INTERNATIONAL SCHOOL OF CURITIBA ISC

Av. Dr. Eugênio Bertolli, 3900
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IB Math HL

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Course Description:

The course focuses on developing important mathematical concepts in a comprehensible, coherent and rigorous way. This is achieved by means of a carefully balanced approach. Students are encouraged to apply their mathematical knowledge to solve problems set in a variety of meaningful contexts. Development of each topic should feature justification and proof of results. Students embarking on this course should expect to develop insight into mathematical form and structure, and should be intellectually equipped to appreciate the links between concepts in different topic areas. They should also be encouraged to develop the skills needed to continue their mathematical growth in other learning environments.

The internally assessed component, the exploration, offers students the opportunity for developing independence in their mathematical learning. Students are encouraged to take a considered approach to various mathematical activities and to explore different mathematical ideas. The exploration also allows students to work without the time constraints of a written examination and to develop the skills they need for communicating mathematical ideas.
(Source: International Baccalaureate Organization – HL Math Guide first examinations 2014)

Course Guidelines

Quarter Grade is calculated out of 100% in the following way:

Unit Tests	45%
Minor Assessments	35%
Projects	20%

- For this course practice is a daily expectation.
- Quizzes will happen on a weekly basis and Tests at the end of each Unit.
- Assessment grades will be currently updated on Jupiter.

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- iPad or laptop will be used up to the teacher discretion, and apps to be downloaded will be determined by the teacher along the course.

Brief Course Outline:

Year 1

- Quadratics
- Functions
- Exponentials
- Logarithms
- Transforming Functions
- Complex Numbers and Polynomials
- Sequences and Series
- Counting and the Binomial Expansion
- Mathematical Induction
- The Unit Circle and Radian Measure
- Non-Right Angle Trigonometry
- Trigonometric Functions
- Trigonometric Equations and Identities
- Vectors
- Vector Applications

Year 2

- Complex Numbers
- Differential Calculus Intro
- Rules of Differentiation
- Properties of Curves
- Differential Calculus Applications
- Integration
- Applications of Integration
- Descriptive Statistics
- Probability
- Discrete Random Variables
- Continuous Random Variables
- Calculus (IB Option)
- Exam Review

Resources

- Haese Mathematics HL Core (3rd edition)
- Graphic Display Calculator: (Texas Instruments TI-84 Plus)
- Compass, protractor, ruler, and grid paper as necessary

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About the International Baccalaureate Diploma Program (IBDP):

The IBDP is recognized by colleges and universities around the world as a premier college preparatory course of study. As such, it is rigorous, in depth and requires a serious commitment from students wishing to complete their high school education with the tools they need to succeed at a college or university. More information may be found on the web at: http://www.ibo.org/diploma

Rough Grade boundaries for IB Math HL (Paper 1, 2 and Calculus Option)

	Range	
Score	Percent	
1	0	13
2	14	27
3	28	40
4	41	52
5	53	65
6	66	76
7	77	100

(Actual 2014 IB Exams Grade Boundaries)

Prior Learning

Students should have a good understanding of topics covered in courses leading up to the DP program: This includes: algebra, trigonometry, geometry, coordinate geometry, statistics and probability. (Excerpt from text covering prior knowledge)

Assessment

Students will be challenged throughout the year and will be marked in accordance with the IB Grading Scheme. Tests and quizzes will be made up of multiple choice and free response problems, which will be marked in accordance with the IB marking scheme. All quizzes and tests will be cumulative and at times, parts or all of the assessment will be done without the use of a calculator. The reason for this is that on

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paper 1 no calculator is allowed and on papers 2 & 3 the use of a calculator is required.

There will be some type of assessment every week at minimum. Doing all of the homework carefully and thoroughly is extremely important to doing well on the exam. Often there will be required reading on the next day's topic.

Assessment Objectives from the IB Guide

Problem-solving is central to learning mathematics and involves the acquisition of mathematical skills and concepts in a wide range of situations, including non-routine, open-ended and real-world problems.

1. Knowledge and understanding: recall, select and use their knowledge of mathematical facts, concepts and techniques in a variety of familiar and unfamiliar contexts.
2. Problem-solving: recall, select and use their knowledge of mathematical skills, results and models in both real and abstract contexts to solve problems.
3. Communication and interpretation: transform common realistic contexts into mathematics; comment on the context; sketch or draw mathematical diagrams, graphs or constructions both on paper and using technology; record methods, solutions and conclusions using standardized
4. Technology: use technology, accurately, appropriately and efficiently both to explore new ideas and to solve problems.
5. Reasoning: construct mathematical arguments through use of precise statements, logical deduction and inference, and by the manipulation of mathematical expressions.
6. Inquiry approaches: investigate unfamiliar situations, both abstract and real-world, involving organizing and analysing information, making conjectures, drawing conclusions and testing

(Source: International Baccalaureate Organization)

Mathematics and theory of knowledge

The Theory of knowledge guide (March 2006) identifies four ways of knowing, and it could be claimed that these all have some role in the acquisition of mathematical knowledge. While perhaps initially inspired by data from sense

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perception, mathematics is dominated by reason, and some mathematicians argue that their subject is a language, that it is, in some sense, universal. However, there is also no doubt that mathematicians perceive beauty in mathematics, and that emotion can be a strong driver in the search for mathematical knowledge.

As an area of knowledge, mathematics seems to supply a certainty perhaps missing in other disciplines. This may be related to the "purity" of the subject that makes it sometimes seem divorced from reality. However, mathematics has also provided important knowledge about the world, and the use of mathematics in science and technology has been one of the driving forces for scientific advances. Despite all its undoubted power for understanding and change, mathematics is in the end a puzzling phenomenon. A fundamental question for all knowers is whether mathematical knowledge really exists independently of our thinking about it. Is it there "waiting to be discovered" or is it a human creation?

Students' attention should be drawn to questions relating theory of knowledge (TOK) and mathematics, and they should be encouraged to raise such questions themselves, in mathematics and TOK classes. This includes questioning all the claims made above. Examples of issues relating to TOK are given in the "Links" column of the syllabus. Teachers could also discuss questions such as those raised in the "Areas of knowledge" section of the TOK guide.
(Source: International Baccalaureate Organization Mathematics HL Guide)

IB Group 5 Aims

The aims of all mathematics courses in group 5 are to enable students to:

1. enjoy mathematics, and develop an appreciation of the elegance and power of mathematics
2. develop an understanding of the principles and nature of mathematics
3. communicate clearly and confidently in a variety of contexts
4. develop logical, critical and creative thinking, and patience and persistence in problem-solving
5. employ and refine their powers of abstraction and generalization
6. apply and transfer skills to alternative situations, to other areas of knowledge and to future
7. appreciate how developments in technology and mathematics have influenced each other

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8. appreciate the moral, social and ethical implications arising from the work of mathematicians and the applications of mathematics
9. appreciate the international dimension in mathematics through an awareness of the universality of mathematics and its multicultural and historical perspectives
10. appreciate the contribution of mathematics to other disciplines, and as a particular "area of knowledge" in the TOK course.