St Lawrence C of E (Aided) Junior School

Mathematics Policy

Introduction

St Lawrence C of E (Aided) Junior School uses the mastery approach to the teaching and learning of mathematics. The rationale behind this approach lies within the research of Guskey (2009) and Skemp (1976), the Mathematics Specialist Teacher Programme, the NCETM/Maths Hub led Mastery Specialist Programme as well as the 2014 National Curriculum, which states:

The expectation is that most pupils will move through the programme of study at broadly the same pace. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice, before moving on.

5 Big Ideas

Our teaching for mastery is underpinned by the NCETM's 5 Big Ideas. Opportunities for Mathematical Thinking allow children to make chains of reasoning connected with the other areas of their mathematics. A focus on Representation and Structure ensures concepts are explored using concrete, pictorial and abstract representations, the children actively look for patterns as well as specialise and generalise while problem solving. Coherence is achieved through the planning of small connected steps to link every question and lesson within a topic. Teachers use both procedural and conceptual variation within their lessons and there remains an emphasis on Fluency with a relentless focus on number and times table facts.

8 Classroom Norms to Establish

- 1. Everyone can learn mathematics to the highest levels
- 2. If you 'can't do it' you 'can't do it yet'
- 3. Mistakes are valuable
- 4. Questions are important
- 5. Mathematics is about creativity and problem solving
- 6. Mathematics is about making connections and communicating what we think
- 7. Depth is much more important than speed
- 8. Maths lessons are about learning, not performing

Teaching for Mastery Principles

- Teaching is underpinned by a belief in the importance of mathematics and that the vast majority of children can succeed in learning mathematics in line with national expectations for the end of each key stage
- The whole class is taught mathematics together, with no differentiation by acceleration to new content. The learning needs of individual pupils are addressed through careful scaffolding, skilful questioning and appropriate rapid intervention, in order to provide the necessary support and challenge
- Factual knowledge (e.g. number bonds and times tables), procedural knowledge (e.g. formal written methods) and conceptual knowledge (e.g. of place value) are taught in a fully integrated way and are all seen as important elements in the learning of mathematics.

- The reasoning behind mathematical processes is emphasised. Teacher/pupil interaction explores in detail how answers were obtained, why the method/strategy worked and what might be the most efficient method/strategy.
- Interim methods (e.g. expanded methods for addition and multiplication) to support the development of formal written algorithms are used for a short period only, as stepping stones into efficient, compact methods.
- Precise mathematical language, coached in full sentences, is always used by teachers, so that mathematical ideas are conveyed with clarity and precision. Pupils are required to do the same (e.g. when talking about fractions, both the part and its relationship to the whole are incorporated into responses: 'The shaded part of the circle is one quarter of the whole circle').
- Conceptual variation and procedural variation are used throughout teaching, to present the mathematics in ways that promote deep, sustainable learning.
- Carefully devised exercises employing variation are used. These provide intelligent practice that develops and embeds fluency and conceptual knowledge.
- Sufficient time is spent on key concepts (e.g. multiplication and division) to ensure learning is developed and deeply embedded before moving on.
- Curriculum design, programmes of study and lesson content are carefully sequenced, in order to develop a coherent and comprehensive conceptual pathway through the mathematics.
- Learning is broken down into small, connected steps, building from what pupils already know.
- Difficult points and potential misconceptions are identified in advance and strategies to address them planned.
- Key questions are planned, to challenge thinking and develop learning for all pupils.
- Contexts and representations are carefully chosen to develop reasoning skills and to help pupils link concrete ideas to abstract mathematical concepts.
- The use of high quality materials and tasks to support learning and provide access to the mathematics, is integrated into lessons. These may include textbooks, visual images and concrete resources.

Features of Teaching

- Lessons are sharply focused: digression is generally avoided. Key new learning points are identified explicitly.
- There is regular interchange between concrete/contextual ideas, pictorial representations and their abstract/symbolic representation
- Mathematical generalisations are emphasised as they emerge from underlying mathematics, which is thoroughly explored within the contexts that make sense to pupils
- Making comparisons is an important feature of developing deep knowledge. The questions 'What's the same, what's different?' are often used to draw attention to essential features of concepts.
- Repetition of key ideas (e.g. in the form of whole class recitation, repeating to talk partners etc) is used frequently. This helps to verbalise and embed mathematical ideas and provides pupils with a shared language to think about and communicate mathematics.
- Teacher-led discussion is interspersed with short tasks involving pupil to pupil discussion and completion of short activities.
- Formative assessment is carried out throughout the lesson; the teacher regularly checks pupils' knowledge and understanding and adjusts the lesson accordingly.
- Gaps in pupils' knowledge and understanding are identified early by in-class questioning. They are addressed rapidly through individual or small group intervention, which may be separate from the main mathematics lesson, to ensure all pupils are ready for the next lesson.
- Teachers discuss their mathematics teaching regularly with colleagues, sharing teaching ideas and classroom experiences in detail and working together to improve their practice.

Lesson Structure

- In lessons there are opportunities for exploration, structuring, documenting, practice and reflecting.
- An anchor task may be used to engage the children in their learning and children are given time to explore the problem (often with concrete materials).
- This problem is discussed deeply and structured by the teacher, using the children's methods when possible, to investigate different ways to solve it. Children evaluate the methods themselves and to try to visualise.
- Enrichment is used over acceleration. Higher attainers should be able to show recordings in more than one way, different possibilities, explain it as a story, verbalise thinking methods and reason ideas etc.
- Guided practice allows children to practise and apply their new knowledge (and methods) to different problems, with support as needed from a peer or adult.
- Children should then be able to apply their understanding to independent tasks, which will need them to use what they have learnt to answer different questions. This may be in a separate practice lesson.

The Maths National Curriculum Programme of Study

St Lawrence follows the New National Curriculum and Programmes of Study for Maths. The following key areas of learning are taught:

- Number and Place Value (including algebra)
- Addition and Subtraction
- Multiplication and Division
- Fractions
- Measurement
- Geometry
- Statistics
- Ratio and Proportion

Attainment Targets

The programmes of study for mathematics are set out year-by-year. By the end of each key stage, pupils are expected to know, apply and understand the matters, skills and processes specified in the relevant programme of study. Pupils are expected to have acquired all the skills, knowledge and concepts securely as outlined in the Key Stage 1 Programme of Study before they come to St Lawrence. The end of year objectives for each year group can be found in **Appendix 1** and agreed common strategies used to teach particular operations and processes are as outlined in our **Calculation policy**.

Lower Key Stage 2

The principal focus of mathematics teaching in Lower Key Stage 2 is to ensure that pupils become increasingly fluent with whole numbers and the four operations, including number facts and the concept of place value. This should ensure that pupils develop efficient written and mental methods and perform calculations accurately with increasingly large whole numbers.

At this stage, pupils should develop their ability to solve a range of problems, including those with simple fractions and decimal place value. Teaching should also ensure that pupils draw with increasing accuracy and develop mathematical reasoning so they can analyse shapes and their properties, and confidently describe the relationships between them. It should ensure that they can use measuring instruments with accuracy and make connections between measure and number.

By the end of Year 4, pupils should have memorised their multiplication tables up to and including the 12 multiplication table and show precision and fluency in their work.

Pupils should read and spell mathematical vocabulary correctly and confidently, using their growing word-reading knowledge and their knowledge of spelling.

Upper Key Stage 2

The principal focus of mathematics teaching in Upper Key Stage 2 is to ensure that pupils extend their understanding of the number system and place value to include larger integers. This should develop the connections that pupils make between multiplication and division with fractions, decimals, percentages and ratio.

At this stage, pupils should develop their ability to solve a wider range of problems, including increasingly complex properties of numbers and arithmetic, and problems demanding efficient written and mental methods of calculation. With this foundation in arithmetic, pupils are introduced to the language of algebra as a means for solving a variety of problems. Teaching in geometry and measures should consolidate and extend knowledge developed in number. Teaching should also ensure that pupils classify shapes with increasingly complex geometric properties and that they learn the vocabulary they need to describe them.

By the end of Year 6, pupils should be fluent in written methods for all 4 operations, including long multiplication and division, and in working with fractions, decimals and percentages.

Pupils should read, spell and pronounce mathematical vocabulary correctly.

Mental Maths Skills

The new curriculum has a strong emphasis on 'Arithmetic' and being able to recall mathematical facts instantly, such as number bonds and times tables. At St Lawrence, we recognise the importance of establishing a secure foundation in mental calculations and the recall of number facts before standard written methods are introduced.

End of year expectations for learning the time tables to recall multiplication and division facts are as follows:

Times Tables End of Year Expectation

By the end of Key Stage 1	Year 3		Year 4
Recall and use multiplication	Recall and use multiplication		Recall and use multiplication
and division facts for the 2, 3,	and division facts for the 2, 4,		and division facts for
4, 5 and 10 multiplication	5, 8 and 10 multiplication		multiplication tables up to
tables	tables		12 × 12
Year 5		Year 6	
Apply all the multiplication tables up to		Apply all the multiplication tables and related	
12 x 12 and related division facts frequently,		division facts frequently, commit them to memory	
commit them to memory and use them		and use them confidently to make larger	
confidently to make larger calculations.		calculations.	

The school uses Times Table Rock Stars to support and engage children in the learning of their times tables.

Each year group has a half-termly target based on Key Instant Recall Facts (KIRFs). They are particularly useful when calculating: adding, subtracting, multiplying or dividing. These Key Instant Recall Facts are outlined for each Year group and each half term in **Appendix 2**.

Planning

Long Term: The National Curriculum identifies the key objectives that we teach in each year group.

Medium Term: In years 5 and 6, our medium term plans are designed using 'White Rose Maths' which follows the National Curriculum objectives and breaks them down into blocks across the year. This ensures an appropriate balance and distribution of work across the term. In years 3 and 4, planning is based on the NCETM prioritisation curriculum, with a view to rolling this out across the school over the coming years.

Short Term: Weekly planning is based on'White Rose' or NCETM small steps guidance but teachers are encouraged to use a variety of resources to design lessons appropriate to the children's needs. Although planned in advance, lessons are adjusted on a daily basis to better suit the needs of a class or individual children. Lessons are planned using slides and a planning cover sheet which provides details of small steps to be covered over the week, key vocabulary and sentence stems. This should be added to over the week to identify any children who have gaps in their knowledge. Children who regularly need support should join an appropriate intervention group.

Resources

A bank of essential mathematics resources including base 10, multi-link, 100 squares and place value counters is kept in each classroom. Further resources relating to key whole school topics e.g. Fractions, are kept in the maths cupboard. Teacher's reference books and research documents are kept in the staff room, on staff shared and Google Drive

Marking, Assessment and Record Keeping

Teachers assess learners through both formative and summative assessments. Ongoing observations of individual or group discussions and assessments from pieces of work support this. Marking of maths books has been reduced to allow more focus on lesson design in response to children's needs (see marking policy). However it is essential that staff pick up and address any misconceptions/mistakes, either during or at the beginning of the next lesson. Thorough questioning should ensure children have clarified their thinking clearly. Planning for the next lesson should identify and address common misconceptions/mistakes made before moving on to the next step.

Pupils take termly tests, which teachers use alongside their teacher assessment. End of unit assessments may also be created by teachers to cover specific areas. 'White Rose' end of term assessments are used in Autumn and Spring Term 2, whilst AQA papers are used for end of year testing. Children are assessed against the end of Year expectations outlined for each year group in the National Curriculum. However, it is an ongoing process throughout the whole year.

'Target tracker' is used to record pupil progress and to determine gaps in their learning and areas where further support or consolidation might be needed.

Parents are informed of children's progress in mathematics through:

1. Informal discussions

- 2. Parental consultations
- 3. Annual reports

Monitoring and Review

The subject leader monitors the planning of each group and supports colleagues in the teaching of mathematics. She provides a strategic lead and direction for the subject in the school. Whole school targets for the teaching of the subject are outlined in the School Development Plan, which is drawn up each year and monitored by the subject leader, the Middle and Senior Leadership team and Governors. Learning walks, lesson observations, planning scrutinies and book looks take place throughout the year to ensure consistency of teaching and learning across the school. The Curriculum Committee of the school's governing body monitors the teaching and learning of mathematics within the school and a report to this committee is given once a year.

Reviewed: September 2022 Next Review: September 2025