The Quality of Education:
Mathematics - Purpose and Provision

St Christopher's:
A Church of England Academy

That person is like a tree planted by streams of water,
which yields its fruit in season
and whose leaf does not wither-
whatever they do prospers.

Psalm 1:3

The Purpose of Study

> “The study of mathematics, like the Nile, begins in minuteness but ends in magnificence”.
>
> Charles Caleb Colton

To enable everyone in our modern society to live well together, they must understand, comprehend and use the diverse nature of mathematics. It is a highly creative and interconnected discipline which has developed over centuries, used too as a tool to solve some of the great mysteries of God’s creations, the myriad of applications of a simple sine curve or the Golden ratio being prime examples. Blessed, therefore, is the one who can use mathematics in whatever form to advance our understanding of science and nature further so that life on earth may be sustained for future generations.

It is essential that all of our pupils are encouraged to build upon their understanding of number, the foundations of the structure of “quantity”, to realise that generalisations of most aspects of mathematics can be expressed algebraically; a concept that many find hard to comprehend. Pupils are shown how various strands of mathematics can be combined to solve problems necessary for our existence and success, from applications in science and industry to being financially literate.

We endeavour to enrich every pupil with as much understanding as possible so that they are able to succeed in whatever path life takes them down. For some, this will require a deeper study for which we are able to accommodate at A-level. All pupils will need to be able to select and apply a diverse range of skills from their comprehension of a given scenario and use them accurately to derive an appropriate solution.

Complementing the School Purpose

Foundation Scripture

Being able to use mathematics enables us all to prosper. Being able to use and apply requires mastery, gained by learning through thoughtfully prepared varied and frequent practice building confidence and resilience in every pupil, for those who do not wither.

Key Themes

Through carefully planned focussed mastery exercises, pupils are taught key skills which build upon previous knowledge. With careful validation and filling in gaps where necessary pupils are shown how to secure wisdom and understanding. Wherever possible the interconnections with and between the various strands in mathematics are highlighted so they can see “the big picture”.

There are often times in lessons when pupils are encouraged to discuss a variety of different mathematical problems. Learning how to live well together involves having the ability to listen, compromise and explain, often using language explicitly chosen to articulate their explanation to both their peers and teachers is an essential life skill to develop.

Christian Virtues

All groups and abilities of pupils will be given the opportunity to learn and achieve well, with meaningful and deliberate practice and exposure to demanding and thoughtful problems to comprehend and solve. Not only will these help to prepare them for their professional and personal responsibilities in adult life, but they will be encouraged wherever possible to make conjectures and identify trends or patterns in their results, exercising their mental development in the process.

Mathematics programmes of study are by necessity organised into apparently distinct domains, but we endeavour at every opportunity to demonstrate how common skills can be easily transferred between them. In key stage 2 pupils would have been exposed to a method of multiplying large numbers together, where a similar process could be applied in the preliminary stages of manipulating algebraic expressions before a more abstract process is followed.

Mathematical activities are provided to support pupils with the mental challenge of thinking ahead for their future. In key stage 4 for example pupils take part in study skills days, part of which focus on the social and cultural applications of finance. Choosing a utility provider, or learning about taxation and pension contributions as percentage of earnings and how this effects take home pay for example.

Complementing School Provision

It is expected that the majority of pupils will move through the prescribed National Curriculum programmes of study for mathematics at broadly the same pace. In reality, by the beginning of key stage 3 it is evident that some pupils have not yet firmly grasped the skills needed to encounter new links across the domains, and others are fluent in their understanding of the primary objectives, and need exposure to new challenges in mathematics. This therefore requires a small degree of 'streaming' by prior ability. But whatever the ability of the class some core and routine teaching strategies are deeply embedded in all lessons. A key skill of the teacher is the ability to assess each pupils understanding of what has been taught, because each foundation stone that is missed will weaken the understanding in the next steps of learning. Our teachers are equipped with a tool box of skills which aim to assess pupils' progress in a variety of ways; the reflective use mini-whiteboards for example are a regular and key component of our lessons. They provide pupils with an informal and non-threatening way of expressing their mathematics and of receiving feedback. We find that many small misconceptions are rapidly fixed with a variety of respectful teacher-pupil and pupil-pupil interactions.

Pupils are only able to learn if they comprehend the explanations and examples given by their teachers. They are therefore exposed to a variety of techniques to embed each skill or objective. This can vary between concrete-pictorial-abstract models in the learning processes to carefully posed thought provoking counter-questions from the teacher.

Varied and frequent practice is used regularly for all pupils and students of all abilities, and we follow current research and teaching pedagogy closely, noting the significance of interleaving and spacing in the exercises that pupils complete to embed their understanding.

The provision of study of mathematics goes beyond the scope of the national curriculum in several ways. More able pupils in key stage 4 are invited to follow the level 2 qualification in further mathematics in order to better prepare them for their A-level studies. Further mathematics is also offered at A-level for those students who have a deeply rooted curiosity of the subject, many of whom go on to study it at some of the best universities in the country. Towards the end of key stage 3, pupils in year 9 will undertake a prolonged statistical study which allows them to make hypotheses between a number of variables and use their data handling skills that they have learned to analyse and test their conjectures.
We are all teachers of literacy, and even more so now in mathematics than ever before as the problems that we seek to solve become increasingly more complex. Reading each question carefully and having a firm grasp of the variables and constraints is therefore vital in reaching a solution. In a similar vein, all staff in school are teachers of numeracy, however they encounter it in their subject area. The maths team have gone to considerable lengths to reinforce the strategies and techniques employed in a wide variety of numerical calculations to avoid any confusion caused by teachers teaching different methods to what the pupils are used to. Programmes of study have been examined across several subjects to ensure that specific content has been covered in their mathematics lessons so that the pupils have the necessary tools available to them wherever possible.

Ad Gloriam Dei

To the Glory of God

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