

AQA Further Pure 1

Complex Numbers

Section 1: Introduction to Complex Numbers

Study Plan (Heinemann textbook)

Background

You have already encountered several number systems in your study of mathematics. Starting with learning to count with the natural numbers, you have progressed through fractions and decimals, negative numbers, and real numbers. Each extension to the number system allows us to solve more problems. For example, the equation $x + 4 = 0$ has no solution in the natural numbers, but it does in the integers.

The equation $x^2 - 2 = 0$ has no solution in the rational numbers, but it does have two real solutions, $x = \sqrt{2}$ and $x = -\sqrt{2}$. However, within the real numbers there is no solution to an equation such as $z^2 + 4 = 0$.

The complex numbers are an extension to the real numbers in which there is a solution to the equation above. It turns out that the complex numbers are the final extension we need for the number system, as all possible polynomial equations have solutions in the complex numbers.

In this section you will learn to manipulate complex numbers, and some of the basic terminology associated with complex numbers.

Detailed work plan



1. Read sections 2.1 – 2.2 (pages 16 – 18). This introduces the concept of complex numbers.



2. **Exercise 2A**
Attempt all the questions.



3. Read sections 2.3 and 2.4 (pages 19 – 21). Examples 1 and 2 in the **Notes and Examples** show addition, subtraction and multiplication of complex numbers.



4. **Exercise 2B**
Attempt all the questions.



5. For extra practice try the interactive tests **Addition and subtraction of complex numbers**, **Multiplying complex numbers** and **Complex conjugates**.



6. Read section 2.5 (pages 22 – 23), and look at Examples 3 and 4 in the **Notes and Examples**.

AQA Further Pure 1



7. Exercise 2C

Attempt the odd numbered questions.

You can also try the Complex numbers hexagonal puzzle.



8. For extra practice look at the Flash resource [Working with complex numbers](#).



9. Read section 2.6 (pages 24 – 26). Equating real and imaginary parts is a key technique when working with complex numbers. There are three further examples in the [Notes and Examples](#).



10. Exercise 2D

Attempt questions 1, 3, 5, 7, 8, 9 and 10.