LE GOUVERNEMENT
DU GRAND-DUCHÉ DE LUXEMBOURG
Ministère de l'Éducation nationale,
de l'Enfance et de la Jeunesse

	Enseignement secondaire	
	Classes internationales	
	Régime anglophone	
	Mathématiques	
	Programme	
	4IEC	

Leçons hebdomadaires: 4
Langue véhiculaire: anglais
Nombre minimal de devoirs en classe: 7 par année / 2 par trimestre

General comments

Students are expected to be familiar with the mathematical skills required for the admission to year 10 (4IEC). The aim of the course is to prepare for the study of mathematics in year 11 (3IEC).

Numerical and algebraic reasoning

The ability to work with numbers and symbols is an essential skill in mathematics. Students are expected to have an understanding of number concepts and to develop the skills of calculation and approximation. Algebra uses letters and symbols to represent numbers, quantities and operations, and employs variables to solve mathematical problems. Algebra is an abstraction of the concepts first used when dealing with numbers and is essential for further learning in mathematics.

Radicals and surds	Chapter 4
- Radicals - Simplest radical form - Adding and subtracting radicals - Multiplications involving radicals - Division by radicals - Equality of surds Notes: - To be added: cube roots, n-th roots, necessary conditions of n-th roots, rational exponents	
Quadratic equations	Chapter 11
Review from year 9 - Equations of the form $x^2=k$ - Solution by factorisation (Sum-product method) - Completing the square	

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- The quadratic formula
- Problem solving

Notes:
- To be added:
  - Quartic equations: Exercise 11B Problem 8 + additional examples added by the teacher
  - Higher degree equations: Exercise 11B Problem 9 + additional examples added the by teacher

- Not treaded in year 10:
  - Radical equations: Exercise 11B Problem 10
  - Section 11F: Quadratic equations with Delta<0
  - Section 11G: The sum and product of the roots

Inequalities	Chapter 22

- Interval notation
- Linear inequalities
- Non-linear inequalities with sign diagrams

Notes:
- To be added:
  - Word problems (quadratic inequalities)
  - Necessary conditions on radicals
  - Systems of inequalities
  - Equations and inequalities involving absolute value

Polynomials	Chapter 24

- Polynomials
- Polynomial operations
- The remainder theorem
- The factor theorem

Notes:
- To be added by the teacher
  - The integer root theorem

Spatial reasoning

Spatial reasoning skills provide students with the tools for analysing, measuring and transforming geometric quantities in two dimensions.

The topics and skills in spatial reasoning will help students develop an understanding of

- construction and manual skills,
- visualization of 2D and 3D shapes
- moving between dimensions
- algorithmic thinking in trigonometry

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Coordinate geometry	Chapter 6
- The distance between two points - Midpoints - Gradient - Parallel and perpendicular lines - The equation of a line - Perpendicular bisectors - Distance from a point to a line **Notes:** - Not treated in year 10: ▪ Section 6H: 3-Dimensional Coordinate Geometry	

Congruence and similarity	Chapter 7
- Congruent triangles - Proof using congruence - Similarity - Areas and volumes	

Trigonometry	Chapter 12

- Trigonometric ratios
- Problem solving using trigonometry
- True bearings
- 3-dimensional problem solving
 	
Notes:
- Not treated in year 10:
    ▪ Supplementary angles
    ▪ The area of a triangle
    ▪ The sine rule
    ▪ The cosine rule
    ▪ Problem solving using the sine and cosine rules
 	
- To be added by the teacher
    ▪ Exact ratios (only right triangle trigonometry including 0 and 90 degrees)	

Reasoning with data

This branch of mathematics is concerned with the collection, analysis and interpretation of quantitative data and uses the theory of probability to estimate parameters, discover empirical laws, test hypotheses and predict the occurrence of events.

Through the study of statistics, students should develop skills associated with the collection, organization and analysis of data, enabling them to present information clearly and to discover patterns. Students will also develop critical-thinking skills, enabling them to differentiate between what happens in theory (probability) and what is observed (statistics).

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Students should understand both the power and limitations of statistics, becoming aware of their legitimate use in supporting and questioning hypotheses, but also recognizing how statistics can be used to mislead as well as to counter opinions and propaganda.

Statistics	Chapter 9
- Discrete data - Continuous data - Measuring the centre - Cumulative data - Measuring the spread - Box-and-whisker plots - Standard deviation	

Effective use of information and communication technology in mathematics

The appropriate use of computers, computer applications and calculators can improve the understanding of all students. In year 9, students are expected to write their first *mathematical investigation*.

A mathematical investigation is a short report written by the student. The emphasis is on mathematical communication (including formulae, diagrams, graphs and so on), with accompanying commentary, good mathematical writing and thoughtful reflection. A student should develop his or her own focus, with the teacher providing feedback. This will allow the students to develop an area of interest for them, without a time constraint as in an examination, and will allow all to experience a feeling of success.

In addition to testing the objectives of the course, the mathematical investigation is intended to provide students with opportunities to increase their understanding of mathematical concepts and processes, and to develop a wider appreciation of mathematics.

It is intended that, by working on the mathematical investigation, students benefit from the mathematical activities undertaken and find them both stimulating and rewarding. It will enable students to acquire the attributes of the IB learner profile.

One of the objectives is to use technology accurately, appropriately and efficiently both to explore new ideas and to solve problems.

Examples include:

- Any kind of calculators, the internet, data logging devices
- Word processing packages, spreadsheets, graphics packages

The paper will be written in Microsoft Word possibly using spreadsheet functions from Microsoft Excel and/or the use of GeoGebra.

In year 10 students write one *mathematical investigation*.

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Textbook

Haese and Harris Publications

Mathematics for the international student 10E (MYP 5 Extended)

ISBN 978-1-921972-53-9

Planning the curriculum

Here's a possible order to sequence the individual chapters.

1. MYP 5E – Chapter 4 – Radicals and surds
2. MYP 5E – Chapter 6 – Coordinate geometry
3. MYP 5E – Chapter 7 – Congruence and similarity
4. MYP 5E – Chapter 11 – Quadratic equations
5. MYP 5E – Chapter 12 – Trigonometry
6. MYP 5E – Chapter 22 – Inequalities
7. MYP 5E – Chapter 24 – Polynomials
8. MYP 5E – Chapter 9 – Statistics

Calculator

Casio FX-991 EX

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