



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.

Surds and other radicals	Chapter 4
Review from year 9: <ul style="list-style-type: none">- Radicals- Properties of radicals- Simplest surd form- Operations with radicals- Division with surds	
New in year 10: <ul style="list-style-type: none">- Equality of surds	
Notes: <ul style="list-style-type: none">- To be added: cube roots, n-th roots, necessary conditions of n-th roots, rational exponents	
Quadratic equations	Chapter 9
Review from year 9 <ul style="list-style-type: none">- Equations of the form $x^2 = k$- The null factor law- Solving by factorisation (Sum-product method)	



New in year 10:

- Completing the square
- The quadratic formula
- Problem solving

Notes:

- To be added:
 - Quartic equations: Exercise 9C.3 Problem 7 + additional examples added by the teacher
 - Higher degree equations examples (where the variable can be factored out) to be added the by teacher
- Not treated in year 10:
 - Radical equations: Exercise 9C.3 Problem 8 (will be treated in inequalities chapter)
 - Section 9G: Quadratic equations with $\Delta < 0$
 - Section 9H: The sum and product of the roots

Inequalities

This chapter is not sufficiently detailed in the book. Sections A and B from chapter 12 can be used as introduction, then the teacher has to complete with the following points:

- Interval notation
- Non-linear inequalities with sign diagrams
- Word problems (quadratic inequalities)
- Necessary conditions on radicals and equations involving radicals
- Systems of inequalities
- Equations and inequalities involving absolute value

Polynomials

This chapter is not in the book. For reference, one can check the second edition of the book which had a chapter on polynomials.

- Definition of polynomial
- Equality of polynomials
- Polynomial operations (adding, subtracting, multiplying and dividing, both long as well as synthetic division)
- The remainder theorem
- The factor theorem
- 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

Coordinate geometry	Chapter 10
<ul style="list-style-type: none">- The distance between two points- Midpoints- Gradient- Parallel and perpendicular lines- Using coordinate geometry- The equation of a line- Graphing straight lines- Finding the equation of a line- Perpendicular bisectors- 3-dimensional coordinate geometry <p>To be added by the teacher:</p> <ul style="list-style-type: none">- Solving systems of equations (by substitution and by linear combination)	
Congruence and similarity	Chapter 13
<ul style="list-style-type: none">- Congruent triangles- Proof using congruence- Similar triangles- Areas and volumes of similar objects	
Trigonometry	Chapter 15
<ul style="list-style-type: none">- Labelling right angled triangles- The trigonometric ratios- Finding side lengths- Finding angles- Problem solving- True bearings <p>To be added by the teacher:</p> <ul style="list-style-type: none">- 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).

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 18
<ul style="list-style-type: none">- Discrete numerical data- Continuous numerical data- Describing the distribution of data- Measures of centre- Box plots- Cumulative frequency graphs- Standard deviation- The normal distribution	

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 or in LaTeX possibly using spreadsheet functions from Microsoft Excel and/or the use of GeoGebra.

In year 10 students write one *mathematical investigation*.

Textbook

Haese and Harris Publications



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

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Planning the curriculum

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

1. MYP 5E – Chapter 4 – Surds and other radicals
2. MYP 5E – Chapter 10 – Coordinate geometry
3. MYP 5E – Chapter 13 – Congruence and similarity
4. MYP 5E – Chapter 9 – Quadratic equations
5. MYP 5E – Chapter 15 – Trigonometry
6. MYP 5E – Inequalities
7. MYP 5E – Polynomials
8. MYP 5E – Chapter 18 – Statistics

Calculator

Casio FX-991 EX