



Curriculum Intent Document

Mathematics Department Ranelagh School

Core Values in Mathematics

Though we are many, we are one body

Eucharistic Prayer, Common Worship

The Mathematics Department at Ranelagh School challenges students to be the best they can be at mathematics, by embedding the core values of the Ranelagh School Learner Profile (RSLP):

- **Confidence** –
Self-assured students are more likely to take mathematical risks, see mistakes as learning opportunities, and be open to new learning experiences. They have self-belief so that even when learning is difficult, they are willing to tackle complex problems.
- **Resilience** –
Students can keep learning even when they find mathematics difficult. They show stamina when they need to work for long periods on challenging problems, knowing that their perseverance will aid success.
- **Curiosity** –
Students who are keen to enquire will ask mathematical questions and have a genuine interest in learning more. They are inquisitive, so work hard on further developing their skills and knowledge. They are more likely to understand their own mathematical abilities, interests, and future aspirations.
- **Creativity** –
Students use inventive, resourceful, and original ways to learn mathematics. Mathematical projects are designed, alongside various other paired and group activities, to enable students to demonstrate their ingenuity and imagination.
- **Empathy** –
Students listen, understand, and learn mathematics from others as well as their teachers. Teamwork is valued; they show warmth, humour, and positivity when collaborating effectively with others.
- **Independence** –
Students are self-motivated, they understand how to learn mathematics and can develop a plan to master a topic. They have self-belief, can access resources, and know how to learn successfully beyond Ranelagh.

Core Values in Mathematics

“It is better to understand a little than to misunderstand a lot” – Anatole France.

**“Mathematics is the most beautiful and most powerful creation of the human spirit” –
Stefan Banach.**

We believe that students deserve a mathematics curriculum that

- is taught by specialists through carefully crafted lessons,
- is challenging while being accessible through carefully pitched activities,
- is aspirational while attainable through structure and high expectations for all,
- is rich in depth and breadth while appropriate through our knowledge of their prior understanding,
- ignites curiosity through our passion for mathematics and our carefully planned questioning,
- underpins everyday life and future employment through application,
- graduates in depth appropriately through Years 7 to 11 and into the sixth form, should students wish to study Mathematics at a higher level.

Our mathematics curriculum will give students opportunities to:

- develop resilience through problems that are a 'manageable challenge',
- develop confidence and independence through careful scaffolding of learning and a safe learning environment,
- become fluent in the fundamentals of mathematics, helping students prepare for future life,
- develop the ability to recall and apply knowledge rapidly and accurately with conceptual understanding,
- have the time to think deeply, discuss and argue about mathematical ideas,
- reason mathematically by following a line of inquiry, conjecturing relationships and generalisations,
- develop an argument, justification, or proof using mathematical language,
- develop problem-solving skills by applying known mathematics to a variety of routine and non-routine problems with increasing sophistication,
- build knowledge and skills throughout their mathematical journey,
- understand what they have mastered and how they need to improve, through formative assessment and teacher verbal feedback.

*We are responsible for teaching mathematics well ... “**mathematics is the language in which God wrote the universe**” ... Galileo Galilei.*

Implementation of the curriculum is through a pedagogy underpinned by:

- a spiralling curriculum basing future teaching on the building blocks previously learned
For example, the topic of Mensuration:
Year 7, 2-D mensuration to Year 8, 3-D Mensuration to Year 10, complex and compound shapes in both 2-D and 3-D to
Year 11, multi-topic problems including mass, density, cost or bounds in mensuration problems,
- specialist teachers delivering a subject they are passionate about, continuing their professional development (CPD) through sharing good practice within the department and through external courses,
- setting based on current mathematical ability. Students start to be partially streamed after the first half term in year 7, with placement reviewed at least once per year as deemed necessary
- a two-year KS3 course that follows the National Curriculum with a Scheme of work (SOW) adapted by specialist teachers to serve the needs of students, scaffolding work at all levels to ensure students are supported and stretched. Enrichment is provided within all topics including entry in UK Mathematics Trust (UKMT) Challenges. When needed, students concentrate on securing the essential building blocks within topics before progressing to harder content. SEND and PP students are supported through quality first teaching in lessons, 1-to-1 and small group support,
- a three-year GCSE course that re-visits previously learned topics to fix in long-term memory whilst layering increasingly complex topics,
- a mastery approach allowing time for topics to marinate and therefore be embedded in long-term memories. Ranelagh regularly assesses student understanding, enabling students to identify misconceptions and celebrate success
Topic testing involves:
“pre-test topic practice” followed by “post-test repair”, using resources that support and enhance independent learning,
- exchanging questions and ideas, which we consider to be a valuable aspect of working mathematically
Outstanding questioning is at the heart of mathematics lessons and oral participation is encouraged,
- variation to develop both holistic understanding and procedural fluency through repetition of key facts to free up working memory while being fully engaged in learning,
- feedback that addresses misconceptions promptly:
 - We learn by studying our mistakes and misconceptions, and distinguishing between the two,
 - Oral questioning and remediation of classwork errors within the lesson, together with the formal end-of-topic tests and multi-topic exams provide opportunities for developing skills and understanding.

Mathematics programme of study- KS3 and KS4

We have designed a mathematics curriculum at Ranelagh School that fulfils several aims. The first of these provides the students entering Ranelagh with a secure understanding of the key skills that are required to further develop their mathematical understanding. We are aware that students arrive at Ranelagh from a variety of feeder schools and we wish for the students to continue to develop and embody the RSLP qualities regardless of their starting point.

The curriculum at Ranelagh is a spiralling curriculum. This ensures that students can develop and deepen their knowledge in the various strands of mathematics; revisiting content regularly and building on prior knowledge to increase and enhance understanding, regardless of ability. Our aim is that frequent revisiting and retrieval of key facts and linking topics across the curriculum will enable students to develop mathematical fluency.

In mathematics, students are encouraged to develop skills that will not only prepare them for the next stage in their mathematical journey at Ranelagh but also for their future careers. Mathematics is not just a subject to be studied at school. The aim is for Ranelagh to help prepare students with a 'mathematics toolkit' which students will continue to add to throughout their time in school. When students leave us, they will be confident that they can approach their future careers with confidence and the ability to succeed, whatever future path they choose.

The KS3 and KS4 curriculums have been designed so that the schemes of work are flexible and students can progress along their individual pathways. Lessons are designed along a common theme/topic; however, teachers have the professional autonomy to adapt the content of the scheme of work, whilst still staying in line with the overarching theme, adapting to the individual needs within their classroom. Teachers will teach the content using their own teaching styles, ensuring that the content of the lesson is delivered whilst also helping the students to develop key skills highlighted in the RSLP. Problems will be modelled for students and broken down to provide clear steps. Students will encounter more traditional problems and then start to link ideas and concepts together including cross-topic links and they will also encounter problems that they are more likely to see in the real world.

At KS3 and KS4, assessments overlap across sets, enabling students to attempt the highest possible assessment of which they are able. This enables them to stretch themselves at every opportunity. The schemes of work are adapted regularly and staff work together to help students achieve the best possible outcomes. Targeted intervention and support are provided to students in all key stages both within the classroom, in form time, and outside of lesson time.

Students begin their KS4 mathematical journey in year 9, following the OCR syllabus. The A01, A02, and A03 objectives (mathematical fluency, mathematical reasoning, and problem-solving) are developed in each of the topics, ensuring students understand the core elements, whilst being able to apply these skills to problem-solving and cross-topic situations. The spiralling curriculum means that students do this at all stages of their mathematical journey, developing their skills and understanding as they move further up the school.

All five key strands of mathematics (number, algebra, ratio & proportion, geometry, and statistics & probability) are studied and revisited as students progress. Students are formally assessed throughout the year and these larger assessments act cumulatively, including questions from previous topics to show students how their mathematics links together but also to help students prepare for their GCSE assessments. Students will be introduced to GCSE-style questions as early as KS3 where appropriate, so that students get used to how questions can be laid out and how they should show their working to deliver the most effective answer. Students will be able to develop skills to help them avoid common errors and misconceptions and they will know the key command words used in examinations as well as be able to tackle the large problem-solving questions within a GCSE examination.

For the most able, students at KS4, students in the top set across years 9 – 11, students can work towards the Further Mathematics AQA Level 2 Certificate. This allows these students to further develop the more challenging topics within GCSE and to learn some topics that act as excellent bridging to the A Level in Mathematics. These students study the GCSE mathematics course but the further mathematics topics are interwoven into the scheme of work and additional topics are delivered towards the end of the course.

Homework at KS3 and KS4 is delivered through several platforms. The main platform used is Sparx Maths which has proved very effective at providing students with consolidation work from their lessons. In addition, the platform can be used to further develop understanding as it adapts to the needs of the students, tailoring difficulty levels as the student completes work. Students have found the revision aspects of this incredibly useful when preparing for examinations at all levels. In addition to Sparx Maths, students also have access to online textbooks, through Kerboodle, various websites and videos as well as more traditional style worksheets and questions to aid their learning.

The scheme of work for KS3 and KS4 may be seen below. This is a fluid scheme of work, adapting to the needs of the individual cohort as they progress through the school.

The further maths students study the topics in **red** when they enter KS4 and **bolded topics** are higher tier only at KS4.

Year	Autumn Term	Spring Term	Summer Term
7	- Introductory Numeracy Lesson - Multiples factors and primes - Lines, Angles, and Properties of Shapes - Constructions, Triangles and Polygons - Negative Numbers – Add and subtract - Ratio and proportion - Perimeter and Area 2-D only	- Introducing Algebra - substitution - Sequences - Straight Line graphs; horizontal & vertical - Statistics –including project - Mental Calculations - Written Calculations	- Decimal calculations - Using a Calculator – more buttons! 3-D drawings, Plans and elevations - Set Theory and Venn Diagrams - N.B. This term includes projects to enhance problem-solving.
8	- Number work - Problem solving - Fractions, Decimals - Angles and polygons - Probability - Percentages - Transformations	- Negative Numbers – multiply and divide - Equations - Formulae - Statistics – including project - Area and Volume 3-D	- Area and Volume project - Straight Line graphs – $y=mx+c$ - Growth and Decay - Vectors - Curve stitching project - Similar triangles - This term includes projects to enhance problem-solving
9	- Rounding, decimal places, and significant figures - Probability - Compound measures - Angles - Algebraic expressions - Further Algebraic expressions - Calculator use and basic sequences	- Calculator use - Sequences - Coordinates and Graphs - Linear equations (Including simultaneous) - Formulae - Further sequences and limit of a sequence - FM Notation for graphs and applications of coordinate geometry - Factors, multiples, primes, powers, roots, and standard form	- Multiples, factors, primes and roots - Standard form - Bearings and scale drawings - Plans and elevations - Pythagoras and Trigonometry 3D Pythagoras and Trigonometry - Introduction to non right-angled triangles

Year	Autumn Term	Spring Term	Summer Term
10	 Pythagoras' theorem and Trigonometry  Fractions, Decimals and Percentages  Perimeter Area and Volume  Inequalities  Trigonometry in non right-angled triangles  Algebraic expressions  Factorising and solving quadratics including harder quadratics  Inequalities including quadratic inequalities	 Transformations  Vectors  Number operations  Ratio and Proportion  Estimation and Bounds  Further inequalities	 Numerical methods  Non-linear graphs  Statistics  Project work is included in this term  Drawing and sketching functions  Harder simultaneous equations  Factor theorem  Circle theorems and angles recap  Function, domain and range
11	 Rounding to decimal places and significant figures  Quadratics (Foundation and Higher)  Solving Quadratic Equations  Simultaneous Equations with Quadratics  Transformation of graphs  Revision and Enhancement of Year 9 topics  Matrices  Equation of a circle and tangent  Binomial Expansion  Algebraic fractions recap  Calculus	 Revision and Enhancement of Year 10 topics  Proportion when revisited from year 9/10  Coordinates and graphs FM  FM Inequalities	Final exam preparation

Mathematics programme of study- KS5

A level Mathematics

Mathematics is everywhere. It is the language of science and nature and forms the building blocks of the natural world. It is a beautiful subject, and studying mathematics at a higher level opens so many doors to other future pathways. Students who have chosen to take Mathematics in the sixth form, have the opportunity to further develop their mathematical skills and experience the incredible complexities and applications that this subject offers. After finishing KS5, they could go on to study Engineering, Statistics, Actuarial Science, Medicine, Pharmacy, Psychology, and Optometry to name but a few.

We understand that there are a variety of reasons that students choose A-level mathematics. For example, they enjoy and excel at it, and/or they need it to support a future career. Whatever the reason, students who study mathematics will continue to improve their planning skills and resilience, they will become highly analytical, they will be able to find solutions to more complex problems, and will learn about the applications of mathematics in more detail.

Our aim for our sixth-form students is that we:

- promote confidence, perseverance, adaptability, and curiosity, ensuring that students enjoy their learning and want to further their study
- continue to develop independent and collaborative learners
- cultivate transferable skills that help prepare our students for future study and careers, whatever the student's pathway ends up being
- inspire students and encourage them to strive for academic excellence
- offer many different approaches to teaching and learning that both engage and motivate our students

We expect at least a Grade 7 at GCSE with strong skills in algebra for students to enrol on the A-Level mathematics course, otherwise, students are likely to find the content of the course too much of a stretch at this stage of their schooling. We follow the Edexcel specification for A-level mathematics.

Before the start of the course students are provided with resources to enable them to begin the course confidently, a basic skills entry test is given within the first week to ensure suitability and where there is doubt, support is put in place.

For all KS5 courses, topic assessments made from past paper questions ensure students know what they must work on and indicate the likely grade outcome. Review sheets for each topic enable students to remediate and strive for mastery.

Students receive 8 hours of teaching fortnightly in year 12 and 9 hours fortnightly in year 13, split between two teachers, covering pure mathematics, statistics, and mechanics. They are expected to do an hour of independent work after each lesson to consolidate and embed their understanding.

Year	Autumn Term	Spring Term	Summer Term
12	Core: - Algebraic expressions including Indices and Surds - Quadratics including solving quadratics, completing the square, functions, and the discriminant - Equations and inequalities including simultaneous equations - Graphs and transformations including sketching graphs and transformations - Straight line graphs - Circles - Algebraic methods including algebraic fractions, dividing polynomials, and factor theorem - Proof - Binomial - Radians arcs and sectors - Trigonometric ratios	Core: - Trigonometric identities and equations - Vectors - Differentiation - Integration - Exponentials and Logarithms Statistics: - Data Collection - Measures of location and spread - Representation of data - Correlation - Modelling in mechanics - Constant acceleration - Forces and Motion	Statistics: - Probability - Statistical Distributions (Binomial Distribution) - Hypothesis Testing Mechanics: - Variable Acceleration Core: - Algebraic Methods including proof - Functions and graphs - Sequences and series
13	Core: - Binomial (Year 2) - Functions and graphs continued - Radians arcs and sectors recap - Trig Functions - Trigonometry modelling - Parametric equations - Differentiation	Core: - Finish Differentiation - Finish Trigonometry modelling - Numerical Methods - Integration - Vectors Statistics - Regression - Probability 2 Mechanics - Moments - Forces and Friction - Projectiles Revision	Statistics - Finish Probability 2 - Normal Distribution Mechanics - Application of Forces - Further Kinematics Final exam preparation

Further Mathematics

A-level Further Maths is a highly desirable qualification for students who have a particular passion for mathematics and aim to excel in STEM-related fields. It not only strengthens academic performance but also opens doors to exciting career and university opportunities.

This course is taught separately, with the A-level exam being taken at the end of Year 13 alongside the A Level in Mathematics. To enrol on the A Level Further Mathematics course, we look for students to have achieved a grade 8 or higher in Mathematics in their GCSE examinations. The examination is delivered according to the Edexcel Specification the same as the A level course. Students study their Mathematics qualification alongside the student taking Mathematics only and receive a further 8 hours in year 12 and 9 hours in year 13 to study the Further Mathematics content. As with the Mathematics qualification they also have study periods for the Further maths.

Ranelagh school uses both Edexcel for A Level Mathematics and for Further Mathematics. For the Further Mathematics, students take three modules; Core Mathematics takes up 1/2 of the course, and the other half is evenly split between two other modules. Students will always take Decision Mathematics as we feel it is important they study this where possible, it does not appear in the A Level Mathematics course. The other module taken is year dependent and will either be Further Mechanics or Further Statistics dependent on cohort and the teachers teaching the qualification.

Specialist Mathematics teachers deliver the content throughout the entire course and students develop a deeper understanding of key Mathematical concepts that enable them to provide a springboard to courses either in Mathematics or with Mathematical content at a higher level.

The teaching by term for years 12 and 13 Further Mathematics is on the next two pages. Please refer to the A Level section for the A Level content.

Year	Core Maths topics	Decision Maths topics	Statistics topics (option 1)	Mechanics topics (Option 2)
12	Year 12 Core:  Complex Numbers  Argand Diagrams  Series  Roots of Polynomials  Volumes of Revolution  Matrices  Linear Transformations  Proof by Induction  Vectors  Polar Coordinates	Decision Maths - Algorithms - Algorithms on Graphs - Algorithms on Trees - Critical Path Analysis - Linear Programming - The Simplex Algorithm	Statistics  Discrete Random Variables  Poisson Distribution  Geometric Distribution  Discrete Probability Distributions  Chi-Squared Tests  Probability Generating Functions	Mechanics - Momentum and Impulse - Work, Energy and Power - Elastic Collisions in One Dimension - Elastic Strings and Springs - Elastic Collisions in Two Dimensions - Elastic Energy

Year	Core Maths topics	Decision Maths topics	Statistics topics (option 1)	Mechanics topics (Option 2)
13	Year 13 Core: • Complex Numbers • Hyperbolic Functions • Differential Equations • Polar Coordinates • Maclaurin Series • Methods in Calculus • Further Vectors • Conic Sections	NB The above topics for Decision Maths are taught across year 12 and year 13	NB The above topics for Statistics are taught across year 12 and year 13	NB The above topics for Mechanics are taught across year 12 and year 13