Arithmetic with Complex numbers Difficulty: Easy

Question Paper 1

Level	A Level
Subject	Maths Pure 3
Exam Board	CIE
Topic	Complex Numbers
Sub-Topic	Arithmetic with Complex Numbers
Difficulty	Easy
Booklet	Question Paper 1

Time allowed: **34 minutes**

Score: **/24**

Percentage: **/100**

Grade Boundaries:

A*	A	B	C	D	E
>90%	81%	70%	58%	46%	34%

(i) Solve the equation $z^2 - 2i\,z - 5 = 0$, giving your answers in the form $x + iy$ where x and y are real.

[3]

(ii) Find the modulus and argument of each root. [3]

(iii) Sketch an Argand diagram showing the points representing the roots. [1]

Throughout this question the use of a calculator is not permitted.

The complex number z is defined by $z = (\sqrt{2}) - (\sqrt{6})i$. The complex conjugate of z is denoted by z^*.

(i) Find the modulus and argument of z

. [2]

(i) Express each of the following in the form $x + iy$, where x and y are real and exact:

    (a) $z + 2z^*$; [4]

    (b) $\dfrac{z^*}{iz}$.

(iii) On a sketch of an Argand diagram with origin O, show the points A and B representing the complex numbers z^* and iz respectively. Prove that angle AOB is equal to $\frac{1}{6}\pi$. [3]

Throughout this question the use of a calculator is not permitted.

The complex numbers $-3\sqrt{3} + i$ and $\sqrt{3} + 2i$ are denoted by u and v respectively.

(i) Find, in the form $x + iy$, where x and y are real and exact, the complex numbers uv and $\dfrac{u}{v}$.   [5]

(ii) On a sketch of an Argand diagram with origin O, show the points A and B representing the complex numbers u and v respectively. Prove that angle $AOB = \frac{2}{3}\pi$.   [3]