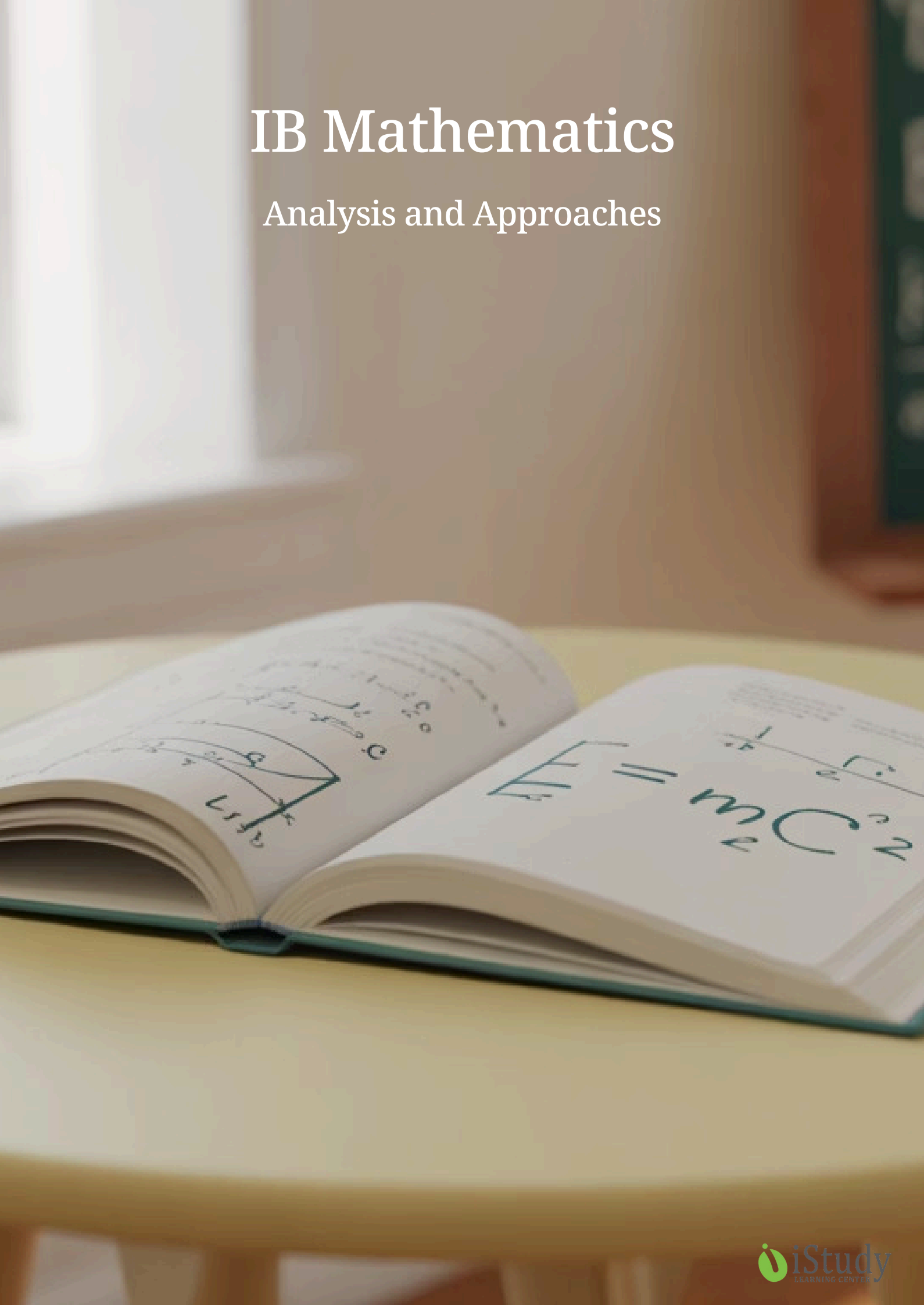
IB Mathematics

Analysis and Approaches



Course Description

Analysis and Approaches (AA) course is designed to enhance students' mathematical knowledge, skills, and understanding. Its main objectives focus on building a strong foundation in mathematical concepts while promoting problem-solving through real-world applications. Students learn to communicate mathematical ideas clearly and develop logical reasoning skills by constructing and evaluating arguments. Additionally, the course emphasizes the effective use of technology in mathematical exploration and its relevance across various disciplines, including science and engineering. Ultimately, these objectives equip students for further education and careers that demand mathematical proficiency and analytical thinking.

Course Objectives

- Develop a strong foundation in mathematical concepts and their applications.
- Enhance critical thinking and creativity in solving real-world problems.
- Strengthen communication skills to express mathematical ideas and construct logical arguments.

Syllabus Structure

1	**Number and Algebra** This topic focuses on fundamental mathematical operations, algebraic manipulation, sequences, series, and complex numbers, providing essential tools for higher-level mathematics.
2	**Functions** Explores different types of functions, including polynomial, exponential, logarithmic, and trigonometric functions, emphasizing their properties, graphs, and transformations.
3	**Geometry and Trigonometry** Covers concepts of 2D and 3D geometry, including coordinate geometry, vectors, and advanced trigonometry, crucial for understanding spatial relationships.
4	**Statistics and Probability** Introduces methods for collecting, analysing, and interpreting data, along with probability theory, statistical distributions, and hypothesis testing.
5	**Calculus** Delves into differential and integral calculus, including limits, derivatives, integrals, and their applications in problem-solving and modelling real-world phenomena.

Students will develop investigative, problem-solving, and modelling skills leading to an individual exploration, which involves a written investigation in mathematics.

Total Teaching Hours

The course demands specific teaching hours to ensure comprehensive coverage and depth:

- **Standard Level (SL):** 150 hours
- **Higher Level (HL):** 240 hours

External Assessment Criteria: Paper 1

Paper 1 (30% of final grade, 2 hours)

Section A: Short-Response Questions

This section accounts for approximately 55 marks and covers a broad range of topics from the syllabus.

Section B: Extended-Response Questions

Also contributing approximately 55 marks, Section B requires a deeper engagement with the syllabus, often involving more complex problem-solving and critical thinking.

No Calculator Permitted

Prohibition of calculators.

Mark Allocation and Question Types

The paper is worth a total of 110 marks, with individual questions varying significantly in their mark allocation based on complexity and scope. Questions may be presented using a variety of formats, including written descriptions, mathematical symbols, diagrams, or tables.

External Assessment Criteria: Paper 2

Paper 2 (30% of final grade, 2 hours)

Section A: Short-Response Questions

This section accounts for approximately 55 marks and covers a broad range of topics from the syllabus.

Section B: Extended-Response Questions

Also contributing approximately 55 marks, Section B requires a deeper engagement with the syllabus, often involving more complex problem-solving and critical thinking.

GDC required

A Graphics Display Calculator (GDC) is essential for this paper.

Mark Allocation and Question Types

The paper is worth a total of 110 marks, with individual questions varying significantly in their mark allocation based on complexity and scope. Questions may be presented using a variety of formats, including written descriptions, mathematical symbols, diagrams, or tables.

External Assessment Criteria: Paper 3

Paper 3 (20% of final grade, 1 hour 15 minutes)

Compulsory Extended-Response Questions

This paper features two mandatory extended-response questions designed to assess problem-solving skills comprehensively across the syllabus.

GDC Required

A Graphics Display Calculator (GDC) is essential for this paper.

Comprehensive Syllabus Coverage

Questions cover all syllabus topics, requiring students to integrate knowledge from various areas within comprehensive problem-solving scenarios.

Mark Allocation and Question Types

The paper is worth a total of 55 marks, with individual questions assigned varying marks based on their complexity and the depth of reasoning required. Questions may be presented through a variety of formats, including written descriptions, mathematical symbols, diagrams, or tables, and generally increase in difficulty throughout the paper.

Emphasis on Higher-Order Skills

Success in Paper 3 demands sustained mathematical reasoning, the ability to generalize findings, and contextual interpretation.

Internal Assessment Criteria

Criterion A: Knowledge and Understanding (HL & SL)

Assesses the extent to which students demonstrate knowledge and understanding of the topic in the syllabus, showing reasoning and providing correct results.

Criterion B: Investigation (HL & SL)

Assesses the extent to which students explore their topic and achieve an original conclusion to what they are investigating and exploring.

Criterion C: Presentation (HL & SL)

Assesses organization, coherence, and clarity of the exploration. It looks at how well communication is delivered through the chosen approach and if the use of mathematical conventions is appropriate.

Criterion D: Reflection (HL & SL)

Focuses on the evaluation of the exploration, students should be mindful of what they have discovered, why their results make sense and what the significance of their results is.

Criterion E: Use of Mathematics (HL only)

Assesses the relevance and correctness of the mathematics used, ensuring it's commensurate with the HL level. Sophistication and rigour in mathematical arguments are also considered.

Learning Approaches

Active Engagement

Students should actively engage in learning activities, experimenting, questioning, and discovering mathematical principles.

Critical Thinking & Problem Solving

Develop critical thinking and problem-solving skills through mathematical inquiry.

Conceptual Understanding

Focus on understanding the concepts of representation, space, systems, and validity to build a deeper comprehension of mathematical ideas.

Reasoning and Evidence

When demonstrating understanding, provide clear reasoning and evidence to support mathematical claims.

Teaching Approaches

Mathematical Inquiry

Conceptual Focus

IB Learner Profile

Active Participation

Assessment Breakdown

External Assessment (HL & SL - 80%)

1

Paper 1: Non-Calculator

- **Weighting:** 30% HL / 40% SL
- **Duration:** 2 hours (HL) / 1 hour 30 minutes (SL)
- **Format:** No calculator permitted. Consists of short-response and extended-response questions covering a broad range of syllabus topics.

2

Paper 2: Calculator Required

- **Weighting:** 30% HL / 40% SL
- **Duration:** 2 hours (HL) / 1 hour 30 minutes (SL)
- **Format:** Graphics Display Calculator (GDC) required. Features short-response and extended-response questions assessing deeper engagement with the syllabus.

3

Paper 3: HL Only (Calculator Required)

- **Weighting:** 20% HL only
- **Duration:** 1 hour 15 minutes
- **Format:** GDC required. Consists of two compulsory extended-response problem-solving questions, demanding sustained mathematical reasoning and

Internal Assessment (HL & SL - 20%)

1

Mathematical Exploration

This is an individual written investigation into a mathematical area. Students are expected to demonstrate knowledge and understanding, conduct an effective investigation leading to an original conclusion, present their work clearly, reflect critically on their findings, and for HL students, utilize sophisticated mathematics.

Weighting: 20% (SL & HL)

Learning Platform for Past Papers

To further support our students, we offer access to a specialized learning platform utilized by international schools. This platform allows students to:

Practice Past Papers

Drill past papers and practice exam-style questions, ensuring they are well-prepared for assessments.

Instant Feedback

Receive instant feedback on their performance and areas for improvement.

Access Resources

Access a wide bank of resources, including study guides and exam tips tailored for IB Mathematics.

Interactive Quizzes

Engage in interactive quizzes to reinforce learning and assess your understanding.