

EdExcel Further Pure 1

Complex Numbers

Section 1: Introduction to complex numbers

Study Plan (New specification 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 section 1.1 (pages 2 – 4). This introduces the idea of imaginary numbers and looks at working with complex numbers. There are some notes on the number system and an example of solving a quadratic equation in the [Notes and Examples](#).



2. Look at the Flash resource [Complex roots of a quadratic](#) which shows how the complex roots of a quadratic equation can be related to the graph of the quadratic function. You do not need to know this work, but it is interesting extension work.



3. **Exercise 1A**
Attempt at least half the questions.



4. For additional practice try the interactive questions [Adding and subtracting complex numbers](#).



5. Read section 1.2 (pages 5 – 6) on multiplying complex numbers. There is an additional example in the [Notes and Examples](#).



6. **Exercise 1B**
Attempt at least half the questions.

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7. For additional practice try the interactive questions [Multiplying complex numbers](#).



8. Read section 1.3 (pages 7 – 9), which looks at complex conjugates and at dividing complex numbers. There are further examples in the [Notes and Examples](#).



9. **Exercise 1C**

Attempt questions 1, 2, 3, 5, 7, 9, 11, 12, 14, 15, 17, 19 and 20.



10. For additional practice, try the interactive questions [Conjugate of a complex number](#) and [Dividing complex numbers](#), and the Flash resource [Working with complex numbers](#).