



Mathematics HL

Units

All Pamoja courses are written by experienced subject matter experts and integrate the principles of TOK and the approaches to learning of the IB learner profile. This course has been authorised by the International Baccalaureate (IB).

Year 1

Unit 1: Course Overview

- 1:1 - Getting Started
- 1:2 - Introducing Mathematics HL
- 1:3 - Assessment and Tools
- 2:1 - Linear Graphs
- 2:2 - Parallel and Perpendicular Lines
- 2:3 - Linear Equations
- 2:4 - Solving Quadratic Equations by Factorising
- 2:5 - Trigonometry

Unit 2: Functions and Equations 1

- 3:1 - Completing the Square
- 3:2 - The Quadratic Formula
- 3:3 - Graphs of Quadratics
- 3:4 - The Nature of the Roots of Quadratic Equations
- 3:5 - Sum and Product of Roots of Quadratics
- 4:1 - Graphs of Polynomials
- 4:2 - Factor and Remainder Theorem
- 4:3 - Polynomial Inequalities
- 4:4 - Sum and Product of Roots of Polynomials
- 5:1 - Functions and Relations
- 5:2 - Types of functions

- 5:3 - Composite Functions
- 5:4 - Inverse Functions
- 6:1 - Transformations
- 6:2 - Graphs of Inverse Functions
- 6:3 - Modulus Functions

Unit 3: Functions and Equations 2

- 7:1 - $y=1xy=1x$
- 7:2 - Rational Functions
- 7:3 - Radical and Reciprocal Functions
- 8:1 - Logarithms
- 8:2 - Laws of Logarithms
- 8:3 - Using Logarithms
- 9:1 - Exponential Functions
- 9:2 - Logarithmic Functions
- 9:3 - Exponential and Logarithmic Models

Unit 4: Trigonometry

- 10:1 - Area of a Triangle and the Sine Rule
- 10:2 - The Cosine Rule
- 10:3 - Ambiguous Case
- 11:1 - Radian Measure, Arc Length and Sector Area

11:2 - The Unit Circle
11:3 - Trigonometric Functions and Graphs
12:1 - Transformations of Trig Graphs
12:2 - Reciprocal Trig Functions
12:3 - Trig Identities
13:1 - Compound Angle Formulae
13:2 - Solving Trig Equations Graphically
13:3 - Solving Trig Equations Algebraically
14:1 - Inverse Trig Functions
14:2 - Solving Equations with inverse Trig Functions

Unit 5: Calculus 1

15:1 - Concept of a limit
15:2 - Differentiation from First Principles
15:3 - The Derivative Function
16:1 - Tangents and Normals
16:2 - Curvature
16:3 - Graphing using Differentiation
17:1 - Derivatives of other functions
17:2 - The Chain Rule
17:3 - The Product and Quotient Rules
18:1 - Implicit Differentiation
18:2 - Related Rates
18:3 - Optimisation
19:1 - More Derivatives
19:2 - Review of Differentiation

Unit 6: Algebra 1

20:1 - Introduction to Complex Numbers
20:2 - The Argand Diagram
21:1 - Complex Numbers and Quadratics
21:2 - Complex Numbers and Polynomials
22:1 - The Modulus-Argument Form
22:2 - Euler's Form
23:1 - De Moivre's Theorem
23:2 - Finding Roots of Complex Numbers
23:3 - The Binomial Expansion and De Moivre's Theorem

Unit 7: Calculus 2

24:1 - Antiderivatives
24:2 - Integrals
25:1 - Integrating to get Inverse Trigonometric Functions
25:2 - Boundary Conditions
25:3 - Integration by substitution
26:1 - Integration by Trigonometric Substitution
26:2 - Integration by Parts
27:1 - Definite Integrals
27:2 - Area Under a Curve
27:3 - Volume of Revolution
28:1 - Areas and Volumes Between Two Curves
28:2 - Kinematics

Unit 8: Review

29:1 - End of Year Review
30:1 - End of Year Exam Paper 1

30:2 - End of Year Exam Paper 2

Unit 9: Algebra 2

31:1 - Pascal's Triangle

31:2 - Binomial Theorem

31:3 - The Product of Two Expansions

32:1 - Arithmetic Sequences and Series

32:2 - Geometric Sequences and Series

32:3 - Converging Geometric Series

33:1 - Proof by Mathematical Induction I

33:2 - Proof by Mathematical Induction II

33:3 - Proof by Mathematical Induction III

Year 2

Unit 1: Statistics and Probability

34:1 - Introducing Mathematics HL

34:2 - Internal Assessment: The Exploration

34:3 - Organising the IA

35:1 - Grouped Data and the Mean

35:2 - Measures of Dispersion

35:3 - Permutations

35:4 - Combinations

35:5 - Introduction to Probability

36:1 - Visual Representations of Probability

36:2 - Conditional Probability

36:3 - Independent Events

36:4 - Bayes' Theorem

37:1 - Discrete Random Variables

37:2 - Binomial Distribution

37:3 - Poisson Distribution

38:1 - Continuous Distribution Functions

38:2 - The Normal Distribution

39:1 - The Z Distribution

39:2 - Identifying Distributions

Unit 2: Vectors

40:1 - Introducing Vectors

40:2 - More about Vectors

40:3 - Magnitude and Unit Vectors

41:1 - Vector Equation of a Line

41:2 - Intersections of Lines in 3D

42:1 - Scalar Product

42:2 - Vector Product

43:1 - Equations of Planes

43:2 - Lines in Planes

43:3 - Angles between lines and planes

44:1 - More Equations of Planes

44:2 - Intersection of Planes

44:3 - Vector planes

Unit 3: Theory of Calculus

45:1 - Continuity and Differentiability at a Point

45:2 - Continuity and Differentiability of a Function

46:1 - The Riemann Sum

46:2 - Improper Integrals

47:1 - Mean Value Theorem

47:2 - Fundamental Theorem of Calculus

Unit 4: IA

48:1 - Internal Assessment Write Up 1

48:2 - Internal Assessment Consent Form

49:1 - Trial Exam Review

50:1 - Trial Exam Paper 1

50:2 - Trial Exam Paper 2

Unit 5: Applications of Calculus

51:1 - First Order Differential Equations

51:2 - Slope Fields

51:3 - Euler's Method

52:1 - Solving Differential Equations by Variables Separable

52:2 - Homogenous Differential Equations

52:3 - Integrating Factors

53:1 - Internal Assessment Submission

53:2 - Taylor Series

53:3 - Maclaurin Series

53:4 - Error Terms

54:1 - L'Hôpital's Rule

54:2 - Taylor Series to find a Limit

Unit 6: Series

55:1 - Sequences

55:2 - Infinite Series
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55:3 - Tests for Convergence

56:1 - Comparison Tests

56:2 - The Ratio Test

56:3 - Alternating Series

57:1 - Absolute Convergence

57:2 - Radius of Convergence

Unit 7: Review

58:1 - Exam Review One

59:1 - Exam Review Two

60:1 - Exam Review Three

61:1 - Exam Review Four

