

St Anne's CE Primary School and Nursery

You are the Light of the World



Mathematics Policy

Adopted by Governing Body: 9th March 2021

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Contents:

1. Rationale and Audience
2. Aims
3. Teaching and Learning – The Mastery Approach
4. What are Fluency, Reasoning and Problem Solving?
5. Lessons at St Anne's
6. Planning
7. Calculation Policy
8. Times Tables
9. Resources
10. Recording
11. Feedback/marking
13. Assessment
14. Responsibilities/monitoring
15. Daily Quick Maths
16. Classroom Environment

1. Rationale and Audience

This policy is set out to describe our values and philosophy in relation to meeting the needs of all mathematical learners at St Anne's Primary School. It outlines the framework within which all staff work and gives guidance on planning, teaching and assessment. It is designed to describe how the school intends to meet the needs of mathematics learners of all ages.

In the first instance, this will be through working within the Foundation Stage Curriculum using the Early Learning Goals. From Y1 to Y6, statutory requirements of the National Curriculum in Mathematics will be met by fully implementing the National Curriculum objectives through the support of the White Rose Maths Hub Mastery planning documents to ensure pupils are fully challenged.

The policy is intended to be read in conjunction with the calculation policy which illustrates strategies and methods outlined in the National Curriculum and that are taught from Reception to Year 6. It is also important to read Development Matters which highlights the Early Learning Goals and the guide of progression in the Reception year.

This policy document, having been presented to and agreed upon by the whole staff and the governing body, is available to all individual members of the teaching staff and for governors, parents or any other interested parties; e.g. the LA, support staff, visiting teachers; from the school office.

2 Our Curriculum Intent

We believe that Mathematics is a fundamental skill to ensure our pupils are well equipped to understand the world around them.

We aim to meet the needs of all pupils in creating a curriculum that encourages children to become resilient learners of Maths. Our core values, particularly Respect, Courage and Wisdom, will be used to encourage children to understand how to explain what is occurring, predict how things will behave, and analyse causes. The curriculum is designed to progressively develop the children's knowledge and understanding of our ever-changing diverse world. We aim to nurture the children's natural curiosity and love of learning.

By the end of Key Stage 2, our curriculum for maths aims to ensure that all pupils:

- 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.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. Although the curriculum is clearly dispersed into areas of learning, children must be encouraged to apply their skills and understanding across the maths

curriculum to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems.

The vast majority of pupils at St Anne's are exposed to and move through the subject-content applicable to their age at a steady pace. However, when children are not secure in their prior learning, and are working at a considerably different level to their peers, learning becomes bespoke and individual to their needs. On the other hand, when children are working above their peers, they are challenged, and their learning is deepened within their age-expected objectives before moving on.

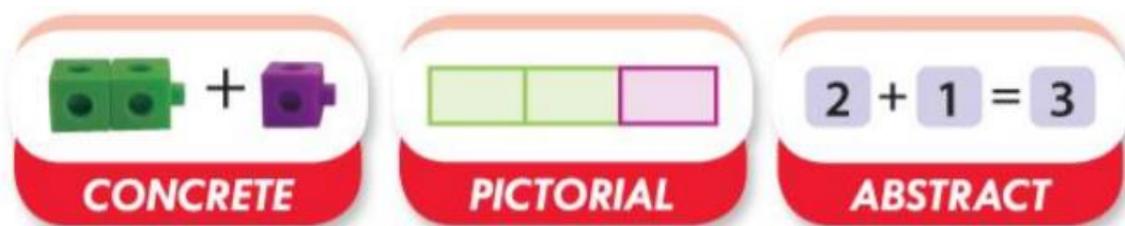
We believe that through these opportunities' children can become confident, resilient Mathematicians who will shine in the world.

Our vision

- To promote a positive attitude towards mathematics in all pupils
- To ensure all pupils are engaged in and are enjoying exploring Mathematics
- To enable all pupils to find links between mathematics and other areas of the curriculum, including Science
- To ensure all pupils progress in mathematics and are challenged appropriately through an in depth understanding
- To use a wide range of concrete, pictorial and abstract representations to develop all pupils' relational understanding of mathematics
- To ensure all pupils are confident using mathematical vocabulary when reasoning about mathematics
- To promote a growth mind set in all pupils, particularly when Problem Solving
- To ensure high expectations and that pupils achieve well

3. Teaching and Learning - A 'Mastery' Approach

The teaching and learning of mathematics at St Anne's Primary should include aspects of the following Mastery approach strategies in every lesson and/or over a series of lessons:



CONCRETE

Concrete is the “doing” stage, using concrete objects to model problems. Instead of the traditional method of mathematics teaching, where a teacher demonstrates how to solve a problem, the CPA approach brings concepts to life by allowing pupils to experience and handle physical objects themselves. Every new abstract concept is learned first with a “concrete” or physical experience. For example, if a problem is about adding up four baskets of fruit, the pupils might first handle actual fruit before progressing to handling counters or cubes which are used to represent the fruit.

PICTORIAL

Pictorial is the “seeing” stage, using representations of the objects to model problems. This stage encourages pupils to make a mental connection between the physical object and abstract levels of understanding by drawing or looking at pictures, circles, diagrams or models which represent the objects in the problem. Building or drawing a model makes it easier for pupils to grasp concepts they traditionally find more difficult, such as fractions, as it helps them visualise the problem and make it more accessible.

ABSTRACT

Abstract is the “symbolic” stage, where pupils are able to use abstract symbols to model problems (Hauser). Only once a child has demonstrated that they have a solid understanding of the “concrete” and “pictorial” representations of the problem, can the teacher introduce the more “abstract” concept, such as mathematical symbols. Pupils are introduced to the concept at a symbolic level, using only numbers, notation, and mathematical symbols, for example +, −, ×, / to indicate addition, subtraction, multiplication, or division

4. What are Fluency, Reasoning and Problem Solving?

Fluency

Fluency comes from deep knowledge and regular practice of skills. This is the first stage of pupil’s understanding.

Fluency includes conceptual understanding, accuracy, rapid recall, retention and practice.

Accuracy – Pupils carefully completing calculations with no or few careless errors.

Pace – Pupils are able to quickly recall the appropriate strategy to solve the calculation and progress through a number of questions at an age-appropriate pace.

Retention – Pupils will be able to retain their knowledge and understanding on a separate occasion to when the concept was first introduced.

The key to fluency is deep knowledge and practice and making connections at the right time for a child.

Reasoning

Verbal reasoning demonstrates that pupils understand the mathematics. Talk is an integral part of mastery as it encourages students to reason, justify and explain their thinking. Plan for young learners to voice their thought processes and for older students to take part in class debates, giving them the space to challenge their peers using logical reasoning. The way pupils speak and write about mathematics transforms their learning. Mastery approaches use a carefully sequenced, structured approach to introduce and reinforce mathematical vocabulary. Encourage talk in mathematics, by introducing concepts such as sentence structures (stem sentences). Pupils should be able to say not just what the answer is, but how they know it’s right. This is key to building mathematical language and reasoning skills. This gives pupils the confidence to communicate their ideas clearly, before writing them down, this is key.

Example Stem Sentences:

The denominator is 5 because the whole has been divided into....

The numerator is 3 because 3 equal parts have been

Teachers then maintain a high expectation upon pupils to repeat and use the correct mathematical vocabulary to explain their understanding verbally and in pupils' reflection comments. By also displaying the vocabulary during the lesson, pupils will be able to use this independently. When questioning and encouraging mathematical talk, teachers should provide regular, purposeful opportunities.

For example:

- *Show me how to complete the calculation*
- *Teach your friend how to complete the calculation*
- *How do you know which operation to use?*
- *Why have you chosen this method?*
- *How else can you represent this number?*
- *What have you learnt today?*
- *True or False*
- *Odd one out*
- *Sometimes, always, never*

Problem Solving

Mathematical problem solving is at the heart of the Mastery Approach. Pupils are encouraged to identify, understand, and apply relevant mathematical principles and make connections between different mathematical concepts. This builds the skills needed to tackle new problems, rather than simply repeating routines without a secure understanding. Mathematical concepts are explored in a variety of representations and problem-solving contexts to give pupils a richer and deeper learning experience. Pupils combine different concepts to solve complex problems and apply knowledge to real-life situations.

Through problem solving, pupils are required to select their mathematical knowledge and apply this to a new concept. Problem solving is more than just word problems but the **RUCSAC** approach can be applied to this style of question:

- 1) **R**ead / look at the problem
- 2) **U**nderstand the problem by underlining or discussing: What is the problem about?
- 3) **C**hoose – Choose the operation required, the number facts or the approach.
- 4) **S**olve – Solve the problem by completing jottings on the page
- 5) **A**nswer – complete the answer to the problem
- 6) **C**heck – have I correctly answered the given problem or is there another step?

5. Lessons at St Anne's

Pupils in Nursery and Reception are taught in mixed ability groups (classes) and follow an integrated mathematics curriculum. In Years 1 to Year 4, pupils continue to be taught in mixed ability groups. In

Years 5 and 6 the pupils are 'set' into ability groups based on Teacher and Summative Assessments.

Mathematics is taught for at least 45 minutes a day in KS1 and 50 minutes per day in KS2. However, when required, teachers may choose to include additional mathematics lessons in their weekly timetable. In addition, all pupils have a daily timetabled basic-skills lesson called Quick Maths. In KS2, additional time is also given to teach times tables through TT Rockstars.

Lesson Structure

All mathematics lessons at St Anne's follow the following structure:

- Starter Activity – to promote fluency of arithmetic and the Non-negotiable concepts - Up to 10 minutes and could include: additional TT Rockstar paper based 3-minute practice, verbal mental maths games/competitions, quick fire questions on mini whiteboards or times table chanting.
- Introduce/consolidate new Learning using the Mastery Approach
- Reflective Plenary - (Purple Pen – KS2 or a Pictorial reflection e.g. drawings of a problem – KS1)

Teaching and Learning Strategies

- The children are taught in discreet year groups, except for a mixed 5/6 Greater Depth group
- Differentiation is provided with targeted support depending on need.

'The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of pupils' understanding and their readiness to progress to the next stage. 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.' (National Curriculum)

- Work is carried out using a balance of individual, paired and group work.
- A high proportion of lesson time is devoted to teaching of methods and vocabulary through modelled examples to ensure that the children are fully confident to tackle independent tasks.
- Teachers model mathematical ideas to fully involve pupils and maintain their interest through appropriately demanding work.
 - Teachers use and expect pupils to use correct mathematical notation and vocabulary.
 - Mathematical errors and misconceptions are dealt with as they are identified in a positive and supportive way, teaching what is right and what is not right.
 - The emphasis on pupil's learning begins with practical examples leading onto informal jottings and mental strategies, and finally to formal representations as laid out for year groups in the calculation policy (CPA approach)
 - Children are given a variety of mathematical approaches to solving problems. They are encouraged to develop their own mathematical strategies as well as learning standard methods (RUCSAC approach)
- The use of calculators is introduced near the end of key stage 2 to support pupils' conceptual understanding and exploration of more complex number problems, once written and mental

arithmetic are secure. Calculators are used in lower years as well as KS2 as a way to self-check answers.

- The school has high expectations and the pupils are expected to present work carefully. Work in maths books is headed with the date, followed by the learning objective, which is highlighted by the teacher when achieved.
- A high priority will be placed on children reasoning and explaining their strategies through teacher questioning and modelling.
- Homework for all pupils is set in accordance with the Homework Policy.

6. Planning

The national curriculum states 'Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas.' Therefore, it is organised into distinct domains.

However, pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning, and competence in solving increasingly sophisticated problems.

These domains for KS1 are:

- Number and place value
- Addition and subtraction
- Multiplication and division
- Fractions
- Measures
- Geometry: properties of shape
- Geometry: position and direction
- Statistics (Year 2)

These domains for KS2 are:

- Number and place value
- Addition and subtraction
- Multiplication and division
- Fractions (including decimals and percentages)
- Ratio and proportion (Year 6)
- Measures
- Geometry: properties of shape
- Geometry: position and direction
- Statistics
- Algebra (Year 6)

The distinct domains highlight the important areas of mathematics children need to learn to make effective progress.

Through combining the national curriculum aims and the White Rose principles our objectives are:

- A dedicated daily mathematics lesson is planned in each class, which will last for at least 45 minutes in KS1 and 50 minutes in KS2. In the Foundation Stage there will be a daily lesson which will last for at least 30 minutes, alongside opportunities for mathematical activities daily through continuous provision.
- Lessons are well structured, lively and delivered at a good pace.
- Lessons are structured to embed mathematical understanding through concrete, pictorial and abstract representation.
- Teaching, questioning and level of support is differentiated so that the children are all working towards the same learning objective appropriate to their age group.
- All children will be exposed to challenge through tasks and questioning including further mastery standard problem-solving activities to enable a high percentage of pupils to reach greater depth.
- Time is given in other subjects for pupils to develop and apply their mathematical skills. Opportunities in Science are evident through floor books, lesson starters and investigations.
- Children will actively take part and are enthusiastic during their maths lessons and will develop an appropriate mathematical vocabulary as modelled by the teachers using guidance from the vocabulary specified in the national curriculum.

Teachers in Years 1 – 6 follow the White Rose Planning. This provides the yearly overview and Medium-Term planning for each year group. However, this should be adapted where appropriate. For calculation, St Anne's Calculation Policy, which follows our Mastery Approach, should be adhered to and displayed in the classroom. EYFS use Development Matters to support their planning.

Teachers should write their own Short-Term Planning using the St Anne's Primary School template. This incorporates: teaching, modelling, misconceptions and key questions.

7. Calculation Policy

St Anne's Calculation Policy is saved on the school system for all staff to access, it is also available in each classroom and followed when teaching written methods. The policy demonstrates our Mastery Approach and shows progression through each operation for each stage of learning.

8. Times Tables

Times Tables are a mathematics 'Non-negotiable' and must be taught and then practised. TT Rockstars is available for the practice of times tables. We teach times tables using the following progression:

Year 1 – Be able to count in multiples of twos, fives and tens

Year 2 - Be able to recall 2, 5 and 10 multiplication and division facts

Year 3 - Be able to recall 3, 4 and 8 multiplication and division facts

Year 4 - Be able to recall 6, 7 and 9 multiplication and division facts

Year 5/6 - application of multiplication and division facts to problem solving

NB: All times tables to be learnt up to 12 x 12 From 2019/2020 Year 4 pupils will take an online Times Table test* which will be a timed assessment testing their speed of recall for multiplication and division facts.

TT Rockstars

TT Rockstars is an initiative for Year 2 – 6. It is a fun way to practise times tables. In school, awards are given for pupils who participate and make progress on TT Rockstars. A leader board is displayed in each classroom and updated each week. The ‘Sound Check’ programme on TT Rockstars follows the exact structure of the 2020 Year 4 Times Table Test.

Pupils are expected to log onto TT Rockstars at home for 15 minutes per week.

In school, pupils complete the TT Rockstar Paper worksheets 3-5 times per week. Each worksheet is timed and takes 3 minutes, and the results are recorded onto the website. At the start of the year, a baseline test is completed and then repeated at the end of the programme.

A full guide to TT Rockstars can be found on their website.

9. Resources

When resourcing and planning using the White Rose Planning, teachers are to also select additional resources from other sources which complement it and follow the Mastery Approach: Concrete, Pictorial and Abstract. Teachers have the flexibility to choose resources they feel are most effective to support the needs of all learners (differentiation) and ensure they achieve the aims of fluency, reasoning and problem solving. Resources are kept online, in classrooms and in the mathematics cupboard (UKS2 shared area).

Each class is equipped with a range of mathematical resources and apparatus relevant to the year group of that class. These are stored in accessible and clearly labelled drawers / shelves / containers. All children have access to a range of aids such as place value cards, dice, times table squares, number lines and 100 squares.

There is range of mathematical software on the Staff shared area as well as access to websites to support a range of activities across Foundation, KS1 and KS2.

10. Recording of Learning

Pupils have a blue square-paged Maths exercise book each. All learning is to be evidenced. This could be photographs, activities or an explanation of the day’s learning. The presentation of mathematics books is to be consistent, age appropriate and show that pupils take pride in the appearance of their work.

The date and the learning objective are to be typed and placed at the top of the page on the left-hand side. When sticking in question sheets/resources, these to be trimmed to ensure they fit onto the page. Pencils and rubbers to be used – no pens (except Purple Pen comment).

11. Feedback and Marking

All teachers to follow the Marking Policy. Immediate intervention is essential and a pupil should leave each lesson feeling successful and any misconceptions or concerns to be addressed.

On occasion and where appropriate, pupils should have the opportunity to self and peer mark their work but the teacher should always complete their own marking and assessment.

13. Assessment

Assessment should be regular and used to inform planning and to make the Teacher Assessment judgements at the end of each term.

- Formative Assessment – Completed regularly to inform planning
- Puma Assessments – completed at the end of each term
- TT Rockstar Baseline Test* (Year 2 – 6)
- Practice SATs Papers (Years 6)

Data from these assessments must be inputted onto Staff Share and should inform our data input for the school's tracking system. At the end of each term, all teachers attend a Pupil Progress meeting to share data and to discuss pupils who are 'off target'. These pupils should be placed into an Intervention/Booster group with a SMART target.

14. Responsibilities

Monitoring of the standards of children's work and of the quality of teaching in mathematics is the responsibility of the mathematics subject leader, the Headteacher and the class teacher.

The main responsibilities of the mathematics subject leader involve:

- providing leadership and direction in Mathematics
- ensuring the national curriculum and 'St Anne's Curriculum' is implemented effectively
- working closely with staff, offering guidance, support, leadership and arranging in-service as appropriate
- scrutinising books frequently, completing half termly health checks and providing whole staff or individual feedback when necessary.
- scrutinising the results of termly / annual assessments throughout the school and providing feedback
- analysis of KS1 and KS2 SAT results, pupil response, teacher assessments and other standardised assessments
- managing, storing and updating resources, following a whole school audit
- monitoring and evaluating the quality of teaching and learning throughout the school in Mathematics – learning walks and lesson observations
- monitoring pupil opinions and feedback (pupil voice)
- liaising with the governor responsible for maths, other schools and the LA
- coordinating the review and updating of the policy when necessary
- ensuring the Mathematics Action Plan is implemented, monitored, evaluated and reviewed in line with the SIP and LA priorities

15. Daily Quick Maths

Years 1 – 6 take part in a 10-minute Maths fluency activity daily. This is at a set time each day and may be separate to the Maths lesson time. Children are given a number of the day and a set of calculations to complete. This ensures regular and effective fluency practise is taking place.

Quick maths should be differentiated to suit the needs of the pupils within the classroom and should be marked daily in order to adapt questions for the following week.

Daily Quick Maths is recorded in the back of Maths books.

16. Classroom Environment

Mathematics should be visible in all classrooms through an interactive display on the wall or a working washing line.

Expectations:

- Relevant concrete apparatus should be readily available for all pupils to refer to.
- Key vocabulary, pictorial and abstract representations should be visible for reference.
- Methods linked to relevant sections of St Anne's Calculation Policy to be displayed (either directly from the policy document or another child friendly version)
- number line displayed

Children should use the working walls as a learning resource daily, with teachers referring to them throughout their teaching.