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 $\overline{z}^2 + 13 = 4\overline{z}$, where $\overline{z}$ is the complex conjugate of z.

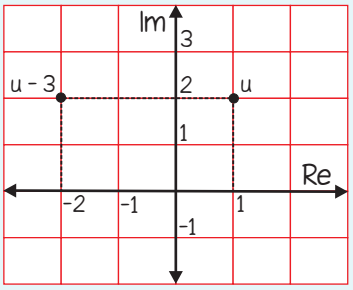
(c) **(i)** Express $\dfrac{4+2i}{3-i}$ in the form $x + yi$, where $x,\ y \in \mathbb{R}$.

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