



# A Level Mathematics L6

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:-

### Autumn Term

Algebraic expressions  
Quadratics  
Equations and inequalities  
Graphs and transformations  
Coordinate geometry in cartesian plane  
Algebraic methods  
Binomial expansion  
Data collection, sampling  
Measures of location and spread  
Representations of data  
Correlation  
Modelling in mechanics

### Spring Term:

Trigonometric ratios  
Trigonometric identities and equations  
Vectors (2D & 3D)  
Differentiation and integration  
Probability  
Statistical distributions  
Kinematics -constant acceleration  
Forces and motion (Newton's laws)

### Summer Term:

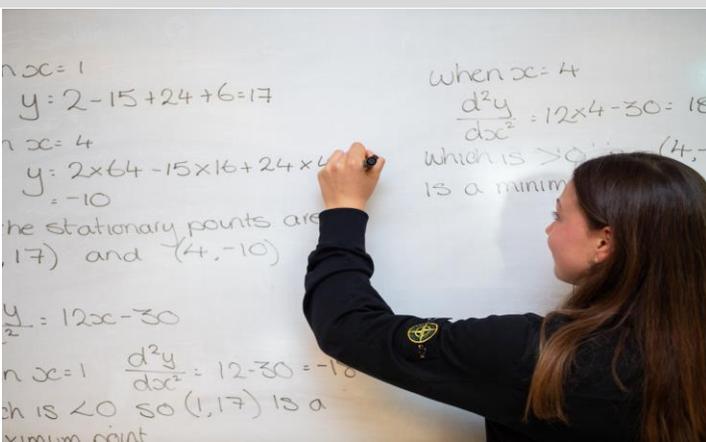
Exponentials and logarithms  
Proof  
Algebraic and partial fractions  
Functions and modelling  
Series and sequences  
✓Statistics  
Statistical hypothesis testing  
Conditional Probability  
✓Mechanics  
Kinematics -variable acceleration

## 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

## How can you enhance your learning at home?

- Pearson Edexcel A-level textbooks (Pure Year 1; Statistics and Mechanics Year 1).
- 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 Casio CG50.



## 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/fl-exagons>
- 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>