

GROUP 5

MATHEMATICS

The nature of Mathematics can be summarised in a number of ways: for example, it can be seen as a well-defined body of knowledge, an abstract system of ideas, or as a useful tool. For many people it is probably a combination of these, but there is no doubt that mathematical knowledge provides an important key to understanding the world in which we live.

Mathematics can enter our lives in a number of ways especially in everyday problem-solving. Mathematics for most of us also extends into our chosen profession: visual artists need to learn about perspective; musicians need to appreciate the mathematical relationships within and between different rhythms; economists need to recognise trends in financial dealings; and engineers need to take account of stress patterns in physical materials. Scientists view Mathematics as a language that is central to our understanding of events that occur in the natural world. Some people enjoy the challenges offered by logical methods of Mathematics and the adventure in reason that mathematical proof has to offer. Others appreciate Mathematics as an aesthetic experience or even as a cornerstone of philosophy. This prevalence of Mathematics in our lives with all its interdisciplinary connotations provides a clear and sufficient rationale for making the study of this subject compulsory within the International Baccalaureate Diploma course.

Consequently, there is no doubt that to some degree everyone is a mathematician. Due to the varying needs of the population the IB Diploma Programme takes account of this by catering for different groups of students. These groups may range from those who intend to pursue the study of Mathematics to an advanced level; to those who possess a great variety of background knowledge and technical skill; and to those who need to be made aware that Mathematics has relevance both in their studies and their future lives.

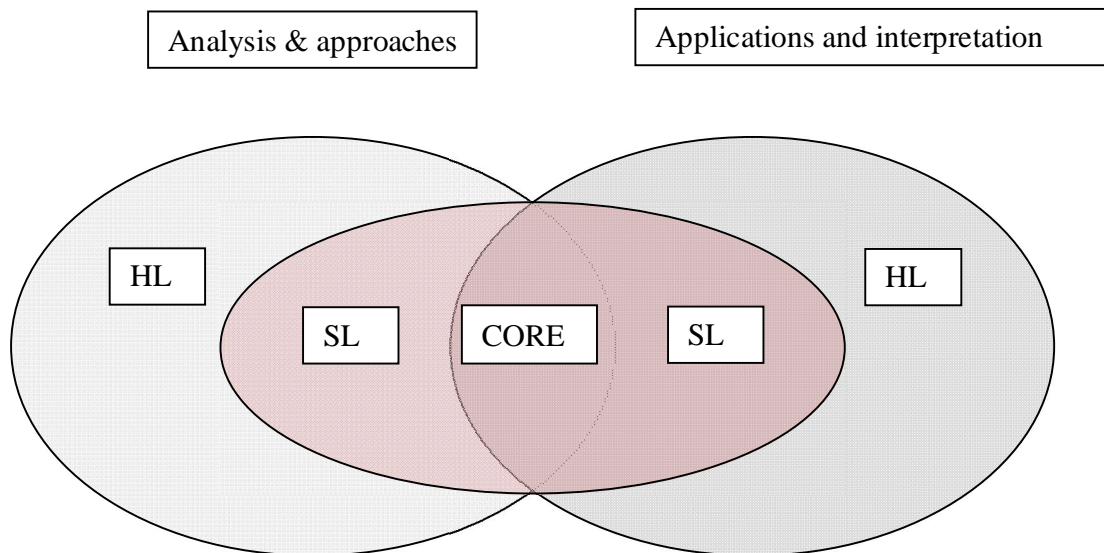
The aims of all Mathematical courses in group 5 are to enable students to:

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 developments
7. Appreciate how developments in technology and Mathematics have influenced each other
8. Appreciate the moral, social and ethical implications arising from the work of mathematicians and the application 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.

There are four IB Mathematics courses offered. These are:

- Analysis and approaches Higher Level
- Applications and interpretation Higher Level
- Analysis and approaches Standard Level
- Applications and interpretation Standard Level

The courses have common core content, which overlap; the SL courses are subsets of the respective HL courses.

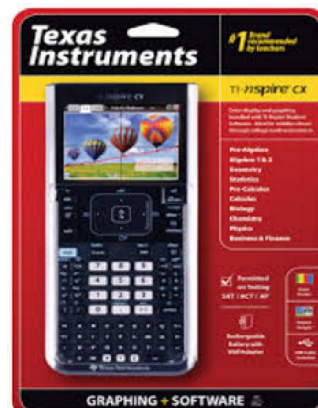


TECHNOLOGY

The use of technology is vital for all Mathematics courses. Students need internet access for

- Edmodo.com
- DESMOS graphing
- Geogebra (free powerful graphing and geometry software)

Graphic Display calculators are used in all four courses and it is essential that students have one from the beginning of the course. It is required that students obtain the Ti 84 Plus or the more expensive Tinspire, which has more functions and is more 'user friendly'.



GROUP 5

Analysis and Approaches (Higher Level)

This course caters for students with a good background in Mathematics who are competent in a range of analytical and technical skills. The majority of these students will be expecting to include Mathematics as a major component of their university studies, either as a subject in its own right or within courses such as Physics, Engineering and Technology. Others may take this subject because they have a strong interest in Mathematics and enjoy meeting its challenges and engaging with its problems.

The nature of the subject is such that it 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 solving 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.

This course would be suitable for those who obtained a strong Grade A, or above in the IGCSE Extended Mathematics Course. It is a demanding course, requiring students to study a broad range of mathematical topics through a number of different approaches and to varying degrees of depth. Students wishing to study Mathematics in a less rigorous environment should opt for one of the standard level courses.

Syllabus Outline –

*Topic 1 : Number & algebra,
& geometry*

Topic 2 : Functions,

Topic 3 : Trigonometry

Topic 4 : Statistics & probability

Topic 5: Calculus

Assessment

Internal Assessment		
Mathematical Exploration	International assessment in Mathematical HL is an individual exploration. This is a piece of written work that involves investigating an area of Mathematics.	20%
External Assessment		
Written Exam	Paper 1 (2 hours) – non calculator Section A short-response questions based on the core syllabus Section B extended-response questions based on the core syllabus	30%
	Paper 2 (2 hours) - calculator Section A short-response questions based on the core syllabus Section B extended-response questions based on the core syllabus.	30%
	Paper 3 (1 hour) – calculator (problem solving)	20%

GROUP 5

Analysis and Approaches (Standard Level)

This course caters for students who already possess knowledge of basic mathematical concepts, and who are equipped with the skills needed to apply simple mathematical techniques correctly. The majority of these students will expect to need a sound mathematical background as they prepare for future studies in subjects such as Chemistry, Economics, Psychology and Business Administration.

The course focuses on introducing important mathematical concepts through the development of mathematical techniques. The intention is to introduce students to these concepts in a comprehensible and coherent way, rather than insisting on mathematical rigour. Students should wherever possible apply mathematical knowledge they have acquired to solve realistic problems set in an appropriate context. The course content is a subset of the Higher Level course content with a similar emphasis on challenging realistic problem solving but studied in a less demanding manner.

This course would be suitable for those who obtained a Grade B, or above in the IGCSE Extended Mathematics Course.

Syllabus Content

*Topic 1 : Number & algebra,
& geometry*

Topic 4 : Statistics & probability

Topic 2 Functions,

Topic 5: Calculus

Topic 3 :Trigonometry

Assessment

Internal Assessment		
Mathematical Exploration	International assessment in Mathematical SL is an individual exploration. This is a piece of written work that involves investigating an area of Mathematics. This component is assessed by the teacher and externally moderated by the IB at the end of the course.	20%
External Assessment		
Written Exam	Paper 1 (1 hour 30 mins.) – non calculator Section A short-response questions Section B extended-response questions	40%
	Paper 2 (1 hour 30 mins.) - calculator Section A short-response questions Section B extended-response questions	40%

GROUP 5

Applications & Interpretations (Higher Level)

This course caters for students who already possess knowledge of basic mathematical concepts, and who are equipped with the skills needed to apply simple mathematical techniques correctly. The majority of these students will expect to need a sound mathematical background as they prepare for future studies in subjects such as Chemistry, Economics, Psychology and Business Administration.

The nature of this course is such that it is designed for students with a strong Mathematical background, but will use these skills in a more practical manner, application focused rather than theory focused. There will also be a strong use of technology bias in the course.

This course would be suitable for those who obtained a Grade B, or above in the IGCSE Extended Mathematics Course.

Syllabus Content

*Topic 1: Number & algebra,
& geometry*

Topic 2 : Functions,

Topic 3 : Trigonometry

Topic 4 : Statistics & probability

Topic 5: Calculus

Assessment

Internal Assessment		
Mathematical Exploration	International assessment in Mathematical HL is an individual exploration. This is a piece of written work that involves investigating an area of Mathematics.	20%
External Assessment		
Written Exam	Paper 1 (2 hours) – non calculator Section A short-response questions based on the core syllabus Section B extended-response questions based on the core syllabus	30%
	Paper 2 (2 hours) - calculator Section A short-response questions based on the core syllabus Section B extended-response questions based on the core syllabus.	30%
	Paper 3 (1 hour) – calculator (problem solving)	20%

GROUP 5

Applications & Interpretations (Standard Level)

This course caters for students with varied backgrounds and abilities. More specifically, it is designed to build confidence and encourage an appreciation of mathematics in students who do not anticipate a need for mathematics in their future studies. Students taking this course need to be already equipped with fundamental skills and a rudimentary knowledge of basic processes. The skills needed to cope with the mathematical demands of a technological society are developed and emphasis is placed on the application of mathematics to real situations. A substantial piece of personal research, in the form of a project, is a requirement of this course. The project is an individual piece of work involving the collection of information or the generation of measurements, and the analysis and evaluation of the information or measurements.

Students who are likely to need to use Mathematics in the pursuit of further qualifications are advised to consider a Higher Level course

Syllabus Content

*Topic 1 : Number & algebra,
& geometry*

Topic 2 : Functions,

Topic 3 : Trigonometry

Topic 4 : Statistics & probability

Topic 5 : Calculus

Assessment

Internal Assessment		
Project	The project is an individual piece of work involving the collection of information or the generation of measurements and the analysis and evaluation of the information or measurements	20%
External Assessment		
Written Exam	Paper 1 (1 hour 30 mins.) 15 Short-response questions	40%
	Paper 2 (1 hour 30 mins.) 6 Extended-response questions	40%