

Complex numbers

chapter

3

Section 3.6 Conjugate roots theorem

If $a+bi$ is a root of a quadratic then $a-bi$ is the other root.

PROJECT MATHS Text & Tests 6

114

Example 1

If $z = 1 + 5i$ is a root of the equation $az^2 + bz + c = 0$, where $a, b, c \in \mathbb{R}$, find the values of a, b, c .

If $1+5i$
is a root
then $1-5i$
is the other
root.

$$\text{Sum} \Rightarrow \frac{1+5i}{2} + \frac{1-5i}{2}$$

$$\begin{aligned} \text{Product} &\Rightarrow (1+5i)(1-5i) \\ &= 1^2 + 5^2 \\ &= 26 \end{aligned}$$

Remember
 $(a+bi)(a-bi) = a^2 + b^2$

$$x^2 - (\text{Sum of Roots})x + (\text{Product of Roots}) = 0$$

$$|z^2 - 2x + 26 = 0$$

$$\begin{aligned} \Rightarrow a &= 1 \\ b &= -2 \\ c &= 26 \end{aligned}$$