

COMPLEX NUMBERS (Q 4, PAPER 1)

2011

4. (a) Let $u = 1 + 2i$, where $i^2 = -1$.

Plot on an Argand diagram

(i) u

(ii) $u - 3$.

(b) Let $z = 2 + 3i$.

(i) Find z^2 in the form $x + yi$, where $x, y \in \mathbb{R}$.

(ii) Show that $z^2 = 4z - 13$.

(iii) Show that $\bar{z}^2 + 13 = 4\bar{z}$, where \bar{z} is the complex conjugate of z .

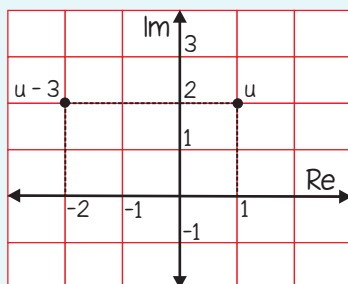
(c) (i) Express $\frac{4 + 2i}{3 - i}$ in the form $x + yi$, where $x, y \in \mathbb{R}$.

(ii) Hence, or otherwise, find the real numbers k and t such that

$$\left| \frac{4 + 2i}{3 - i} \right| (k + 5i) = \frac{1}{\sqrt{2}} (7 + (t - 1)i).$$

ANSWERS

4 (a)



(b) (i) $-5 + 12i$

(c) (i) $1 + i$

(ii) $k = \frac{7}{2}, t = 11$