St George's Catholic Voluntary Academy

Mathematics Policy

Introduction

This policy outlines the teaching, organisation and management of the mathematics taught and learnt at St Georges Voluntary Catholic Academy. The school's policy for mathematics is based on the Primary Maths National Curriculum 2014 document for the teaching of mathematics from Year 1 to Year 6 and the Early Years Foundation Stage (EYFS) curriculum.

Rationale

Mathematics is a tool for everyday life. It is a whole network of concepts and relationships which provide a way of viewing and making sense of the world. It is used to analyse and communicate information and ideas and to tackle a range of practical tasks and real life problems. It also provides the materials and means for creating new imaginative worlds to explore.

Essential characteristics we want to see in our pupils are:

• An understanding of the important concepts and an ability to make connections within mathematics.

• A broad range of skills in using and applying mathematics.

• Fluent knowledge and recall of number facts and the number system.

• The ability to show initiative in solving problems in a wide range of contexts, including the new or unusual.

• The ability to think independently and to persevere when faced with challenges, showing a confidence of success.

• The ability to embrace the value of learning from mistakes and false starts.

• The ability to reason, generalise and make sense of solutions.

• Fluency in performing written and mental calculations and mathematical techniques.

• A wide range of mathematical vocabulary.

• A commitment to and passion for the subject.

We at St. George's are committed to working in partnership with parents and ensure that they are kept informed about the curriculum being studied through our website and curriculum evenings.

Aims

The national curriculum for mathematics 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 (National Curriculum 2014)

Teaching Mathematics

All children in KS1 and KS2 participate in a daily mathematics lesson. The children in Early Years Foundation Stage (EYFS) will work towards their Early Learning Goals in line with EYFS curriculum. Our prime focus is to develop high levels of numerical understanding for all of our children. This is achieved by using the Big Maths approach to teaching number and 'Little Big Maths' for EYFS which is available to all classes, with online support.

What is Big Maths?

Big Maths is a systematic and structured approach to ensuring all children become numerate and then become fully rounded mathematicians. At the heart of this structure are the detailed sequences of learning through progress drives.

Big Maths ensures every child has a solid foundation of Core Knowledge before they

start to use and apply it to wider mathematical concepts such as shape, fractions etc.

Recognising the evidence of 'Cognitive Load Theory', Big Maths helps to manage the load

and maintain balance between working and long-term memory.

We do this with CLIC in the first 20-minutes of the maths lesson. This stands for Counting, Learn Its, It's Nothing New and Calculation and a child journeys through them chronologically before moving into wider maths in the remaining part of your lesson.

Some of the ways Big Maths incorporates 'Cognitive Load Theory' research are:

- Providing children with success criteria for every step
- Applying secured knowledge to increasingly challenging contexts
- Recognising the 'CLT' models for explicit instruction.
- Incorporating the ability to teach through enquiry-based learning

At St Georges, through a consistent and logical progression in learning, we aim to equip our children with the mathematical knowledge and understanding that they will be able to use and apply in their everyday lives. We strive to ensure that all children have fluency in basic number knowledge and are able to apply reason and logic to problems.

Big Maths provides an accurate and simple, but highly effective, framework that guarantees progress. This framework is known as CLIC (Counting, Learn Its, It's Nothing New and Calculation) is characterised by accurate steps of progression (known as Progress Drives) that make new learning easy by building on previous skills learnt. The CLIC resources provide progression at a glance as well as progression in detail. This ensures that all staff members teaching from the programme are following the same approach and therefore making learning clear for children. It also allows staff to fill in any gaps and to prevent future gaps from developing as all children make their way through the system with the necessary pre-requisite skills to meet new learning with further success and confidence.

Big Maths comes with a wealth of resources including jingles to help children learn their 'Learn Its.' http://www.andrelleducation.com/product/big-maths-beat-that-challenge-jingles/

<u>Big Maths Characters</u>

At St Georges we have the Big Maths characters displayed in every classroom so that children can directly link their learning across their school life. During each lesson on number, the children will experience CLIC taught in various ways, often using the Big Maths characters below.
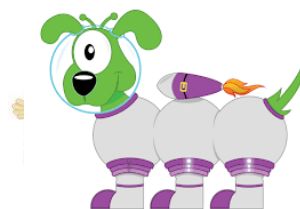
What is CLIC?
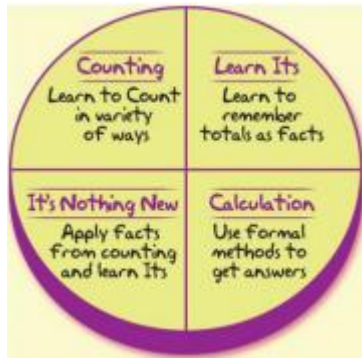
Counting – Counting is done in many ways including counting forwards and backwards in various increments; work on place value and reading and ordering numbers.

Learn Its – Learn Its are 72 number facts which are learnt throughout the years from Reception to Year 4. They are split across the different terms so that each class works on a few Learn Its at a time, to ensure they are fully embedded. 36 are addition facts and 36 are multiplication facts; these are learnt in class and practiced at home and are tested once a week in school through the 'Big Maths Beat That!' Challenge.

It's Nothing New – Children use a bank of facts and methods that they already have, to solve problems and that each step of progress is very small; children will use and apply their skills and methods to a range of different situations and problems.

Calculation – This is often the main part of the maths lesson which focuses on teaching solid written and mental methods for addition, subtraction, multiplication and division. The children move through progress drives which introduce small, focused steps of progress throughout the year.

Outer Numeracy

We follow an approach where we build on children 'Core maths' first so that they have basic skills needed to be numerate.

We call the rest of the mathematics curriculum 'Outer Numeracy'. When we zoom into Outer Numeracy we see four aspects but this time they are non-chronological. They are:

Real Life Maths: (think 'word problems') These are worded scenarios that ask children to solve problems that attempt to mimic real life. For example, 'There are 20 pencils in a box. 50 children need 2 pencils each. How many boxes are needed?' All CLIC skills can be taken into real life context.

SAFE Maths: (think shape, measure, fractions and data) This refers to a large amount of primary mathematics curriculum content. Virtually all of SAFE Maths is underpinned by a Core Numeracy element. Shape - 2D, 3D, Coordinates etc.. Amounts - Measures for distance, mass, angles etc. Fractions - Fractions of amounts, percentages, ratio etc.. Explaining Data - Graphs, probability.

Multi-Methods: (think 'Column Methods, Calculators and Cool Moves') These refer to more efficient aspects of numeracy beyond the core. For example, one might teach children to add using near doubles, or to solve 405 – 198 by adding 2 to both numbers. This means the question is easily re-written as 407 – 200 and the gap between the two numbers becomes clearer. These methods also include Column Methods and solving calculations using a calculator.

Dangerous Maths: (think 'number problems') This means maths problems that take the child out of their immediate comfort zone and require more creative and analytical thinking. For example, 'What is the highest square number under 1000?' Dangerous Maths also includes algebra and number patterns. We just use the phrase 'Dangerous Maths' as teachers to remind us that children shouldn't find this part of the maths curriculum easy.

Reasoning and problem solving at St George's.

A key part of our maths curriculum at St Georges is developing the children's ability to mathematically reason and solve a variety of problems. It is vital children are able to do this, as it shows that they have a deeper understanding of different concepts, and that they are able to apply their basic knowledge and skills to a variety of situations. In order to support this, we have introduced our "mastery dragons". They consist of supporting the children to: explain, prove, use, convince and evaluate.

Each dragon looks at how you can question the children, as well as providing them with a scaffold to answer the question. Both teachers and children really enjoy using them, and have noticed how they are supporting the children to reason in maths.
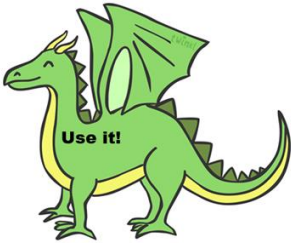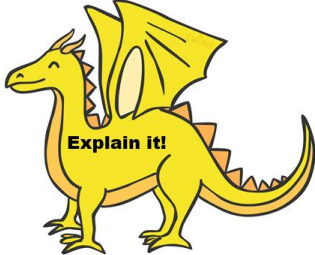
Progression in Reasoning

- *Step one*: Describing: simply tells what they did.

- *Step two*: Explaining: offers some reasons for what they did. These may or may not be correct. The argument may yet not hang together coherently. This is the beginning of inductive reasoning.

- *Step three*: Convincing: confident that their chain of reasoning is right and may use words such as, 'I reckon' or 'without doubt'. The underlying mathematical argument may or may not be accurate yet is likely to have more coherence and completeness than the explaining stage. This is called inductive reasoning.

- *Step four*: Proving: a watertight argument that is mathematically sound, often based on generalisations and underlying structure. This is also called deductive reasoning.
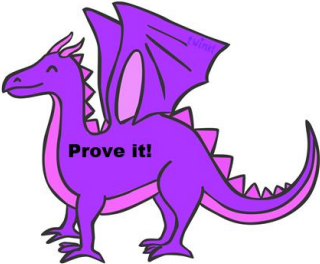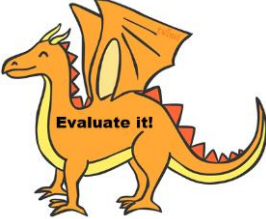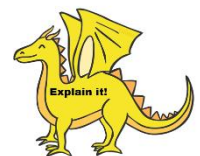
- *Step five*: Justifying: a correct logical argument that has a complete chain of reasoning to it and uses words such as 'because', 'therefore', 'and so', 'that leads to'

Progression in Questioning

Dragon	KS1	KS2
	How can you find the answer the fastest? Can you group these in some way? Where can this number go? Which manipulatives could we use to help us? What comes next? What have we been working on that might help with this problem?	Is there a more efficient method? Can you write it another way? What would be the best equipment to use to support us? Use your knowledge of…………. to………………? When would we use this method? Is there a way to record what you've found that might help us see more patterns?
	Both of these shapes have the same sides/corners etc. True or False? What is the first step you take to…..? Can you tell me how you got that answer? Can you draw it? What can you see?	Summarise how you solved the problem? Are there any other methods you could use to find the answer? How could you use this answer to work out….? What multiplication facts have you used to help you calculate 2400/6

	Can you see any patterns? What is the same and what is different? How did you group these? What's the same? What's different? Can you group these in some way? Can you see a pattern? How do you know that ….. is the missing number	Would you be able to use the same method to solve a different problem?
Prove it!	What have you found out? What can we use to help us find the answer? How do you know the answer is correct? How can you show me the answer is correct? Can you show me how you got that answer?	What have you discovered? Can you group these in some way? How can you use this equipment to check this answer? What do you know about counting that can help you with proving this answer is correct. How can this pattern help you find an answer? What have you discovered? How did you find that out? Why do you think that? What made you decide to do it that way?
Convince me!	Spot the mistake I think this is false/True Tell me what is wrong with … Is it ever false that …? (always true that …?) Are everybody's answers the same? Why/ why not?	What made you decide to do that? Why did you do it like that? Why have we got two different answers? Who is correct? Have we found all the possibilities? Who has a different solution?

		Are everybody's results the same? Why/ why not?
Evaluate it!	**Heavily scaffolded** Is there a quicker way? How do you know you have found the only answer? Is there more than one answer? How do we know we have found out all the possible answers?	Why did you use that method? Can you explain this in a different way? How would the method change if….? How many more solutions can you find? What would happen if we change…..? Can you find a different way to reach your answer? Could you choose a different method to solve this question? Do you think we have found the best solution?

Planning

Here at St George's all teachers follow the 'CLIC on your planning' MTP document. This covers all aspects of CLIC. It shows all progress drives both new and revisited. Planning will also reference reasoning DRAGONS and key misconceptions expected.

Assessment

Assessment for Learning (AfL) is a constant and ongoing process used by teachers to inform next steps in learning, to organise groupings for and during lessons and to actively adapt lessons to meet the needs of all learners.

We complete regular assessments as part of Big Maths weekly tests to identify learning gaps.

'Big Maths Beat That!' – timed challenge where children answer 'Learn Its' questions. The aim is to beat their previous score. (Friday)

CLIC test – 10 questions relating to concepts taught at children's individual level throughout the daily CLIC lessons. Once they have got 10 out of 10, three weeks in a row, they move onto the next level.

SAFE test- 10 questions based on shape, amounts, fractions and statistics. Once they have got 10 out of 10, three weeks in a row, they move onto the next level.

Each class has a file with weekly progress trackers, this is then analysed and mapped in line with national expectations. By doing this we can ensure that we identify any children who are currently off track and therefore put interventions and support in place.

We also Use 'PUMA' maths assessment termly to ensure we cover all aspects of the National Curriculum. From the tests we analyse the results in line with national expectations so we can highlight any weaker areas of maths or any children who are off track.

Calculation

Our calculation policy is directly in line with Big Maths. All teachers use the progress drives from the Big Maths handbook for planning and assessment as well the Big Maths column methods.
 For more information on this please see:
http://www.andrelleducation.com/product/big-maths-the-column-methods-sample/
For more information, please visit the Big Maths Website:
http://www.andrelleducation.com/big-maths/

Cross Curricular Links
Mathematics should not be taught in isolation from other areas of learning. Opportunities to embed learning from mathematics lessons are planned in long term, medium term and short term plans.

Differentiation

Teachers will include all pupils fully in their mathematics lessons. The tasks will be differentiated in a number of ways to ensure all pupils achieve their potential. Within in each progress step children will be taken through the 'Making it Stick' journey, starting from repeated practice questions, on to worded 'real-life' questions, finishing with deeper problem solving. This allows the teacher to continually challenge the more able children, hence allowing others to maintain pace, focusing on the core skill being taught.
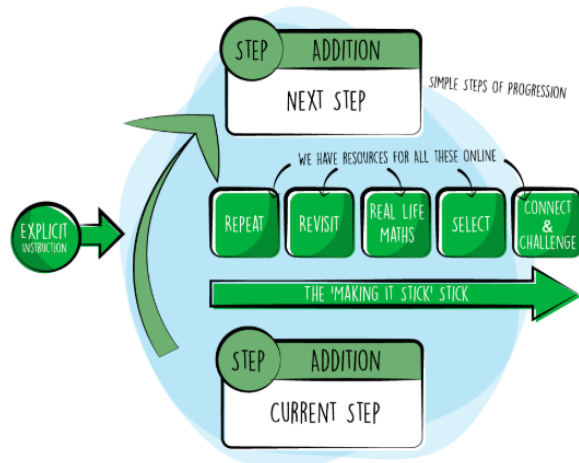
Intervention strategies, adult support and quality first teaching is used to ensure that all pupils make the best possible progress in mathematics.

Depending on the particular needs of a cohort, children may be organized into ability sets with the agreement of the Headteacher. If working in sets, work is differentiated further to meet the needs of all children.

Special Needs (including Gifted and Talented)

- ❑ Children with learning difficulties and those who are mathematically able are supported through a differentiated curriculum and are given opportunities to develop skills at an appropriate rate.
- ❑ Ongoing informal assessment, in the form of targeted questioning, and weekly CLIC and Beat That challenges directly informs the learning objectives set for each individual. As a result, appropriate challenges and opportunities are planned for and delivered.
- ❑ Children with specific mathematical learning needs, will have provision made through the targets set on their Individual Education Plans.
- ❑ Teaching Assistants and other adults in school are used to support individual children.
- ❑ The SEN policy gives details of the arrangements for specific support.

Homework

Homework activities are given to pupils in order for them to practice and consolidate their skills and knowledge, to develop and extend their techniques and strategies, and to prepare for their future learning.

Information and Communication Technology

ICT will be used in various ways to support teaching and motivate children's learning. ICT will be used in mathematics lessons when it is the most efficient and effective way of meeting the learning objectives. Example videos of the different calculation methods used are available on our website.

Marking

Refer to the marking of mathematics policy. Use 'Think for Pink' and children are given the opportunity to correct work during 'Red pen time'. Also challenge questions are given when all work is correct to promote challenge and progress in their learning journey.

Equal Opportunities

All the mathematics we work on shows positive images of the various groups in society. We seek to celebrate the mathematical heritage of all the cultures in the school and to recognise that the teaching and learning of mathematics comes from all over the world.

Monitoring

Monitoring the planning, teaching and assessment of Maths occurs termly to fit in with the School Development Plan, through the collection of assessment data, book scrutinies, pupil interviews, learning walks and observations.

Staff Development

Continuing Professional Development needs are identified by individual members of staff and by the Senior Leadership Team. Staff are encouraged to continue to update and extend their personal knowledge and understanding of mathematics on a regular basis. These are addressed in termly Staff Meetings, IRIS Connect teaching videos, master classes, school-based INSET, Numeracy Training Courses and individual work with the co-ordinators.

Resources

Working Walls and resources

Classes have a supply of items needed on a regular basis. Other mathematical equipment is centrally stored. It is easily accessible and available to use as required. Resources will be replaced and enhanced as necessary.

The Working wall includes the following:
- CLIC headings
- The current counting steps being taught or consolidated
- The current 'Learn-Its' displayed on fact family triangles with appropriate vocabulary statements displayed.
- It's Nothing New section which shows connections

- e.g. If I know 3 + 8 =11 I also know 11 – 3 = 8, 30 + 80 = 110, 30p plus 80p = £1.10 etc.
- The current calculation steps being taught.
- The current progress drives being taught.

A challenge area will be created in each classroom that provides a range of mathematical problems for the children to solve.

Policy, Review and Monitoring

The class teachers, the mathematics co-ordinator and the Headteacher will monitor the approaches detailed in this policy.

The policy has been drawn up as a result of staff discussion and has the full agreement of the Governing Body. The implementation of this policy is the responsibility of all the teaching staff.