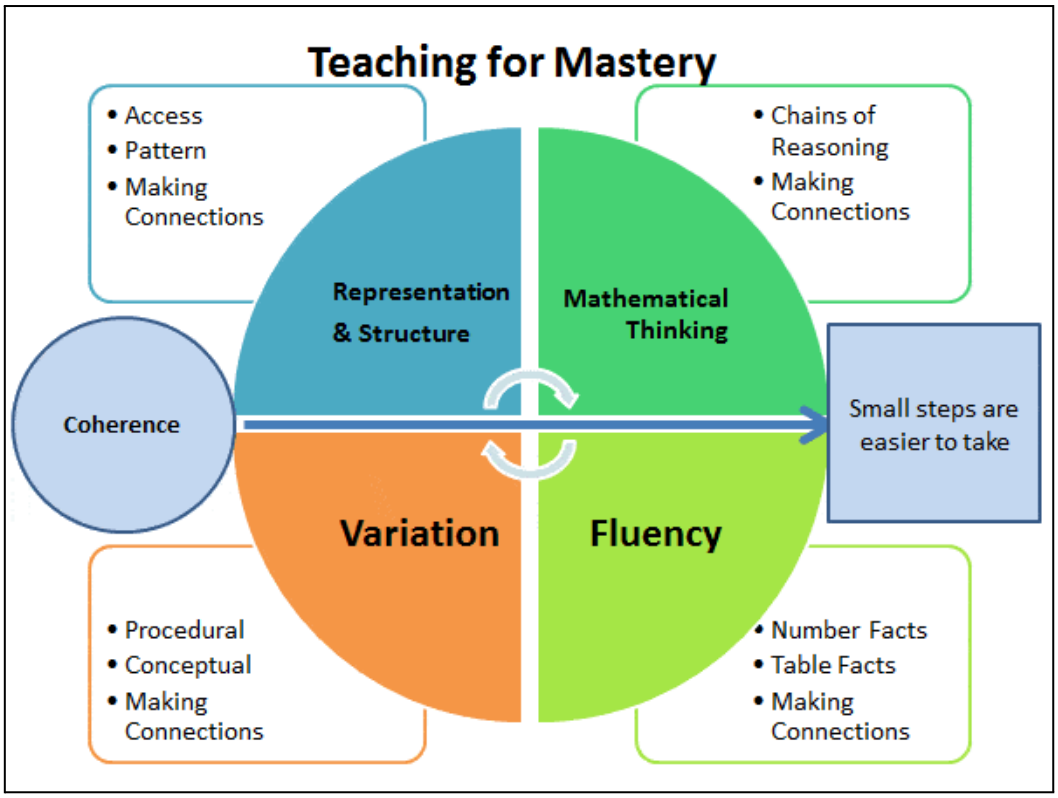
We encourage children to believe in their ability to learn and succeed in mathematics, emphasizing that with adequate time, quality teaching, the right resources, and dedicated effort, every child can progress.

- Everyone can make progress in Maths if they work hard
- Mistakes are valuable if we learn from them and support others ("Good mistakes")
- Asking questions is important (especially when unsure)
- Depth of understanding is more important than speed and providing quick answers
- Children are working towards their own goals and personal bests

Key Principles

Certain principles and features of a mastery approach have been adopted:

- The large majority of pupils will progress through the curriculum content at the same pace.
- Teachers are encouraged to spend longer in class on a small number of fundamental maths topics, going into much more detail and depth. Teaching is focused, rigorous and thorough, to ensure that learning is sufficiently embedded and sustainable over time.
- Teaching is underpinned by careful curriculum design with key concepts revisited and interlinked with one another.
- Lessons follow a gradual step-by-step teaching approach whereby the use of varied visual representations, carefully chosen resources, language structures and use of mathematical vocabulary foster deep conceptual and procedural knowledge.
- Tasks are varied to challenge those with secure understanding; we do not accelerate children on to new content or areas of learning.
- Teachers expect and support precise explanations and reasoning from children, when appropriate using sentence stems and worked examples to help them.
- Practice and consolidation play a central role. Carefully designed variation within this builds fluency and understanding of underlying mathematical concepts.
- Teachers plan questions carefully to test children's conceptual understanding, and assess pupils regularly to identify those requiring further support.
- Number facts and calculation strategies are consistently practiced to develop fluency, allowing children to free up their working memory and concentrate on more complex areas of mathematics.



Schemes of Work

White Rose

We use the White Rose Medium term yearly planner, along with the small steps and key questions within units, as a basis for planning. The planning carefully sequences knowledge, concepts and procedures to build mathematical knowledge and skills systematically. There is flexibility in the planning so that teachers can address identified gaps in children' s mathematical knowledge that hinder their capacity to learn and apply new content, e.g. teachers may extend a unit of work if the children have not consolidated their knowledge and embed and revisit key units throughout the year. Teachers refer to the ready-to-progress criteria to further support their planning.

Number Sense

We use the Number Sense Early Years Programme in Reception and the Number Facts Fluency Programme from Year 1 to Year 3. They are fully resourced schemes of work focused on number facts teaching. The systematic and structured programme ensures children develop visual models of number, a deep understanding of number and number relationships, and fluency in addition and subtraction facts. There is a daily 15-minute session which builds pupils' fluency with essential number facts through a carefully sequenced approach. Activities are interactive and progressive, enabling children to internalize key concepts and apply them flexibly in calculations. The approach emphasizes developing accuracy, automaticity, and confidence, ensuring a strong foundation for future mathematical learning and problem-solving.

Additional Resources

To supplement the schemes of work, we use the "Deepening Understanding" planning resource, particularly for providing consolidation, retrieval and challenge tasks that support the main learning. Websites like NRICH are used to find open-ended tasks that promote maths talk, reasoning, and problem-solving. Teachers also use 'Check its', 'Test its', and 'Think its' to extend, consolidate, and challenge understanding. NCETM Mastery resources provide questions, tasks, and practical activities to support teaching and assessment.

Medium Term Planning

Key Planning Questions:

Choosing your Topic / Unit:

- Does it link to your last unit or a prior unit? Identify transferable knowledge and explain how it will be used.
- What key questions should children answer by the end of the unit? Use this to shape your planning.

Identifying Prior Knowledge:

- Have you assessed what children already know?
- Do they have the prerequisite skills and understanding to begin the unit?
- What activities or teaching can support gaps before starting?

Key Concepts and Connections:

- What are the key steps in understanding, and how will you order them?
- How will you connect these steps to prior learning?

Challenging Points:

- What are common misconceptions or difficult concepts to teach and difficult to learn?
- How can you make these clearer (e.g., resources, support, or language)?

Language:

- What key vocabulary or stem sentences do children need to understand, use and repeat?
- Can you use visuals or actions to support memory (dual coding)?
- Are you clearly modelling at all stages of the lesson (start, mini-plenaries, plenary)?

Representations:

- Which models, images, or contexts will support understanding?
- How will children represent their thinking for assessment?

Variation:

- Have children secured the key knowledge to apply it flexibly across procedural and conceptual variations?
- How can variation deepen understanding and expose misconceptions?
- What should be varied — numbers, representations, or connected skills — to ensure clarity and depth?

Problem Solving:

- Are there opportunities for mathematical thinking (specialising, generalising, speculating, reflecting)?
- Can children apply their knowledge to different contexts?

Moving on:

- Have you assessed children's understanding and reassessed to confirm security?
- Have all children met your pre-determined threshold?
- What happens for those who haven't consolidated learning?
- How will you revisit and reassess concepts to ensure retention?
- Have you planned spaced retrieval activities to reinforce knowledge throughout the year?
- How will you link the current unit to the next with a clear focus on transferable knowledge?

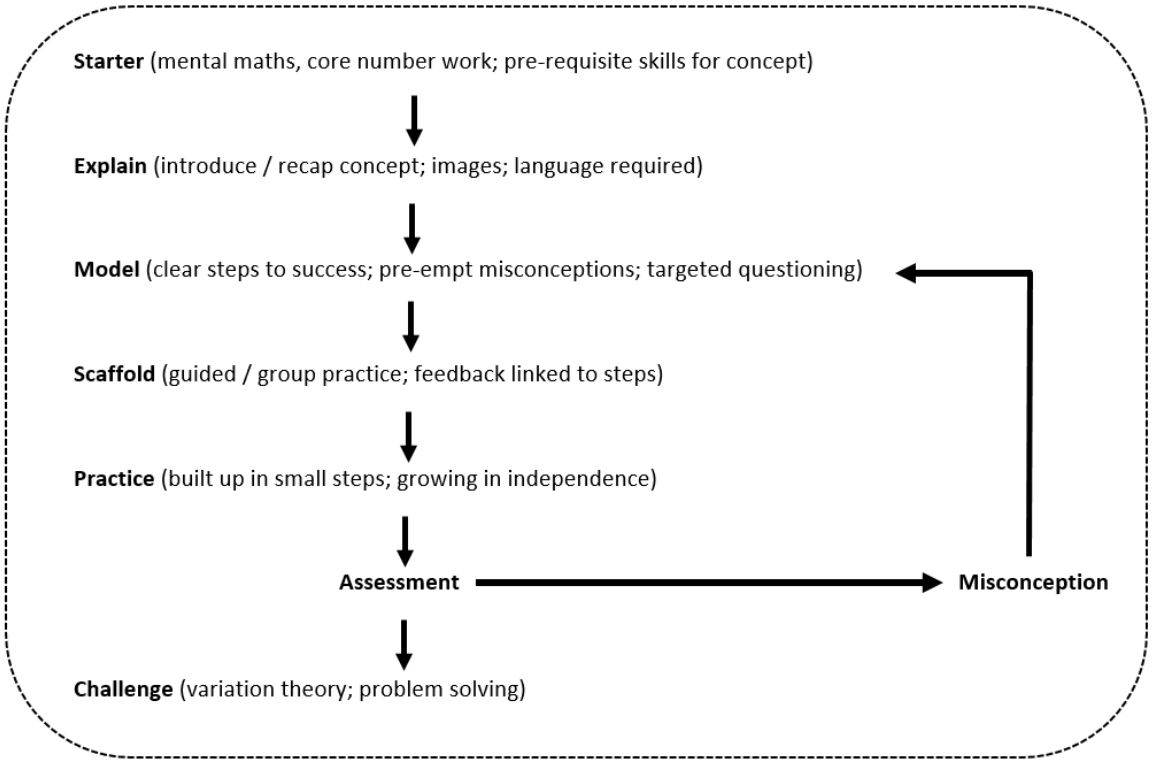
Lesson Design

Practice-Apply-Deepen (PAD):

Teachers use the PAD approach (Practice, Apply, Deepen) to ensure structured progression in learning. This method may be applied across a unit or within individual lessons and is designed to develop children' s reasoning and problem-solving skills while ensuring mastery of basic concepts. Teachers assess if a child needs to consolidate their understanding before progressing.

- **Practice**: This stage focuses on the explicit teaching of a new calculation method, skill, or concept. Children are given time and opportunities to practice, reinforcing their understanding. This aligns with the fluency aspect of White Rose planning. Children need to be secure in their understanding before moving on
- **Apply**: Building on basic skills, this stage encourages children to explore the concept in different contexts, such as solving puzzles, identifying differences, or explaining their reasoning using mathematical language. This links to the reasoning aspect of White Rose planning.
- **Deepen**: This stage often addresses misconceptions or presents complex scenarios that require multiple approaches. It encourages students to think independently, articulate their reasoning clearly, and solve problems. This links to the problem-solving aspect of White Rose planning and incorporates variation theory to challenge students further.

Basic Lesson Design:

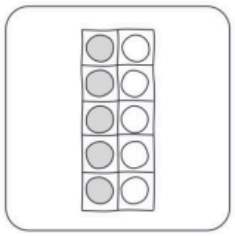
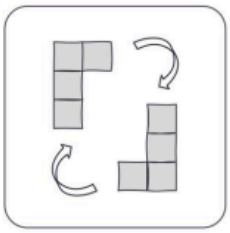


Number Sense - EYFS

We use the **Early Years Number Sense** programme to develop a deep understanding of quantities up to ten, starting with the innate ability to visually process small quantities. Key aspects of the programme include:

- **Subitising and Manipulating Numbers**: Children begin by developing subitising skills (recognizing small quantities without counting), and then progress to partitioning and manipulating numbers to 10, helping them understand the different properties of numbers.
- **Visuospatial Approach**: The programme uses visual and spatial methods to help children see and arrange quantities in various ways, supporting the development of both number sense and spatial awareness.
- **Promotes Talk and Reasoning**: The programme encourages mathematical discussions through animations and prompts, supporting children to talk about numbers and reasoning in class.
- **Systematic and Structured**: The programme follows a coherent teaching sequence, providing a structured resource for teaching number concepts and integrating well with existing curricula.
- **Linked to the Statutory Framework**: The programme aligns with the Early Years Foundation Stage (EYFS) framework, covering key elements related to number and numerical patterns, with guidance to assess the Early Learning Goals for Number and Numerical Patterns.

The programme is focused on developing the following three mathematical skills and dispositions:

	Subitising, partitioning and a deep understanding of quantities to 10	From the statutory framework for the early years foundation stage: *"Children should be able to count confidently, develop a deep understanding of the numbers to 10, the relationships between them and the patterns within those numbers"*
	Spatial awareness	From the statutory framework for the early years foundation stage: *"It is important that the curriculum includes rich opportunities for children to develop their spatial reasoning skills"*
	Positive attitudes	From the statutory framework for the early years foundation stage: *"It is important that children develop positive attitudes and interests in mathematics, look for patterns and relationships, spot connections, 'have a go', talk to adults and peers about what they notice and not be afraid to make mistakes."*

Shape and **Space** content is taught through **White Rose** resources, which offer a practical, concrete, and visual approach. This method supports children in understanding geometry through hands-on activities, helping them make connections between shapes, space, and their real-world experiences.

Throughout all of our maths provision, we emphasise the importance of consolidating learning through **continuous play**, both inside and outside the classroom. Play-based activities allow children to apply and explore mathematical concepts in practical, meaningful ways, enhancing their understanding through exploration and discovery.

Number Sense - Number Facts (KS1)

To calculate Number Bonds to 20 in Year 1 to Year 3, we use the Number Sense Maths Programme. These strategies are taught as part of a 15-minute daily session, normally before the main maths sessions starts.

The programme teaches a defined set of addition and subtraction facts and calculation strategies systematically, ensuring nothing is left to chance. It places a strong emphasis on part-part-whole models and additive relationships, promoting flexibility and fluidity between addition and subtraction. The focus is on building rapid recall of both known and derived facts, moving beyond counting.

Structured in six stages, the programme is broken down into smaller teaching steps with accompanying resources. These resources include teaching points, classroom activities, animations to develop number sense, and progressively challenging exercises with scaffolding for children, along with guidance for teachers and parents. Stages 1-4 are taught in Reception and Year 1, while stages 5 and 6 are covered in Year 2, with consolidation in Year 3 at the start of the year.

Addition Grid Facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0+0	0+1	0+2	0+3	0+4	0+5	0+6	0+7	0+8	0+9	0+10
1	1+0	1+1	1+2	1+3	1+4	1+5	1+6	1+7	1+8	1+9	1+10
2	2+0	2+1	2+2	2+3	2+4	2+5	2+6	2+7	2+8	2+9	2+10
3	3+0	3+1	3+2	3+3	3+4	3+5	3+6	3+7	3+8	3+9	3+10
4	4+0	4+1	4+2	4+3	4+4	4+5	4+6	4+7	4+8	4+9	4+10
5	5+0	5+1	5+2	5+3	5+4	5+5	5+6	5+7	5+8	5+9	5+10
6	6+0	6+1	6+2	6+3	6+4	6+5	6+6	6+7	6+8	6+9	6+10
7	7+0	7+1	7+2	7+3	7+4	7+5	7+6	7+7	7+8	7+9	7+10
8	8+0	8+1	8+2	8+3	8+4	8+5	8+6	8+7	8+8	8+9	8+10
9	9+0	9+1	9+2	9+3	9+4	9+5	9+6	9+7	9+8	9+9	9+10
10	10+0	10+1	10+2	10+3	10+4	10+5	10+6	10+7	10+8	10+9	10+10

Subtraction Grid Facts

+	0	1	2	3	4	5	6	7	8	9	10
0	0−0										
1	1−0	1−1									
2	2−0	2−1	2−2								
3	3−0	3−1	3−2	3−3							
4	4−0	4−1	4−2	4−3	4−4						
5	5−0	5−1	5−2	5−3	5−4	5−5					
6	6−0	6−1	6−2	6−3	6−4	6−5	6−6				
7	7−0	7−1	7−2	7−3	7−4	7−5	7−6	7−7			
8	8−0	8−1	8−2	8−3	8−4	8−5	8−6	8−7	8−8		
9	9−0	9−1	9−2	9−3	9−4	9−5	9−6	9−7	9−8	9−9	
10	10−0	10−1	10−2	10−3	10−4	10−5	10−6	10−7	10−8	10−9	10−10
11		11−1	11−2	11−3	11−4	11−5	11−6	11−7	11−8	11−9	11−10
12			12−2	12−3	12−4	12−5	12−6	12−7	12−8	12−9	12−10
13				13−3	13−4	13−5	13−6	13−7	13−8	13−9	13−10
14					14−4	14−5	14−6	14−7	14−8	14−9	14−10
15						11−5	15−6	15−7	15−8	15−9	15−10
16							16−6	16−7	16−8	16−9	16−10
17								17−7	17−8	17−9	17−10
18									18−8	18−9	18−10
19										19−9	19−10
20											20−10

Calculation Strategies

Daily 10 (KS2)

The "Daily 10" is grounded in research on **retrieval practice, spaced practice, and interleaved practice**, which are essential for strengthening long-term retention and building fluency. Regularly revisiting key knowledge helps learning "stick" and supports automaticity in arithmetic.

It is a focused 15-minute maths session delivered from part way through Years 3 to 6 to improve fluency, speed, and accuracy in arithmetic.

Each week, a set of 10 question types are selected and kept consistent, with slight variations such as changing digits or numbers. The goal is to consolidate previously learned concepts, ensuring children practice and embed their knowledge. The majority of the questions are revisited regularly, with Monday focusing on explicit instruction and the rest of the week on practice and feedback.

Questions may evolve in complexity over the week, ensuring children feel confident before tackling more challenging problems. Teachers are encouraged to adjust questions based on children's needs and ensure that all children — including lower-attaining and less confident learners — experience success. Resources such as our school question bank help guide the selection of questions.

The overall focus is on ensuring retention and making learning "stick" in long-term memory, with additional challenge for those who need it.

Daily 10

	Question
1	____ = 3.4 + 7
2	¼ + ¾ = ____
3	⅙ of 72 = ____
4	____ = 9,999 + 10
5	68.2 ÷ 100 = ____
6	2.357 + 4.078 = ____
7	____ = 1,540 ÷ 5
8	____ = 9/10 - ⅕
9	253 ÷ 1 = ____
10	____ x 46=1702

How We Support Learning and Memory

Interleaving:

- We mix practice of different but connected skills, such as multiplication and division, to help children identify and apply the right strategies.
- This approach strengthens understanding by building connections between related topics.

Retrieval Practice:

- We encourage children to recall information purely from memory to embed knowledge deeply and aim for automaticity with key facts like number bonds and times tables.

Mental Maths Strategies:

- We focus on developing quick and accurate recall of key facts (e.g., times tables, number bonds, doubles). These skills help children make connections and solve problems effectively.

Use of Visual Representations:

- We carefully select visual images (e.g. part-whole models, number lines, bar models) to expose mathematical concepts clearly.

Spaced Practice:

- We revisit learning regularly, using tools like White Rose "Flashback 4" tasks and arithmetic-focused "Do Now" activities, to reinforce retention and reduce forgetting.

Pre-Requisite Skills and Knowledge:

- We ensure children have the foundational skills and knowledge they need to access new concepts by addressing gaps before introducing new learning.

Intelligent Practice:

- Our tasks are carefully designed and sequenced with purposeful variation to highlight underlying mathematical structures and deepen understanding.

Calculation Policy

We use the White Rose Calculation policy (addition and subtraction & multiplication and division) which aligns with planning. It is structured around the concrete – pictorial –abstract approach, providing opportunities throughout for using mathematical vocabulary, developing mathematical thinking and using multiple representations. This is reflected in the school's calculation policy. Children learn through active, practical enquiry and experiment using concrete materials, represent their mathematical ideas through pictures and images and follow a clear progression toward recording abstractly.

Additional notes for Calculation Methods:

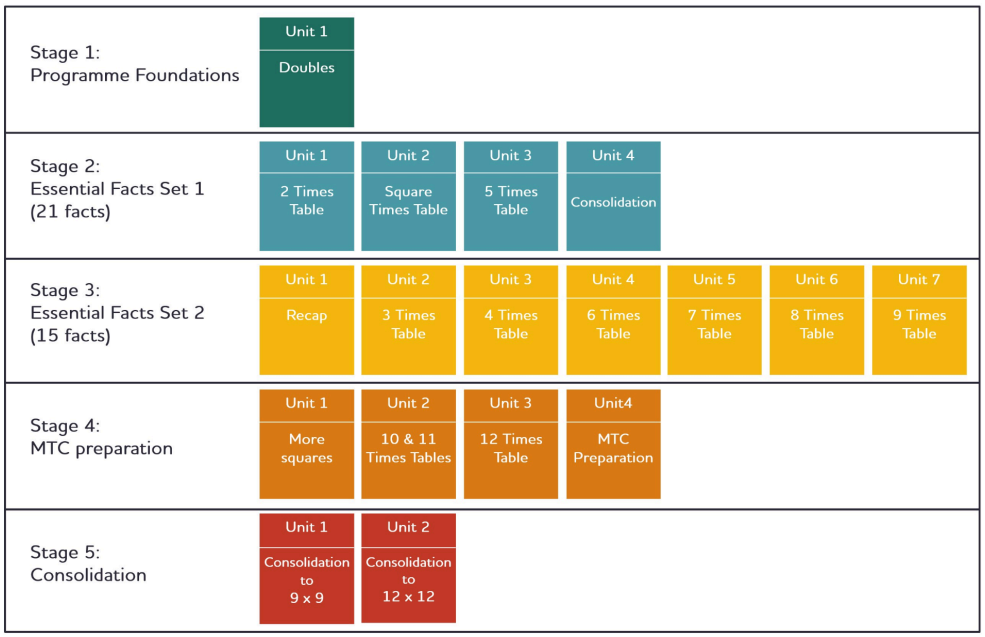
- Regular number practice is essential in creating 'automaticity' and 'arithmetical proficiency' - being able to recall as many facts as possible quickly and accurately. This is crucial as it frees up the working memory to concentrate more on the underlying concepts being taught.
- Children who make persistent mistakes should return to the method that they can use accurately until they are ready to move on.
- Teachers will discuss errors and diagnose problems then work through questions that caused difficulties step-by-step – not by simply re-teaching the method.
- Children should be encouraged to consider if a mental calculation would be appropriate before using written methods.
- All new written methods should be presented alongside the previous method and children should be encouraged to explain 'what's the same' and 'what is different'.
- Teachers will use meta-language to talk through new written methods e.g. 'if you know this, then you know this…'
- Children should be encouraged to use the correct language and explain how they have answered a question (e.g. refer to the actual value of digits).

Multiplication

Times Tables Fluency Programme:

In Years 3, 4 and 5 we adopt a research informed approach to teaching times tables based on the **Number Sense** Times Tables Fluency Programme, which is based on mastery and Shanghai models. Our aim is for all children to have a proficient and automatic recall of multiplication facts. This is important as it 'frees up' space for children to focus their brain activity on the application of the multiplication facts in different contexts, not the facts themselves.

We want multiplication facts to be learnt and stored, rather than being 'calculated' or answered by 'skip counting' (we don't want the children to think). Our aim is for all children to be able to automatically recall all multiplication facts in less than 3 seconds, particularly the 1 to 9 times tables as these are the building blocks they need in Y5 and Y6 to do any written algorithm.



Outline of Approach:

- Children learn a core set of 36 multiplication facts, with division facts and commutativity explicitly taught to reduce memory load and support efficient learning (e.g. if you know 3 × 7, you know 7 × 3).
- The learning of times tables is broken down into manageable chunks (teaching & learning a times table at a time). This is scheduled very carefully across the year – nothing is left to chance.
- Rote learning in which children learn the number facts AND a sound pattern (teachers and children learn each fact one way round, always stating the larger number first. E.g., 3x7 becomes 'Seven threes are twenty one'. This phrase is always used and repeated by the children after the teacher when going through answers).
- Little and often: a two-minute times table quiz, at least once a day.
- Booklets with questions for a quiz every day to support each times table - 40 questions in each quiz. The children have two minutes to complete the test (an average of 3 seconds per question)
- It is the teacher's job to know who is 'stuck' and find the barrier for children who aren't progressing and problem solve past the barrier

Feedback, 'Marking' and Assessment

Meaningful, manageable and motivating:

We follow the NCETM's marking guidance, which advises that "the next lesson is the next step." While there is no expectation for teachers to provide written comments or 'next steps' in books after each lesson, it should be evident in a child's book that their understanding is regularly assessed and that teaching is adapted accordingly.

Teachers assess children' s understanding and mathematical fluency during and after every lesson, determining when they are ready to move on to the next stage of learning. Teaching "with a pen in hand" allows teachers to spot mistakes in real-time and provide immediate feedback. In cases where tasks have definitive right or wrong answers, children may mark their own work to identify and correct mistakes. Daily assessments, including reviewing books, should inform the design and content of the next lesson, addressing key discussion points (misconceptions), modeling strategies effectively, and selecting tasks that either move children forward or consolidate their understanding.

Identifying Errors or 'Slips'

When teachers look at children's books, they are expected to distinguish between errors that reflect a misunderstanding, and mistakes that are simple slips.

Example	**Action**	**Feedback** or **Feedforward**
A child makes an error that the teacher distinguishes as a 'slip'. The teacher believes the child can self-correct their mistake.	The teacher draws a box / space for the child to input their new answer in a red pen. **Or** The child has another go and writes their answer next to their old one in a red pen. When appropriate, children show their working out using a red pen. In both cases, the teacher may direct the child to a model, image or a set of 'steps to success' to support them.	The teacher marks the new answer (s) **or** the teacher reads out the answer / the child goes to a marking station and the child marks their new answer. The teacher checks their new answer (s) to confirm it was a 'slip' and not a conceptual misunderstanding. The teacher may also provide a consolidation task / question(s) so the child or group of children can demonstrate secure understanding, before moving on. This is either during the lesson 'over the shoulder' or during the start of the next lesson as part of the 'Do Now' task.
A child makes an error that the teacher distinguishes as a conceptual misunderstanding.	The teacher will need to address this specific misconception individually or, if it is common, to a group or class. If possible, the teacher stops the lesson 'in the moment'. The concept or knowledge is re-taught. The teacher may need to consider the explanations, images, resources or models chosen to demonstrate the underlying concept, idea or learning point. The learning may need to be broken up into smaller chunks. **Or** The teacher amends the content of the next lesson considering the above. The teacher may need to provide extra guidance, modelling and scaffolded support (including a focus group).	The teacher adapts the next lesson to ensure there are consolidation tasks / questions so the child / children can demonstrate they are secure with their understanding, before moving on. If it was addressed during the lesson, 'in the moment', this might be part of a 'Do Now' task the following day. If it was identified during / after the lesson, particularly if it was a common misconception, it will need to be addressed as a part of the main body of the next lesson, probably at the start.

Assessment

Formative Assessment:

Assessment in the classroom is an ongoing process that informs future teaching. Every lesson includes a form of formative assessment, whether practical, written, or oral, to gauge how well children have understood the learning. Teachers assess understanding during and after each lesson to adapt and plan effectively for the next steps. Evidence of a child's progress should be visible in their books, aligning with the aims outlined in medium-term planning. Spaced practice, which involves revisiting concepts taught earlier in the year, is used to reinforce learning and assess retention over time. This may not always be evidenced in books.

Summative Assessment:

Summative assessment takes place at the end of every long term and is used to validate teacher assessments and compare attainment levels.

Testbase standardised tests are administered and analysed to support teacher judgments on overall attainment. These tests help identify gaps in knowledge and understanding, informing future planning. Testbase has been selected for its alignment with the White Rose scheme of work and its thoughtful approach to assessment:

- It revisits learning from previous years in domains less likely to have been taught, ensuring continuity.
- It builds progressively toward familiarising pupils with the format and style of national curriculum tests.
- It provides a holistic view of a child's understanding, helping teachers judge whether children are 'on track' to meet the expected standard by the end of the year.

By combining formative and summative assessment, we ensure teaching is responsive and targeted, supporting all children to achieve their best outcomes in mathematics.

Assessing Mastery

At Southville, we assess whether pupil has a deep understanding of a mathematical concept, idea or technique if they can:

- make decisions on what to do and how to do it, choosing the most efficient option for them
- describe it in his or her own words
- represent it in a variety of ways (e.g. using concrete materials, pictures and symbols – the CPA approach)
- explain it to someone else or write an explanation for them clearly and systematically
- make up his or her own examples (and non-examples) of it
- see connections between it and other facts or ideas
- recognise it in new situations and contexts (varied tasks and problem solving tasks)
- challenges him/herself, looking for further opportunities to develop understanding
- does not just accept what others say, they question and test it.

This requires appropriate tasks for children to apply and problem solve using the knowledge they have accrued.

Home Learning

In Key Stage 1, homework focuses on practising key facts learned in Number Sense each week to build foundational skills. In Key Stage 2, children are expected to practise their times tables daily, using school-provided booklets or resources to target the tables they find most challenging. Teachers may also provide supplementary tasks that mirror classroom learning—such as a few additional examples in the same format—to reinforce specific methods or concepts and support fluency. Such tasks will focus on the expected knowledge- extension tasks will not be provided.

Impact

Through discussions with staff, monitoring of medium-term planning, evaluations during learning reviews, analysing assessment scores, and examining children's books, the subject leader and members of the SLT ensure there is:

- **Clear, Coherent Sequencing of Content**: The curriculum is sequenced effectively, building on prior learning to ensure a logical progression in mathematical concepts.
- **Progression and Challenge**: Lessons provide appropriate challenge and progression for each year group, with opportunities for both differentiation and stretch.
- **Coverage of the National Curriculum**: A range of mathematical topics from the National Curriculum is taught, ensuring comprehensive coverage across all areas.
- **Regular Teaching of Arithmetic**: Arithmetic is consistently taught and reinforced, with specific focus on fluency and mental calculations.
- **Consistency in the Teaching Approach**: Teachers are following the agreed teaching methods and strategies, as outlined in CPD sessions, ensuring consistency across the school.
- **Adherence to the Feedback Policy**: Teachers are consistently following the feedback and marking policy, providing effective feedback that informs further learning.
- **Review of Test Scores**: Test scores are regularly reviewed to identify common areas for improvement and to track students' progress over time.
- **Identification of Key Areas for Improvement**: Based on assessment scores and book reviews, common areas for improvement are identified, and tailored interventions or strategies are implemented to address these.
- **A Purposeful Learning Environment**: The classroom environment is reviewed to ensure it supports mathematical learning effectively, with resources that assist in developing arithmetic skills and problem-solving strategies and working walls that clearly model strategies that children are working on.