Summary

HL - Complex numbers

Subject	Year	Start date	Duration
Mathematics: applications and interpretation	IB2	Week 4, October	4 weeks

Course Part

Description

In this unit you will further extend your knowledge of the number system by learning what complex numbers are and how to manipulate them.

Inquiry & Purpose

Inquiry / Higher Order Questions

Type	Inquiry Questions
Debatable	Do complex numbers really exist?
Content-based	What are the applications of complex numbers?

Curriculum

Aims

Employ and refine their powers of abstraction and generalization

Objectives

Problem solving: Recall, select and use their knowledge of mathematical skills, results and models in both abstract and real-world contexts to solve problems.

Syllabus Content

Topic 1: Number and algebra

AHL Content

AHL 1.12

Complex numbers: the number i such that $i^2 = -1$. Cartesian form: $z = a + bi$; the terms real part, imaginary part, conjugate, modulus and argument.

Calculate sums, differences, products, quotients, by hand and with technology. Calculating powers of complex numbers, in Cartesian form, with technology.

The complex plane.

Complex numbers as solutions to quadratic equations of the form $ax^2 + bx + c = 0, a \neq 0$, with real coefficients where $b^2 - 4ac < 0$.

AHL 1.13

Modulus–argument (polar) form: $z = r(\cos\theta + i\sin\theta) = rcis\theta$

Exponential form: $z = re^{\theta}$

Conversion between Cartesian, polar and exponential forms, by hand and with technology.

Calculate products, quotients and integer powers in polar or exponential forms.

Adding sinusoidal functions with the same frequencies but different phase shift angles.

Geometric interpretation of complex numbers.

ATL Skills

Approaches to Learning

Thinking

Developing IB Learners

Learner Profile

Inquirers

Knowledgeable

Thinkers