📔 Summary

HL Algebra (Complex numbers)

Subject	Year	Start date	Duration
Mathematics: analysis and approaches	IB1	Week 2, January	3 weeks

Course Part

Description

Algebra is an abstraction of numerical concepts and employs variables which allow us to solve mathematical problems.

📚 Inquiry & Purpose

② Inquiry / Higher Order Questions

Type	Inquiry Questions
Debatable	How does language shape knowledge? For example, do the words "imaginary" and "complex" make the concepts more difficult than if they had different names?
Skills-based	Can De Moivre's theorem be extended to all n?

🔍 Curriculum

⊕ Aims

Develop logical and creative thinking, and patience and persistence in problem solving to instil confidence in using mathematics

◇ Objectives

Reasoning: Construct mathematical arguments through use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions.

📖 Syllabus Content

Topic 1: Number and algebra

AHL Content

AHL 1.12

Complex numbers: the number i, where $i^2 = -1$

Cartesian form $z = a + bi$; the terms real part, imaginary part, conjugate, modulus and argument.

The complex plane.

AHL 1.13

Modulus–argument (polar) form: $z = r(\cos\theta + i\sin\theta) = r\operatorname{cis}\theta$

Euler form: $z = re^{i\theta}$

Sums, products and quotients in Cartesian, polar or Euler forms and their geometric interpretation.

AHL 1.14

Complex conjugate roots of quadratic and polynomial equations with real coefficients.

De Moivre's theorem and its extension to rational exponents.

Powers and roots of complex numbers.

AHL 1.15

Proof by mathematical induction.

Proof by contradiction.

Use of a counterexample to show that a statement is not always true.

📑 ATL Skills

👨‍🏫 Approaches to Learning

🧠 Thinking

- In this unit, we will

  ask students to formulate a reasoned argument to support their opinion or conclusion

  give students time to think through their answers before asking them for a response

  reward a new personal understanding, solution or approach to an issue

  ask open questions

  set students a task which required higher-order thinking skills (such as analysis or evaluation)

  build on a specific prior task

  help students to make their thinking more visible (for example, by using a strategy such as a thinking routine)

  require students to take an unfamiliar viewpoint into account when formulating arguments

  ask questions that required the use of knowledge from a different subject from the one you are teaching

  include a reflection activity

  make a link to TOK

Developing IB Learners

☆ Learner Profile

🔍 Inquirers

📚 Knowledgeable

💡 Thinkers