IB Higher Applications & Interpretations 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**

Autumn Term

- Measuring space: accuracy and 2D geometry
- *Modelling with matrices: storing and analysing data*
- Measuring space: accuracy and 2D geometry
- Representing space: non- right angled trig and volume
- *Modelling with matrices: storing and analysing data*
- Representing and describing data: descriptive statistics
- Modelling relationships and bivariate data

Spring Term

- Modelling constant rates of change: linear functions Dividing up space: coordinate geometry, lines, Voronoi diagrams, vectors, lines
- Modelling constant rates of change: linear functions
- Dividing up space: coordinate geometry, lines, Voronoi diagrams, vectors, lines
- Optimizing complex networks: graph theory

Summer Term

- Functions
- Geometry and trigonometry
- Statistics and probability
- Number and algebra
- Quantifying uncertainty: probability
- Representing multiple outcomes: random variables and probability distributions

"

If you can't explain it simply, you don't understand it well enough" Albert Einstein

How can you enhance your learning at home?

Pearson Mathematics Applications and Interpretation Standard Level textbook will be extensively utilised. Teacher also has copy of Oxford University Press textbook. Other publishers: Hodder and Haese.
Online resources:

- StudyIB.net
- RevisionVillage.com
- Kognity (subscription required)

Enrichment: UKMT Senior Maths Challenge

Knowledge, understanding & Skills

- Develop an understanding of the concept and principles of mathematics
- Clearly communicate mathematics in a variety of contexts
- Develop logical and creative thinking when using mathematics for problem solving
- Begin to apply and transfer skills to alternative situations and to other areas of knowledge
- Be aware of how developments in technology and mathematics influence each other
- Develop an appreciation for the universality of mathematics and its multicultural, international and historical perspectives
- Appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course
- Start to develop the ability to reflect critically upon your own work and the work of others
- Work independently and collaboratively to extend your understanding of mathematics

What does excellence look like?

- Knowledge and understanding: recall, select and use your knowledge of mathematical facts, concepts and techniques
- Problem solving: recall, select and use your knowledge of mathematical skills, results and models to solve problems
- Communication and interpretation: sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology, record methods, solutions and conclusions using appropriate notation
- Technology :use technology to explore new idea sand to solve problems
- Reasoning: construct mathematical arguments by the manipulation of mathematical expressions
- Inquiry approaches: investigate unfamiliar situations; involving organizing and analysing information then drawing conclusions

How will we assess impact?

- **Regular exposure to Exam-style questions**
- **Self-assessment**
- **Peer assessment**
- **Half-termly unit tests**
- **Past papers and PPE**

- **A graphical calculator is required for this course and we facilitate purchase of Casio CG50.**

- **External examination requirements:**
- **Paper 1 (30%) = short-response questions**
- **Paper 2 (30%) = long-response questions**
- **Paper 3 (20%) = extended response problem- solving questions**
- **Internal assessment (20%) = coursework assessed by teacher and externally moderated by IB**

International Opportunities

- The first systematic effort to use transformations as the foundation of geometry was made by Felix Klein in the 19th century, under the name Erlangen programme.
- The term "**function**" was literally introduced by Gottfried Leibniz, in a 1673 letter, to describe a quantity related to points of a curve, such as a coordinate or curve's slope. Johann Bernoulli started calling expressions made of a single variable "functions." in 1698.
- The Persian poet and mathematician Omar Khayyam was probably familiar with the formula to higher orders, although many of his mathematical works are lost. The binomial expansions of small degrees were known in the 13th century mathematical works of Yang Hui and also Chu Shih-Chieh.

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