



A Level Further Mathematics L6

(Online teaching with timetabled support sessions)

Mathematics teachers are striving for all students to develop an interest in studying the subject at a higher level. Students will be encouraged to explore the links between mathematics and other fields of study. Students will develop an awareness of the relevance of mathematics to the world of work and to situations in society in general.

Mathematics knows no races or geographic boundaries; for mathematics, the cultural world is one country.
David Hilbert

Students will learn:-

✓ Pure Mathematics:

Algebraic expressions
Quadratics
Equations and inequalities
Graphs and transformations
Coordinate geometry in cartesian plane
Algebraic methods and proof
Binomial expansion
Trigonometric ratios, identities, equations and modelling
Vectors (2D & 3D)
Differentiation and integration
Exponentials and logarithms
Algebraic and partial fractions
Functions and modelling
Series and sequences
Radians
Parametric equations
Numerical methods

✓ Statistics:

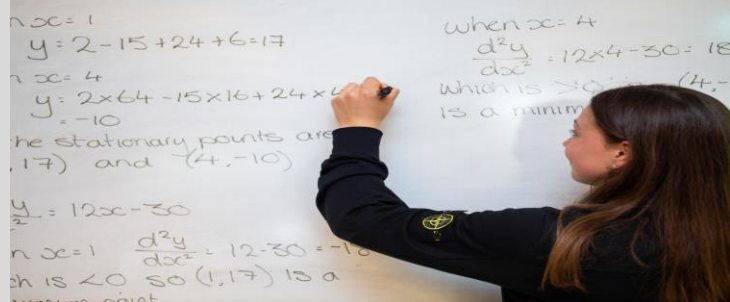
Data collection, sampling
Measures of location and spread
Representations of data
Correlation and regression
Probability
Statistical distributions
Statistical hypothesis testing

✓ Mechanics:

Modelling in mechanics
Kinematics - constant and variable acceleration
Forces and motion (Newton's laws)
Moments
Kinematics - projectiles

Knowledge, understanding & Skills

- Understand coherence and progression in mathematics and how different areas of mathematics are connected
- Reason logically and recognise incorrect reasoning
- Generalise mathematically
- Construct rigorous mathematical proof
- Use your skills and techniques to solve challenging problems that require you to decide on the solution strategy and communicate the mathematical rationale for these decisions clearly
- Recognise when mathematics can be used to analyse and solve a problem in context
- Represent situations mathematically and understand the relationship between problems in context and mathematical models that may be applied to solve them
- Read and comprehend mathematical arguments, including justifications of methods and formulae, and communicate your understanding
- Use technology such as calculators and computers effectively and recognise when your use may be inappropriate



Matriculation requirements:

Grade 8 or higher at GCSE Mathematics

and

must also be studying A Level Mathematics

How can you enhance your learning at home?

- Pearson Edexcel A-level textbooks (Pure Year 1 & 2; Statistics and Mechanics Year 1 & 2).
- Focus on exam-style questions, problem-solving questions and Mixed Exercises.
- Integral resources (online login or published on Shared Drive)
- Dr Frost Maths (individual login)
- Maths Genie•Zigzag papers•Boardworks presentations
- Enrichment: UKMT Senior Maths Challenge

How will we assess impact?

- Exam-style question starters to recap previous work
- Self-assessment
- Peer assessment
- Half-termly unit test
- Integral topic assessment
- Past papers and PPE

Calculator is permitted for all papers. The Casio fx-991 EX 'Class Wiz' is a minimum requirement but we recommend the NumWorks Graphing Calculator.



What does excellence look like?

- Use and apply standard techniques select and correctly carry out routine procedures, accurately recall facts, terminology and definitions
- Reason, interpret and communicate mathematically, construct rigorous arguments (including proofs), make deductions and inferences, assess the validity of mathematical arguments, explain your reasoning

International Opportunities

Within the curriculum

Mathematical proof was revolutionized by Euclid (300 BCE), who introduced the axiomatic method still in use today. Euclid's book, the *Elements*, was read by anyone who was considered educated in the West until the middle of the 20th century. In addition to theorems of geometry, such as the Pythagorean theorem, the *Elements* also covers number theory, including a proof that the square root of two is irrational and a proof that there are infinitely many prime numbers.

Abraham de Moivre 1667 – 1754 a French mathematician who invented factorials.

Thomas Jan Stieltjes, (born 1856, Zwolle, Netherlands—died 1894, Toulouse, France), Dutch-born French mathematician who made notable contributions to the theory of infinite series.

Hipparchus of Nicaea (/hɪˈpɑːrkəs/; Greek: Ἱππάρχος, Hipparkhos; c. 190 – c. 120 BC) was a Greek astronomer, geographer, and mathematician. He is considered the founder of trigonometry but is most famous for his incidental discovery of precession of the equinoxes

Wider Reading:

- Read and comprehend articles concerning applications of mathematics and communicate your understanding
- “How to think like a mathematician” by Kevin Houston
- “How to study for a mathematics degree” by Lara Alcock
- “Alex’s Adventures in Numberland” by Alex Bellos
- “Cabinet of Mathematical Curiosities” by Ian Stewart
- “The Num8er My5teries” by Marcus du Sautoy
- “How Many Socks Make a Pair?: Surprisingly Interesting Maths” by Rob Eastway
- “The Curious Incident of the Dog in the Night-time” by Mark Haddon
- “The Penguin Dictionary of Curious & Interesting Numbers” by David Wells
- “The Calculus Wars” by Jason Socrates Bardi
- “The Code Book” by Simon Singh
- “50 Mathematical Ideas You Really Need to Know” by Tony Crilly

Extra Challenge:

- podcast produced by Oxford university: <http://podcasts.ox.ac.uk/series/secrets-mathematics>
- Two interesting MOOCs: <https://www.futurelearn.com/courses/recreational-math>
<https://www.futurelearn.com/courses/flexagons>
- Two more challenging MOOCs: <https://www.coursera.org/learn/linear-algebra-machine-learning> (requires knowledge of matrices) and <https://www.coursera.org/specializations/introduction-data-science?action=enroll>