IB mathematical studies standard level subject brief

The IB Diploma Programme, for students aged 16 to 19, is an academically challenging and balanced programme of education that prepare students for success at university and life beyond. Students take courses in six different subject groups, maintaining both breadth and depth of study. Mathematical studies standard level is in group 5, mathematics and computer sciences. In addition, three core elements—the extended essay, theory of knowledge and creativity, action, service—are compulsory and central to the philosophy of the programme.

About the IB: For over 40 years the IB has built a reputation for high-quality, challenging programmes of education that develop internationally minded young people who are well prepared for the challenges of life in the 21st century and able to contribute to creating a better, more peaceful world.

The IB subject briefs illustrate four key course components in the IB Diploma Programme,

I.   Course description and aims

II. Curriculum model overview

III. Assessment model

IV. Sample questions

Overview of the mathematical studies standard level course and curriculum model

I. Course description and aims

The IB Diploma Programme mathematical studies course, available in standard level only, is for students with varied backgrounds and abilities. The course 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, however, should be already equipped with fundamental skills and a rudimentary knowledge of basic processes. In addition, the course will enable students to:

- develop logical, critical and creative thinking
- develop an understanding of the principles and nature of the subject
- employ and refine their powers of abstraction and generalization
- develop patience and persistence in problem solving
- appreciate the consequences arising from technological developments
- transfer skills to alternative situations and to future developments
- communicate clearly and confidently in a variety of contexts
- enjoy the courses and develop an appreciation of the elegance, power and usefulness of the subjects
- appreciate the multiplicity of cultural and historical perspectives of mathematics, including the international dimension of mathematics.

II. Curriculum model overview

Mathematical studies standard level

Course	130 hours of instruction on eight topics	130 hours
	• Introduction to the graphic display calculator	
	• Number and algebra	
	• Sets, logic and probability	
	• Functions	
	• Geometry and trigonometry	
	• Statistics	
	• Introductory differential calculus	
	• Financial mathematics	
Project Work	An individual piece of work	20 hours
Total teaching hours		**150 hours**

III. Assessment model

Assessment for mathematical studies standard level

The IB assesses student work as direct evidence of achievement against the stated goals of the Diploma Programme courses, which are to provide students with:

- a broad and balanced, yet academically demanding, programme of study
- the development of critical-thinking and reflective skills
- the development of research skills
- the development of independent learning skills
- the development of intercultural understanding
- a globally recognized university entrance qualification.

The assessments aim to test all students' knowledge and understanding of key concepts through:

- reading, interpreting and solving a given problem using appropriate mathematical terms
- organizing and presenting information and data in tabular, graphical and/or diagrammatic forms
- knowing and using appropriate notation and terminology
- formulating a mathematical argument and communicate it clearly
- selecting and using appropriate mathematical strategies and techniques
- demonstrating an understanding of both the significance and the reasonableness of results
- recognizing patterns and structures in a variety of situations, and make generalizations
- recognizing and demonstrate an understanding of the practical applications of mathematics
- using appropriate technological devices as mathematical tools
- demonstrating an understanding of and the appropriate use of mathematical modelling.

Assessment for mathematical studies standard level (continued)

Students' success in the mathematical studies standard level course is measured by combining their grades on external and internal assessment.

The internal assessment is of each student's project, a piece of written work based on personal research involving the collection, analysis and evaluation of data. Projects, which may involve modelling, investigations, applications or statistical surveys, must demonstrate the ability to use the mathematics learned during the course.

Assessment at a glance

Type of assessment	Format of assessment	Time (hours)	Weighting of final grade (%)
External			**80**
Paper 1	Fifteen short-response questions	1.5	40
Paper 2	Five extended-response questions	1.5	40
Internal			**20**
Practical work	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		

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IV. Sample questions

The following questions appeared in previous IB Diploma Programme mathematical studies standard level examinations.*

1. The age in months at which a child first starts to walk is observed for a random group of children from a town in Brazil. The results are:
14.3, 11.6, 12.2, 14.0, 20.4, 13.4, 12.9, 11.7, 13.1.

   (a) (i) Find the mean of the ages of these children.
       (ii) Find the standard deviation of the ages of these children.
   (b) Find the median age. (Paper 1)

2. Consider the function $f(x) = \dfrac{3}{x^2} + x - 4$.

   (a) Calculate the value of $f(x)$ when $x=1$.
   (b) Differentiate $f(x)$.
   (c) Find $f'(1)$.
   (d) Explain what $f'(1)$ represents.
   (e) Find the equation of the tangent to the curve $f(x)$ at the point where $x=1$.
   (f) Determine the x-coordinate of the point where the gradient of the curve is zero. (Paper 2)

* the syllabus for examinations current until 2014