Mathematics

Curriculum Philosophy

The Mathematics Department at St. George's is **committed** to the integration of **Christian values**, namely **dignity, hope, community, wisdom, humility, and kindness**, in our curriculum. Our goal is to cultivate **aspirational** learners who understand the significance of their education in God's plan. At the heart of our mission lies a recognition of the **inherent worth and dignity of each individual,** reflected in our curriculum by promoting Mathematics as a means to **serve and uplift humanity**. Through the study of mathematical concepts and problem-solving, we strive to instil hope in our students, **challenging them** to overcome obstacles and reach their **full potential**. Community is central to our approach, as we foster a supportive and inclusive learning environment where students can collaborate and share their ideas, recognising the interdependence of all people in God's kingdom. In addition, through exploration of the **abstract and logical foundations** of mathematics, we aim to develop students' **wisdom and humility**, encouraging them to reflect on their beliefs and **broaden their perspectives**. We believe that mathematics is a tool for serving God and others, and strive to impart this belief to our students as we equip them for lives of service and excellence in His name.

Our Mathematics department develops **successful mathematicians** who enjoy the subject and are able to **view the world** around them through the lens of mathematics. We want our pupils to have **choices** once they leave St George's, the choice to do **highly skilled jobs** in a world where many jobs are becoming automated and we recognise that a strong mathematical background is key to getting these highly skilled jobs in many areas.

One of the keys to ensuring pupils enjoy maths is for them to see its **relevance and application** in the real world, not just in 'everyday life' but to see that it is used in many of the most highly skilled careers and that our pupils can absolutely aspire to pursue them.

At the beginning of their St George's maths journey we build on what the pupils have learned at Key stage 2 with a focus on mastering at a greater depth the foundations of mathematics, promoting a **deep understanding** of the key principles of mathematics. **Quality teaching and learning** is the key to creating **successful and enthusiastic mathematicians**. It is an absolute priority in our department for our youngest mathematicians to be properly nurtured.

As pupils progress we build on those foundations and equip the pupils with the skills to tackle complex problems that require a wider range of 'tools'. As a result of the real focus on depth of understanding, pupils are able to **apply multiple skills to unfamiliar problems** without 'compartmentalising' different topics but seeing the link between the different areas of maths.

By the end of their journey at St George's we expect pupils to recognise the **beauty in sophisticated mathematical methods;** be **analytical thinkers and have a thirst for mathematical reasoning** which will allow them to **thrive in their future roles in society**.

In order to achieve a true understanding of mathematics topics have been intelligently sequenced based on the following rationale:
The overall aim of the mathematics curriculum is to provide pupils with the knowledge they need to **increase their cultural capital and be successful in their lives** beyond the academy. By adopting a spiral curriculum, in which topic areas are revisited and extended on a yearly basis, this sequence of learning promotes a deeper understanding of the mathematical concepts being taught, both in-line with the National Curriculum and in the wider domain.

Knowledge and application are interleaved throughout the curriculum, with constant links to real life context, unfamiliar problems and abstract mathematical problems.

The concept of **interrupting the forgetting process** permeates the mathematics long-term plan and schemes of work (SOW). Interleaving and spaced learning are utilised in several ways. Across each year, new learning is split into units of work, each beginning with quick revision, then focusing on extension and application of similar learning the year before. As a result, pupils will consistently revisit topics (spaced learning) and interleave concepts throughout their mathematics career. Every lesson begins with a 'Do Now', which promotes recall of integral knowledge, along with applied practice, from topics in the previous lessons. Learning is assessed at the end of each Progress Period, this is teacher marked and time is allocated for reteach and **closing of gaps**. In addition to this we assess the learning of pupils on a lesson by lesson basis through effective questioning and AFL – there is opportunity every lesson for independent practice while the teacher circulates and supports.

The mathematics curriculum will address social disadvantage by addressing gaps in pupils' knowledge and skills:
The spiral nature of the mathematics curriculum is designed with the most vulnerable pupil in mind, assuming a basic mathematical understanding from previous learning, each progress period builds the pupils' knowledge. We use allocated 'Closing the Gap' time to ensure fluency in fundamental mathematics by closing any knowledge gaps evidenced in assessment, whilst also providing suitable extension.

Disadvantaged pupils are supported to succeed in mathematics through prioritised intervention. Pupils with special educational needs or disabilities have additional support. Over-timetabling and double staffing are used all through to target this cohort to help close any gaps. Such pupils also receive further intervention through 'Morning Mastery' & 'Prep'.
All pupils access the same curriculum, we have the **highest expectations of all.**

We fully believe mathematics can contribute to the personal development of pupils at St George's:
Pupils will be encouraged to develop socially in mathematics lessons through the celebration of making mistakes; setting **high expectations** helps pupils to develop listening and speaking skills. Self-awareness is developed through self-assessment, which enables pupils to have an accurate understanding of their strengths and weaknesses, to accept them and to understand how to learn from them.

Developing morality is evident in much of the mathematics curriculum where there is reference to real life contexts, and pupils are encouraged to make decisions thus developing an understanding that certain choices may have different consequences and outcomes. Examples of this include discussions regarding 'loan sharks' when learning about percentages, as well as how the media can use misleading statistical diagrams.

By encouraging pupils to question how mathematics impacts the way the world works we promote the spiritual growth of our pupils. Referring to 'big issues 'such as the gender pay gap, birth and death rates, gambling through probability, and global warming within contextual questions allows pupils to have a concrete understanding of where mathematics fits into the bigger picture. Teaching a variety of strategies that allow creativity to blossom (i.e. tessellation, construction and symmetry)

Mathematics is a universal language utilised throughout the world and throughout history. Discussion when introducing many topics, such as place value, time, Fibonacci sequences, Pythagoras and Trigonometry to name a few, allows cultural influences to be explored.

At KS3 and KS4, our belief is that homework should be interleaved revision of powerful knowledge that has been modelled and taught in lessons. This knowledge is recalled and applied through a range of low-stakes quizzing and practice.

Opportunities are built in to make links to the world of work to enhance the careers, advice and guidance that pupils are exposed to:
The mathematics curriculum provides pupils with opportunities to **consider the world of work** and how mathematics leads to successful careers. Units of work contain careers spotlights where pupils are introduced to a variety of careers, which utilise the learning of the unit. Information about qualifications needed, salaries and career progression are also referenced.

Curriculum Sequencing

All children are entitled to a curriculum and to the powerful knowledge that will open doors and maximise their life chances. Below is a high-level overview of the critical knowledge children will learn in this particular subject, at each key stage from Year 7 through to Year 11, in order to equip pupils with the cultural capital they need to succeed in life. The curriculum is planned vertically and horizontally giving thought to the optimum knowledge sequence for building secure schema.

		Sequencing
Year 7	Progress Period 1	- Analysing and displaying data – Number skills – Expressions, functions, formulae and equations – Decimals and Measures – Area and Perimeter
	Progress Period 2	- Fractions, decimals and percentages – Probability – Ratio / proportion
	Progress Period 3	- Lines and angles – Sequences – Graphs – Symmetry and Transformations
Year 8	Progress Period 1	- Calculations (including with negatives) - Powers, roots and brackets – Primes, Multiples and factors – Area of triangle, parallelogram and trapezium - Volume of cubes and cuboids - 2D representation of 3D solids - Surface area - Measures and units - Circumference and Area of a circle - Data Handling
	Progress Period 2	- Algebraic Expressions – Solving Equations – Real life graphs – Decimals and Ratio
	Progress Period 3	- Angles in parallel lines – Angles in Polygons – Calculations with Fractions – Equations of lines – Fractions, Decimals and Percentages

Year 9	Progress Period 1	- Number skills - Indices and roots – Factors, multiples and prime factor decomposition - Algebraic manipulation	- Indices – Algebraic manipulation – Forming and Solving equations – Standard index form - Surds – HCF, LCM and prime factor decomposition – Estimating – Straight line graphs
	Progress Period 2	- Substitution - Representing and interpreting data – Fractions, decimals and percentages	- Sequences - Representing and interpreting data – Averages and range from frequency tables – Fractions, decimals and percentages - Representing and interpreting data
	Progress Period 3	- Equations and inequalities - Rearranging formulae - Sequences – Properties of shapes, Polygon and angle facts – Pythagoras' Theorem	- Ratio and proportion - Polygons and parallel lines – Pythagoras' Theorem and Trigonometry – graphs of real life situations
Year 10	Progress Period 1	- Averages and range from frequency tables – Perimeter, Area, Volume – Real life Graphs – Straight line Graphs	- Perimeter, Area and Volume – Accuracy and bounds – Transformations – Constructions, Loci, Bearings – Quadratic equations – Straight line graphs
	Progress Period 2	- Transformations – Ratio - Proportion - Plan, elevation, Constructions, Loci and bearings	- Simultaneous Equations - Inequalities – Compound Measures – Repeated % change - Similarity and congruence - Probability – Box Plots and Cumulative Frequency - Proportion
	Progress Period 3	- Pythagoras and Trig – Probability – Multiplicative reasoning	- Sine and Cosine rule – 3D trig -– Trig graphs – CF, Boxplots and Histograms – Further quadratics and non-linear graphs – Circle Theorems – Circle Geometry
Y 11	Progress Period 1	- Quadratics – Circles, Cylinders, Cones, Spheres – Fractions and Reciprocals – Indices and standard form – Similarity, congruence – Vectors – Standard Graphs – Simultaneous equations	- Product rule for counting & Capture and recapture – Further algebra – Surds – Functions - Proof – Vectors and Geometric proof - Proportion – Graphs, Gradient and Area under graphs – Transformations of functions – Iteration – Non calculator trig