Year 13 Further Maths

What have students at St. Crispin's been taught to understand and be able to do?

Core Knowledge

Year 13 – Students are taught using the Oxford University Press AQA A-Level Further Maths textbook.

Sequencing of learning is loosely based upon the chapters in the book. The exact order of the work is detailed in the scheme of work at the bottom of this document.

Year 13 content

Complex Numbers – exponential form, DeMoivre's theorem, roots of unity.

Series – summing series using partial fractions, Maclaurin series

Curve Sketching– reciprocal and modulus graphs, transformations, hyperbolic functions, rational functions with oblique asymptotes

Integration– improper integrals, inverse trigonometric functions, hyperbolic functions, partial fractions, reduction formulae, polar graphs and area, lengths and surface areas

Differential Equations – first order equations, second order equations, simple harmonic motion, damped and forced harmonic motion, couple equations

Numerical Methods - numerical integration, Euler's method

Matrices- determinants, inverse matrices and linear equations, manipulating determinants, eigenvalues and eigenvectors

Vectors– vector product, equation of a plane, finding distances

Circular Motion– kinematics of circular motion, conical pendulum, vertical circular motion

Centres of mass - moments and couples, centre of mass for point masses, laminas and solids, equilibrium.

Core Skills

Students in Year 13 follow the second year of a two-year A-Level scheme of work. In Year 13 students cover approximately half of the content from the content areas: Further Pure Maths, Mechanics and Discrete.

Core skills students will develop are to:

- Be able to reason mathematically
- To be able to follow mathematical processes but also apply knowledge from across the curriculum and make connections between their learning
- To apply taught skills to solve functional real world mathematical problems
- To develop revision and exam techniques to prepare them for the formal A-Level assessments.

Students are pushed to develop their fluency in mathematics by having a large focus of every lesson on developing student's numeracy skills in every unit of work.

Students are also given regular feedback and teacher modelling to encourage students to be able to write meticulous, detailed, and mathematically correct solutions so that students are able to communicate mathematically.

Year 13 Further Maths continued

What have students at St. Crispin's been taught to understand and be able to do?

Graphs and Networks – planar graphs and isomorphisms, network flows

Critical Path Analysis – Gantt charts, resourcing

Linear Programming and Game Theory – simplex algorithm, games as linear programming problems

Group Theory – groups, subgroups, isomorphisms.

How has learning been assessed?

Students take end of chapter tests throughout the year where areas of weakness are identified and intervention with specialist intervention teachers organised.

Students also sit two full sets of papers as mock exams in the run up to their formal exams in the summer. One during the mock exam period for all subjects in January and in class in March.

Summer exams – Paper 1, 2hrs Further Pure Maths. Paper 2, 2hrs Further Pure Maths. Paper 3, 2hrs Mechanics and Discrete.

There is no set Further Pure Maths content per paper. All content is covered across papers 1 and 2.

What is coming up in the following year?

In Year 13 students finish receiving quality first teaching of the final half of content and then start a series of revision of key material from Year 12.