

COMPLEX NUMBERS (Q 4, PAPER 1)

2002

4 (a) Given that $i^2 = -1$, simplify

$$2(3-i) + i(4+5i)$$

and write your answer in the form $x + yi$ where $x, y \in \mathbf{R}$.

(b) Let $z = 5 + 4i$.

(i) Plot z and \bar{z} on an Argand diagram, where \bar{z} is the complex conjugate of z .

(ii) Calculate $z\bar{z}$.

(iii) Express $\frac{z}{\bar{z}}$ in the form $u + vi$ where $u, v \in \mathbf{R}$.

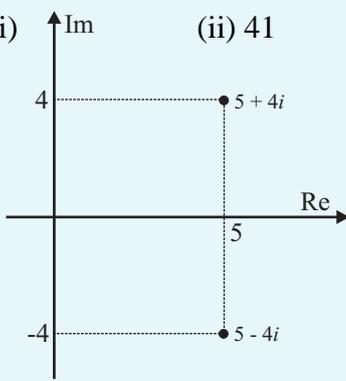
(c) p and k are real numbers such that $p(2+i) + 8 - ki = 5k - 3 - i$.

(i) Find the value of p and the value of k .

(ii) Investigate if $p + ki$ is a root of the equation $z^2 - 4z + 13 = 0$.

ANSWERS

4 (a) $1 + 2i$

(b) (i)  (ii) 41 (iii) $\frac{9}{41} + \frac{40}{41}i$

(c) (i) $p = 2, k = 3$ (ii) Yes