

AQA Further Pure 1

Complex Numbers

Section 1: Introduction to Complex Numbers

Exercise

1. Find the roots of the following equations:

(i) $z^2 + 25 = 0$

(ii) $4z^2 + 9 = 0$

(iii) $z^2 - 2z + 2 = 0$

(iv) $4z^2 + 4z + 5 = 0$

2. In each of the following cases find

a) $z_1 + z_2$

b) $z_1 - z_2$

c) $z_1 z_2$

d) z_1^*

e) z_2^*

f) $z_1^* + z_2^*$

g) $z_1^* - z_2^*$

h) $z_1^* z_2^*$

(i) $z_1 = 2 + 3i$; $z_2 = 1 - 2i$

(ii) $z_1 = -2i$; $z_2 = 3 + i$

What do you notice about the results?

3. Given that $z = (a + i)^4$ where a is real, find values for a such that z is real.

4. Given that $a + bi$ is the conjugate of $(a + bi)^2$ find **all** possible pairs of values for a and b .

5. Find values for a and b given that:

(i) $(a + bi)(2 + i) \equiv a - 3i$

(ii) $(a + i)(4 - bi) \equiv 3b + 2ai$

6. By writing $(a + bi)^2 = 3 - 4i$ find values for a and b and hence find the square roots of $3 - 4i$.

7. Find the values of p and q given that one root of the equation $z^2 + pz + q = 0$ is:

(i) $2 - i$

(ii) $1 - 3i$

(iii) $2i$

(iv) $5 - 3i$