

## Mathematics at St James

St James Church of England Primary School

### Intent:

At St James Church of England Primary school, we provide a high-quality mathematics education utilising a mastery approach so that all children: become fluent in the fundamentals of mathematics; are able to reason mathematically with increasing articulacy; and can solve problems by applying their understanding to a variety of problems. Our inclusive mathematics curriculum provides challenge for all pupils with teachers choosing to progress to new learning only when the majority of learners have a secure understanding. Challenge occurs through depth of understanding with an offer of rich and sophisticated problems rather than new content. Our mathematics curriculum aims to develop the five core mathematical competencies in all of our learners - therefore providing a foundation for our children to understand the world around them knowing both the beauty and power of mathematics in its own right and how it can be applied to other subjects across the curriculum including Science and Computing.

### Implementation:

#### Curriculum Planning:

- At St James Church of England Primary School, our mathematics planning from EYFS through to Year 6 is informed (not dictated) by use of Maths-No Problem! - a high-quality mastery scheme of work, setting high aspirations for all children, ensuring that all pupils can "keep up with new content", as opposed to having to "catch up." Five Mathematics lessons are taught per week to fully maximise curriculum coverage, including 'Fluency Friday' (incorporating discrete teaching of multiplication tables) to ensure pupil automaticity. Through implementation of a spiral curriculum, each lesson sequentially builds upon the prior learning. Topics consolidate understanding, while also increasing in complexity allowing new learning to be related to previous learning aiding retrieval.
- Maths - No Problem! provides a series of carefully sequenced lessons enabling new knowledge and skills to be built upon what has been previously taught and pupils can work towards clearly defined end points. However, our highly skilled teachers are then able to reflect and adapt the teaching sequence appropriately (dependent on pupil's knowledge) to provide further opportunities for practise, consolidation and an increasing depth of conceptual understanding. The sequence and speed of lesson delivery is dictated by pupil understanding with whitespace lessons and prioritisation of 'key lessons' utilised where appropriate to embed the most fundamental concepts. This ensures that all statutory National Curriculum coverage is met, with additional coverage of deeper non-statutory content if time allows.

#### Lesson Classification Guide

The lessons for each year have been reviewed and categorised using the following criteria:

KEY LESSON	★	★	• is a key lesson
COMBINED	⏪	⏩	• can be combined with other lessons in the chapter
INTEGRATED	↔	↔	• can be integrated with lessons from other year groups
INDEPENDENT	📅	📅	• can be tackled independently
NON-STATUTORY	⦿	⦿	• non statutory
IF TIME ALLOWS	⏸	⏸	• if time allows

#### Lesson Coverage Across a Year

Year Group	Number of MNP Lessons	Number of Whitespace Lessons
Y1	86	104
Y2	119	71
Y3	148	42
Y4	138	52
Y5	126	64
Y6	137	53

- Our mathematics long-term plan clearly stipulates the order of topics taught in each age group in each term, so that new knowledge and skills can build on what has been taught before and towards our clearly defined end points - thus ensuring our long-term is taught in its entirety year-on-year. This plan loosely follows Maths - No Problem's

recommended long-term plan but has been amended to meet the needs of our school community by addressing identified gaps in pupils' knowledge and skills from question level analysis.

- At St James the Maths – No Problem! Foundations scheme of work forms the basic outline for our curriculum offer in Reception as a full-year programme of teaching and learning activities, exercises and stories to deliver a firm foundation for developing maths mastery in Key Stage 1. Reading is at the beating heart of our curriculum offer within Reception, in order to start on our journey of creating 'joyful readers' as a Journey Driver.
- Non statutory guidance from the Department for Education and NCETM titled 'ready to progress criteria' are also utilised within planning to summarise the most important knowledge/concepts within each year group and make important connections between these mathematical topics. Again, this informs planning to ensure that pupils embed key concepts within their long-term memory and apply them fluently.
- Across the school we also focus on the fundamental teaching and learning of multiplication tables, which are progressively planned across our mathematics long-term plan to be learnt with increasing fluency. By the end of Year 4, pupils should be able to recall all of their times tables accurately, supporting development in children's working memory.
- Across school, daily mathematics retrieval sessions take place across all classes. Beginning as 'Mathematics Meetings' across Phase 1 this quick-fire session, support retrieval and fluency within the four core number operations.

### Reading

Each lesson begins with an anchor task which uses a story problem to launch the lesson and make learning meaningful through reading. Children will then develop discussion in groups, with a greater emphasis on full sentences and using mathematical vocabulary to be articulate. Our delivery is also supported through a textbook which allows the children to independently discover methods to solve a problem. Reading is central to our EYFS curriculum offer with picture books used throughout our teaching.

### Vocabulary Teaching:

Vocabulary is progressively taught within our mathematics curriculum. This is mapped out upon our medium-term planning documentation adhering to both our calculation policy and the Department for Education's 'Ready to Progress' documentation. Consistent definitions are provided using our glossary of key terms across school.

### Pupil Premium Enhancements:

Following guidance from the EEF, our pupil premium children are targeted with the following enhancements to ensure that they "keep up with new content", as opposed to having to "catch up".

- Use assessment to build on pupils' existing knowledge and understanding.
- Use manipulatives and representations.
- Teach strategies for solving problems.
- Enable pupils to develop a rich network of mathematical knowledge.
- Develop pupils' independence and motivation.
- Use tasks and resources to challenge and support pupils' mathematics.
- Use structured interventions to provide additional support (including First Class Number 1 and 2).

### High Achieving Learners:

During mathematics lessons at St James high achieving learners are actively encouraged (through the development of their metacognitive thinking) to:

- Use the three Ps of pattern, word problem or prove it to deepen their understanding.
- Use physical models or draw something appropriate.
- Explain things to themselves as they work through examples.
- Try to construct relationships between new processes and what they already knew.
- Infer additional information that wasn't directly given.

Additional 'deeper thinking' tasks are also provided where appropriate.

- Support pupils to make a successful transition between Primary and Secondary school.

### SEND Offers

Teachers use appropriate assessment to set targets which are deliberately ambitious for pupils identified as having a SEND and ensure needs are met as identified through their I.S.P. This is supported by the use of our SEND Toolkit where bespoke individual next steps are produced. Lessons are planned to address potential areas of difficulty and to attempt to remove barriers to pupil achievement through adaptive teaching (involving explicit instruction, cognitive and metacognitive strategies, scaffolding, flexible groupings and use of technology). For the majority of children, such planning means that our pupils with SEND and disabilities are able to study the full National Curriculum. Teaching and targeted support is weighted towards the 'ready to progress' statements and fundamental knowledge stated'. Due to our high number of dyslexic learners, we also utilise the follow recommendations to overcome this specific barrier to learning.

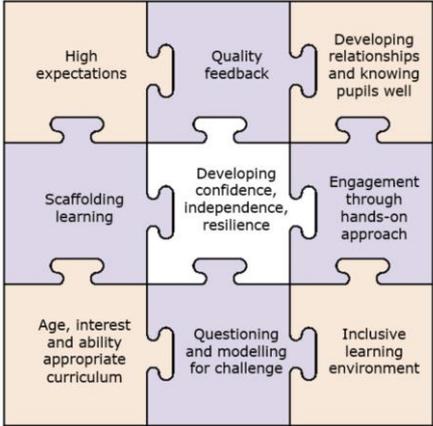
<https://mathsnoproblem.com/blog/learner-focus/overcoming-obstacles-maths-learners-dyslexia/>

Cognition and Learning (CL)	Sensory and/or Physical Needs (SPN)
<ul style="list-style-type: none"> <li>• Pupils encouraged to explain what they have to do to check understanding.</li> <li>• Links to prior learning explicitly made.</li> <li>• Number lines stuck to desks.</li> <li>• Use of diagrams and pictures to add meaning</li> <li>• Have small whiteboards and pens available for notes, to record ideas etc.</li> <li>• Additional time to complete tasks if necessary.</li> </ul>	<ul style="list-style-type: none"> <li>• Ensure that left and right-handed pupils are not sitting next to each other with writing hands adjacent.</li> <li>• Seating should allow pupil to rest both feet flat on the floor - check chair heights.</li> <li>• Desk should be at elbow height.</li> <li>• Sloping desk provided if possible.</li> <li>• Encourage oral presentations as an alternative to some written work.</li> <li>• Allow additional time to complete tasks.</li> <li>• Allow more thinking and talking time.</li> <li>• Model and teach careful listening along with signals when careful listening is required.</li> </ul>
Communication and Interaction (CI)	Social, Emotional and Mental Health Difficulties (SEMH)
<ul style="list-style-type: none"> <li>• 'Rules' of good listening displayed, taught, modelled and regularly reinforced.</li> <li>• Pupils aware of pre-arranged cues for active listening (e.g. symbol, prompt card).</li> <li>• Delivery of information slowed down with time given to allow processing.</li> <li>• Pupils are encouraged - and shown - how to seek clarification.</li> <li>• Adult support used effectively to explain and support pupils to ask and answer questions.</li> </ul>	<ul style="list-style-type: none"> <li>• Take time to find pupil's strengths and praise these - ensure that the pupil has opportunities to demonstrate their skills to maintain self-confidence.</li> <li>• Provide lots of opportunities for kinaesthetic learning e.g. practical activities, experiential learning, multi-sensory resources.</li> <li>• Give breaks between tasks and give legitimate 'moving around' activities.</li> <li>• Have a range of simple, accessible activities that pupils enjoy to use as 'calming' exercises.</li> </ul>

	<ul style="list-style-type: none"> <li>Use interactive strategies e.g. pupils have cards/whiteboards to hold up answers, come to the front to take a role etc.</li> <li>Teach pupils how to use post-it notes for questions and ideas rather than interruptions (when appropriate).</li> </ul>
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Maths Specific Strategies to Support SEND learners:

- Ensure key learning points are reviewed regularly throughout the lesson
- Present tasks in a meaningful context
- Ensure that multi-step tasks are supported by jottings and model this
- Give contexts for pupils to apply their learning
- Don't rush into abstract and formal written work before understanding is secure
- Be prepared to explore, repeat and rehearse steps again to ensure understanding of abstract concepts
- Give access to a wide range of practical resources
- Different coloured pens for hundreds, tens, ones etc.
- Provide talking partner for pupils to share/explain their mathematical thinking
- Make close observations of pupil to fully understand the mathematical strategies being used to solve the problems- get them to talk through what they are doing.



Scaffold and Support:

- Focus Group (If a group of children are collectively not ready to progress, staff are encouraged to gather a group of them around them, and then convert the independent work into a guided practice).
- Struggling Learners (Early interventions help pupils to catch-up and perform better across the curriculum. Any children who need additional support within the less are supported using the 3C's—coherence, context or concrete. As soon as possible, use the following strategies to support struggling learners. Providing clear models for solving a problem type using an array of examples, giving pupils extensive practice in new strategies and skills, providing chances to think aloud and talk about their steps and decisions, providing students with extensive feedback).

Cultural Capital:

Cultural capital visits, visitors and events - whether it be the Money Mentors in KS2, our celebration of World Mathematics Day or our Geography field trip to a river in Y4 - allow us to illustrate how Mathematics is threaded through all aspects of life throughout differing occupations. Within our lessons, we also believe we offer the right mix of

challenge and support for our children to be confident in taking risks with their mathematical thinking and how mistakes are part of the learning process that they can take into future study and beyond.

### Teaching and Learning Approaches:

- Within our mathematics lessons at St James, all learners move through topics at broadly the same pace through an inclusive approach, beginning with mixed ability groupings within all our classrooms. Each topic is studied, focussed upon depth of understanding and the teacher does not move onto the next stage until all children demonstrate that they have a secure understanding of the most fundamental mathematical concepts. Our inclusive approach places emphasis on promoting multiple methods of solving a problem, creating self-confidence and resilience in pupils. Those pupils who grasp concepts quickly, are challenged with rich and sophisticated problems within the topic, incorporating the 3 Ps (Can you find a pattern? Can you create a word problem? Can you prove it?) Those children who are not sufficiently fluent to progress are provided additional support to consolidate their understanding prior to moving on with the 3 Cs (Can I use concrete resources? Is the problem in context? Am I using effective communication?).
- Our teaching and learning approach also supports the OFSTED 'Mathematics Research Review' with staff fully aware of how they need to teach different types of knowledge in order to become fluent.
 

**Declarative knowledge:** can be introduced with "I know that" and refers to facts and formulae, and the relationship between facts.

**Procedural knowledge:** can be introduced with "I know how" and refers to methods, and the principles underpinning them. An example of this is a missing number problem.

**Conditional knowledge:** can be introduced with "I know when" and refers to knowledge and understanding of strategies which can be used to reason and solve problems. This extends to combinations of declarative and procedural knowledge which then become strategies for particular types of problems.
- Every mathematics lesson taught across school follows an identical three-part lesson approach (incorporating the anchor task, guided practice and independent practice) to create consistency across school. Each lesson also underpins the five core competencies of the mastery approach, which are attributes that can be seen within our learners and are competencies that children develop throughout their mathematical journey.

Lesson Part:	Lesson Feature:	Five Core Competencies Demonstrated by Learners Throughout A Lesson:
Anchor Task (30 minutes)	Lesson opens with a potential real-life problem called an anchor task, which develops children's reading skills. Pupils tackle the problem, utilising concrete, pictorial, abstract approach. Record ideas in journaling after extensive opportunities for exploration and discussion.	Visualisation: ask learners to show 'how they know' at every stage of solving the problem. Generalisation: challenge learners to dig deeper by finding proof. Communication: encourage learners to answer in full sentences. Try asking learners to talk about the work they're doing or use structured tasks centred around a class discussion.
Guided Practise (10 minutes)	With the methodology discussed, the children then used this learning in the Guided Practice section. Working through the problems together, children continue to talk to each other and share ideas.	Number sense: a learner's ability to work fluidly and flexibly with numbers.
Independent Practise (15 minutes)	For the final part of the lesson, children complete the independent practice section of the workbook individually. Initially, the workbook questions are scaffolded. However,	Metacognition: teach learners to think about how they are thinking. This helps learners solve multi-step tasks and promotes the ability to keep complex information in mind.

	as pupils work through them, the scaffolding is reduced, and the questions gradually become more challenging. Use of purple pen to discuss solutions if appropriate.	
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- Fundamental to our teaching and learning approach, the five core competencies supplement NCTEMs “Five Big Ideas”: representation and structure, mathematical thinking, fluency, variation and coherence. These five big ideas have been used to develop the 5 core competencies that are fundamental to lesson delivery).  
<https://mathsnoproblem.com/blog/teaching-practice/relational-understanding-with-core-competencies-ncetms-big-ideas/>

Five Big Ideas Lesson design principles for teachers	Five Core Competencies Demonstrated by learners	Feature
1. Representation and structure	1. Visualisation	Relational understanding is all about visualising and understanding the underlying structure behind problems. Incorporates manipulatives and bar models.
2. Mathematical thinking	2. Generalisation	Making connections, spotting links, noticing patterns and reasoning – which all help to build a connected body of knowledge.
	3. Communication	
3. Fluency	4. Number sense	Partitioning facts, times tables facts and using connected facts like equivalent fractions. When learners are fluent, they can use the known to work out the unknown – an important component of relational understanding.
4. Variation		
5. Coherence		
	5. Metacognition	The ability to think about one’s thinking.

- Each evidence-based unit of work is grounded in research and theory, incorporating the seminal work of Piaget, Bruner Dienes, Vygotsky and Skemp.
  1. Piaget - letting students have ample processing time to accommodate new ideas.
  2. Zoltan Dienes - learning of ideas in an informal way, through exploration, before structured learning.
  3. Lev Vygotsky - an emphasis on cooperative learning or collaborative structures during learning that derives from
  4. Richard Skemp - emphasis on relational understanding, not just instrumental understanding.
  5. Jerome Bruner: - CPA approach, which is the use of concrete experiences to move learners to abstract learning. Learners begin with concrete representations, before moving to pictorial and finally abstract once they have a deeper conceptual understanding. We believe that manipulatives should be used to reveal useful information but not as an external memory device (supported by the research of OFSTED).

- As a core feature of instructional teaching, our teaching of mathematics is also widely applicable to Rosenshine's Principles of Instruction in order to develop conceptual understanding. Reviewing material- checking prior learning has been activated where it relates to new learning and supporting students to remember what they've been taught over time with regular formative assessment. Questioning and checking for understanding- finding out whether all students are making sense of the ideas being explored and adapting the teaching accordingly. Sequencing Concepts; modelling; scaffolding- building up learning from small steps, showing how to do things, providing structured support through use of the anchor test. Stages of Practice: guiding practice securing a high success rate, building fluency and confidence, before supporting students to practise independently - making sure they can do things for themselves without help during the independent practice section.
- To minimise 'Cognitive Load', all of our teachers also prioritise the four following steps to support the transition of knowledge to long-term memory. Focused Learning Objective (we always provide our learners with a very clear idea of what we want our learners to achieve). Activate Prior learning (At the start of the lesson, teachers choose to design a task that encourages learners to retrieve essential skills. This means their working memory can hold on to new learning during the lesson). Present Information Clearly (Our teachers take time when designing lessons to make sure information is presented clearly. We avoid unnecessary extras which may detract from the learning goal, as we know that if the design is inconsistent, learners need to expend effort in making sense of it). Avoid Cognitive Overload (Our teachers break questions up into chunks so that learners can digest each part separately - this includes full understanding new vocabulary).
- The promotion of metacognition (the ability to think about one's thinking) is a key feature of our approach to teaching and learning within mathematics. Teachers are aware that there a direct link between learners' metacognition and their achievement in mathematics. Our teachers will actively, ask questions that give learners a starting point, ask questions that stimulate mathematical thinking, ask assessment questions and ask final discussion questions.
- Reading and Oracy are both at the centre of our mathematics curriculum to promote the development of articulate learners. In lessons, progressive STEM sentence starters are utilised in addition to carefully mapped vocabulary that adheres to our calculation policy. A key feature of mathematics lessons is live marking and feedback. This takes place to support, challenge and extend children's thinking in the moment and reduce teacher workload. See 'Marking and Feedback' policy for more detailed information.

### Assessment Procedures:

- Self-Assessment (We utilise 'assessment as learning' to develop and support children's metacognitive skills. This form of assessment is a crucial part of our Mathematics lessons in helping children become lifelong learners as it focuses their efforts 'reflecting' on their own learning. It powers a growth mindset where they see their maths ability as something that can change and improve).
- Formative Assessment (Frequent low-stakes testing. If we have **ASSESSED** that a child needs support, we **DIAGNOSE** why by exploring the following factors: finding the basic facts answered incorrectly; determine if the same basic facts appear more than once: if they were answered incorrectly then there could be a real misconception; determine if the pupil sometimes answered correctly and sometimes incorrectly: the incorrect answers could be due to sloppy work habits (if there are more wrong answers towards the later part of the worksheet) or it could be a real misconception; try to understand the pattern of reasoning used by the pupil. Once the cause has been diagnosed, we **REMEDiate** effectively by breaking down the problem into smaller sub-tasks, identifying the skills required to complete each sub-task and focusing in on where a pupil's misconceptions lie. This should be completed as close to completion the task as possible to ensure misconceptions do not persist). Spotlight children are identified through ongoing assessment and are supported on an individual basis.



- Summative Assessment (Across school, NFER assessments or appropriate end of Key Stage Assessments [Y2 and Y6] are utilised termly to assess pupil progress. Question level analysis occurs using Ask Eddi to check pupils' understanding to inform teaching, and to help pupils embed and use knowledge fluently to develop their understanding).

### Staff Professional Development:

- All teaching staff have attended accredited Maths - No Problem! Training highlighting our commitment to a mastery approach across the school.
- As part of LDST, extensive trust wide networking takes place through School Improvement Liverpool and curriculum networking teams, ensuring the latest curriculum updates and disseminated and implemented.
- Internal to school, coaching cycles also regularly take place to show how to model an aspect of maths or establishing best practice across year groups.
- From 24-25 school will be working closely with the North-West Maths Hub to provide further support. This will be built upon further Maths networks across LDST.

### Journey Drivers:

J	Joyful Readers	Each lesson begins with an anchor task which uses a story problem to launch the lesson and make learning meaningful through reading. A textbook approach is also utilised while reading is central to our EYFS curriculum offer with picture books used throughout our teaching.
O	Opportunities to Build Upon Knowledge and Skills	Subject planning and delivery sequenced through a spiral curriculum with extensive retrieval opportunities built around Journey Drivers. Development of Computational Thinking with clear links to the Computing Curriculum.
U	Understand British and Christian Values	British Values (Rule of Law and Mutual Respect). Christian Values (Courage and endurance). SMSC woven throughout
R	Resilience and Perseverance	Strategies for developing metacognition woven throughout the mathematics curriculum. Inclusive approach to lessons - "keep up with new content", as opposed to having to "catch up" for all learners.
N	Nurture Curiosity	Child led learning as a feature of the three-part lesson - children to articulate their own understanding and methods.
E	Encourage Articulate Learners	Use of STEM sentence starters and progressive vital vocabulary woven into all lessons. Extensive opportunities to reason and discuss problems within journaling.
Y	Your Wellbeing and Health.	Curriculum Content including Money Mentors. Application of Mathematics to real life contexts.

*At St James we instill British Values in the subject of Mathematics by:*

#### Individual Liberty:

With 'Maths No Problem' children have the opportunity to make individual choices based on the strategies they are fluent with. They also have the opportunity to share these strategies with others. Each year, all classes have the

opportunity to take part in an Enterprise project which allows children to take the lead in learning, expressing ideas and creating a product.

### Rule of Law:

Children will learn specific Mathematical rules and look at these in differentiated variations to ensure they have mastered concepts. Children will develop an attitude that recognises consequences to mistakes when solving problems and look for ways to self-correct.

### Democracy:

With our 'Maths No Problem' scheme, children are encouraged to take into account the views of others in shared activities. Children will share a range of strategies to solve problems in various ways, encompassing the mastery approach. Also, in Statistics lessons, children will vote when collecting and interpreting data.

### Mutual Respect and Tolerance of those with Different Faiths and Beliefs:

As children develop a 'Mastery' approach, they will become more fluent with a range of strategies to solve problems. These strategies will come from a range of backgrounds including Singaporean methods. Mathematics encourages children to work in social situations reinforcing our school's values.

Social learning and peer- assessment plays an integral part in children's learning and understanding. Each child has the opportunity to work through and solve problems collaboratively, looking at similarities and differences between individual styles and approaches to solving problems.

### At St. James we develop SMSC in the subject of Mathematics by:

#### Spiritual

<p><u>Mirrors</u> (Reflection on thoughts and feelings).</p>	<ul style="list-style-type: none"> <li>• A core focus on understanding the 'Universal Language' of Mathematics.</li> <li>• In Mathematics lessons, pupils are always encouraged to delve deeper into their understanding of Mathematics and how it relates to the world around them. Extensive opportunities for problem solving are provided through the mastery approach of curriculum delivery.</li> <li>• Through the Maths No Problem Scheme of work, the open-ended 'Explore Task' provides opportunities to develop resilience and reflect on a variety of methods.</li> </ul>
<p><u>Windows</u> (Looking out)</p>	<ul style="list-style-type: none"> <li>• Opportunities for the application of Mathematics across the curriculum including a real focus on STEM subjects.</li> <li>• Appreciating the beauty of Maths through 'awe and wonder all around them.'</li> <li>• Opportunities for Maths in nature experiencing God's world.</li> </ul>
<p><u>Doors</u> (Stepping out into the world)</p>	<ul style="list-style-type: none"> <li>• Pupils are making connections between numeracy skills and real life. Maths can be used to explain the world around them.</li> <li>• Understanding different perceptions with progression in concrete, pictorial, and abstract representations ready for application in the world around them.</li> <li>• Following of Money Mentors in Years 5 and 6 to prepare children for use of money in the outside world.</li> </ul>

#### Moral

Maths supports moral development by encouraging children to make rational judgements and express their views with confidence, justifying their answers and the methods used, but also being willing to review and alter their initial views.

#### Social

Maths supports social development by encouraging children to cooperate and work well as a team to solve problems, sensitively challenging the opinions of others when necessary. We expect children to show excellent behaviour, and we aim to develop their understanding of the positive contribution that can be made to society through maths.

#### Cultural

Maths supports cultural development by providing a rich range of experiences, placing maths in real life contexts to develop children's awareness that maths is a life skill in all cultures around the world. Children enjoy cultural experiences such as number activities in French and using practical Maths. We aim to develop community links through Maths related fundraising activities, supporting Maths students from universities, and inviting visitors to speak to pupils about how Maths is linked to a wide range of careers.