



Mission Statement

“A Caring Christian Family Where We Grow Together”

MATHS POLICY

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Persons Responsible for Policy:	Executive Headteacher RCSAT
Approval Date	01/04/2017
Signed:	Director RCSAT
Signed:	Executive Headteacher RCSAT

Aims

We teach the knowledge, skills and language required to enable our pupils to be competent in (number, ratio and proportion, algebra, measurement, geometry and statistics). We also develop their ability to use and apply that knowledge and to think mathematically, enabling our pupils to make decisions, communicate, reason, explain, solve problems, follow lines of enquiry and investigate.

The aim of this policy is to:

- Ensure consistency of approach, methods, strategies, language, assessment and planning through the school
- Support progression in learning and confidence in the pupils
- Increase the confidence of our teachers and teaching assistants
- Help inform parents and governors of our methods and development.

We aim to develop pupils who:-

- Have the knowledge and skills across the range of mathematical disciplines.
- Are fluent in the above so that they can use and apply that knowledge and those skills in a range of situations (both real life and imaginary).
- Enjoy their learning of mathematics, willingly tackle their work and learn new mathematics but ask for help should they need it.
- Are confident mathematicians, able to solve problems by making decisions, communicating their ideas and using reasoning.

A Mastery Approach

Following extensive pedagogical research about teaching mathematics, we were particularly inspired by the approach of Ban Har Yeap and his focus on all children being ‘mathematicians’, with a solid conceptual understanding, rather than children who learn mathematical procedures.

We want our pupils to be confident mathematicians, who experience the full richness of an exciting and varied maths curriculum. The children learn in a fun and practical way which ensures they have a concrete understanding of concepts before moving on. Our approach to teaching maths enables children to work collaboratively, communicate their ideas clearly and problem solve effectively.

We use the National Curriculum as well as Singapore Maths to support our teaching and learning. These aims and objectives are taught across the school in daily maths lessons. Children work in mixed ability classes with daily discrete teaching of mathematics and also apply mathematical skills through a topic-based approach. Lessons are scaffolded to support struggling learners and rich, sophisticated problems are set to challenge advanced learners.

We believe that, where possible, lesson objectives should be taught in a real life, practical context. Maths should be engaging and resources are available in all the classes to support children to visualise their learning.

We aim to build pupils' understanding of mathematical terms and symbols steadily and systematically through the school. We provide opportunities for pupils to talk mathematically and to communicate

ideas on paper, in pictures, using written algorithms, with charts/diagrams etc. We appreciate that mathematical English may have different meanings from ordinary English and we highlight/explain those differences as appropriate (e.g. digit, volume, difference).

What does Mastery look like?

We are now using the 'Maths No Problem' Singapore text books and interactive resources to plan and teach our maths lessons. We aim to introduce the children to maths through the use of concrete, pictorial, abstract methods to give children a deeper understanding of how mathematics works.

The only way to achieve mastery is to build upon a solid foundation of conceptual understanding and procedural fluency. To ensure a deep level of understanding, it is necessary to move through the curriculum at a different pace to the method used in previous years.

The teaching of mathematics in the Foundation Stage consists of daily maths workshops that focus on specific areas of the subject. These sessions focus on counting, using number names in the correct order and recognising numbers in the environment. The children learn through a range of practical contexts using images, objects, stories, rhymes and songs to engage and promote the importance of number. The children are introduced to the language of 'more or less' and start to recognise simple shapes from everyday objects. They begin to develop early problem-solving skills to encourage them to use maths outside of the classroom. In Reception, maths teaching is based on the EYFS curriculum and supported by the use of White Rose 'Mastery Maths' resources.

Key Stage 1 and 2 pupils will spend much longer on certain key areas, such as place value and the four operations (+ - X ÷) to fully embed the concept before moving on, rather than how they were historically taught by spending a fortnight on each area, each term.

We explicitly teach each topic once throughout the year but these areas of maths are met continuously through our representations and lead-in stories in other maths lessons. Therefore, nothing is truly taught in isolation.

- Every lesson begins with a lead in story or anchor task ('in focus activity'). Children are given the opportunity to explore and investigate the problem with a friend and unpick what they need to find before developing a strategy for solving it.
- Personal journals are used for children to record their thinking, be that a calculation, a drawing or a bar model. These are not marked by the teacher and give the children the confidence to make jottings and try ideas out without the fear of being wrong. We then encourage through modelling, the recording of a 'most efficient' method.
- Children are provided with resources such as Dienes, place value counters, Cuisenaire rods, Numicon tiles or even just strips of card to fold and manipulate. Children of all abilities will use resources not as a calculation tool but as a way to model their thinking and demonstrate understanding of a mathematical concept.
- All children are capable of succeeding. In lessons, all children will have access to an age-related curriculum with differentiation being addressed through scaffolding and the level of depth at which tasks are pitched. All children are exposed to mastery tasks.

- Greater depth tasks are within the age-related objective for the lesson; they will explore the concept more deeply and apply the concept in reasoning and problem solving activities.
- Everyone moves through the curriculum at the same pace. Pupils who find specific concepts more difficult to grasp will be given extra support during interventions before, during and after lessons.
- The lessons are split into a 30-40 minute main teaching session, followed by a 15-20 minute application or challenge activity.
- Aim 2 of the National Curriculum is for pupils to be able to reason mathematically. In order to develop this ability, children need to be able to talk about their mathematics. Children are encouraged every lesson to talk through their reasoning using mathematical vocabulary and with the support of modelled stem sentences to help them to structure answers.
- We cover less content in each lesson but instead, focus on a single concept to explore and understand in depth. Lessons now provide the small building blocks required to develop a genuine conceptual understanding.

Assessment and Feedback

The children are provided with feedback every single lesson through our RAG rating system. We keep track of which children are able to access or move beyond the task and also those who need extra support on a daily basis to ensure that they are all given the opportunity to make good progress through extra intervention sessions and small group work.

We carry out White Rose end of unit tests for each year group and two, half yearly Maths no Problem tests. We also keep skills sharp through regular low stakes class-based tests.

What is age-related?

Follow the link to the National Curriculum website [here](#) to see what our children are expected to achieve in each year group. Some elements are statutory, others are not but we aim to teach as broad a curriculum as possible.

Fluency and Times Tables:

We teach maths fluency and times tables both in and outside the maths lesson for an extra 10 minutes a day during registration (challenge time). The focus of this is to make sure there are the building blocks of mental methods and quick recall of number facts to enable the children to then tackle the more problem solving and reasoning questions within lessons.

Times Tables Expectations:

A list of the sequence in which we teach times tables at RCSAT is as follows:

Year 2 - 2, 4, 5, 10

Year 3 - 2,5,10,4,8,3

Year 4 - 2,5,10,4,8,3,6, 11, 12,7, 9

Year 5&6 - All of the above with revision / embedding and inverse operations (division)

End of Year Maths Expectations:

There are files attached to this page which show the relevant end of year expectations for maths for each year group.

Homework

We include practical application of mathematics in our 'Take Away Homework' so that children can choose to engage in a meaningful task which challenges them to apply their skills. In KS2, we occasionally supplement this with paper based maths homework sheets and SATs revision in Year 6.

We expected children to practise times tables each week from Year 1 to Year 6. Teacher's will regularly assess the children's knowledge of times tables and their ability to apply this knowledge flexibly (and the inverse with division).

Mathletics is an online resource purchased by school to allow the children to access up to date maths activities set by the teacher to support their learning at home. Parents can access the resource portal via their child's login and password to support their learning, using the most up to date methods.

Here is a useful link below which explains the recent research project showing the positive impact that Mathletics has on the attainment of children in their maths tests at Primary School:

http://www.3plearning.com/uk/mathletics/oxford-report/?dm_i=3187,56FR,2R4CPZ,F7LN,1

Resources

We also use various practical resources such as Numicon to support our maths teaching. This resource set helps our children to make mathematical connections and to move from practical number activities to abstract calculations easily.

Here is a link to the Numicon webpage; you can access some free resources via the link.

<https://global.oup.com/education/content/primary/teaching-support/pages/numicon/?region=uk>

[Maths No Problem parent videos](#)

Appendix 1

Further information about Maths No Problem

At a glance:

- Singapore consistently top the international benchmarking studies for maths teaching
- A highly effective approach to teaching maths based on research and evidence
- Builds students’ mathematical fluency without the need for rote learning
- Introduces new concepts using Bruner’s Concrete Pictorial Abstract (CPA) approach
- Pupils learn to think mathematically as opposed to reciting formulas they don’t understand
- Pupils experience the same lesson routine every single session so it builds familiarity and security. The lesson sequence is: In Focus Activity, Let’s Learn, Guided Practice followed by independent fluency and problem solving and/or reasoning task to support all learners in their application of what they has been taught.
- Teaches mental strategies to solve problems such as drawing a bar model
- Singapore developed a new way of teaching maths following their poor performance in international league tables in the early 1980’s. The Singapore Ministry of Education decided to take the best practice research findings from the West and applied them to the classroom with transformational results.
- Based on recommendations from notable experts such as Jerome Bruner, Richard Skemp, Jean Piaget, Lev Vygotsky, and Zoltan Deines, Singapore maths is an amalgamation of global ideas delivered as a highly-effective programme of teaching methods and resources.
- The effectiveness of this approach is demonstrated by Singapore’s position at the top of the international benchmarks such as TIMSS and PIRLS and explains why their programme is now used in over 40 countries including the United Kingdom and the United States.
- Learn more about the [teaching methods](#) and [fundamental ideas](#) from Singapore including our approach to [bar modelling](#), [CPA](#) and [number bonds](#).
- Since 2007 Maths – No Problem! has helped hundreds of schools and parents teach the world-class methods from Singapore and we can use our expertise to help your school too. The Maths – No Problem! Primary Series was assessed by the DfE’s expert panel, which judged that it alone met the core criteria for a high-quality textbook to support teaching for mastery.

Programme based on established theories

Singapore maths is an amalgamation of global ideas delivered as a highly effective programme of teaching methods and resources. The approach is based on recommendations from notable experts such as Jerome Bruner, Richard Skemp, Jean Piaget, Lev Vygotsky and Zoltan Dienes.

Jerome Bruner

Bruner studied how children learned and put forward the Concrete Pictorial Abstract (CPA) approach to learning. He also coined the term “scaffolding” to describe how children build on the information they have already mastered. In his research on the development of children (1966), Bruner proposed three modes of representation: concrete or action-based (enactive representation), pictorial or image-based (iconic representation) and abstract or language-based (symbolic).

Based on his findings, Bruner proposed the spiral curriculum: a teaching approach in which each subject or skill area is revisited in intervals at a more sophisticated level each time. Using this technique of a spiral curriculum, material is presented in a logical sequence. Initially a concept is enacted with “concrete” materials, later it is represented by models (pictures) and then by abstract notation (such a plus or equals sign). These learning theories are the basis of the Concrete Pictorial Abstract approach which runs throughout the Maths – No Problem! Programme.

Richard Skemp

Skemp wrote about instrumental and relational learning in his paper “Relational Understanding and Instrumental Understanding” (Richard R. Skemp Department of Education, University of Warwick. First published in Mathematics Teaching 7 in 1976).

Skemp distinguishes between the ability to perform a procedure (instrumental) and the ability to explain the procedure (relational) and argues that these are two different methods of learning – relational and instrumental. Singapore maths aims for pupils to progress beyond seeing mathematics as a set of arbitrary rules or procedures so that they have a relational understanding.

Zoltan Dienes

Based on Dienes’ ideas (1960), systematic variation is used throughout the series. The idea is that you vary the lesson through a series of examples that deal with the same problem or topic. Variation can take the form of mathematical variability, where the learning of one particular mathematical concept is varied, and perceptual variability, where the concept is the same but the pupils are presented with different ways to perceive a problem and use different ways to to represent the same concept. The Singapore maths approach presents this in a systematic way to ensure pupils comprehend what they are learning.

International research

Singapore maths has produced a world-class level of achievement for many years. Singapore students scored first in the past three Trends in International Mathematics and Science Studies (TIMSS). These studies are conducted by the International Association for Evaluation of Educational Achievement (IEA). Singapore’s 4th and 8th grade students scored top place for Mathematics in 1995, 1999, 2003 and 2007.

UK adoption

The Department for Education, the National Centre for Excellence in Teaching Mathematics (NCETM), the National Curriculum Review Committee and OFSTED have all emphasised the pedagogy and heuristics developed in Singapore. Today, maths textbooks based on the Singapore maths approach are being used in thousands of schools across the UK and have been widely adopted by the Department for Education’s Maths Hubs.