COMPLEX NUMBERS (Q 4, PAPER 1)

1997

4 (a) Simplify

$3(1+5i)+i(3-2i)$

and express your answer in the form $p + qi$, where $p, q \in \mathbf{R}$ and $i^2 = -1$.

(b) (i) For what values of a is

$|a+8i| = 10$ where $a \in \mathbf{R}$?

(ii) If $w = 4i$, verify that

$w^3 - w^2 + 16w - 16 = 0$.

(c) Let $z = 1 + i$ and let $\overline{z}$ be the complex conjugate of z.

Express $\frac{z}{\overline{z}}$ in the form $x + yi$, $x, y \in \mathbf{R}$.

Hence solve $k\left(\frac{z}{\overline{z}}\right) + tz = -3 - 4i$

for real k and t.

ANSWERS

4 (a) $5 + 18i$

(b) (i) $a = \pm 6$

(c) $\frac{z}{\overline{z}} = 0 + i$; $t = -3$, $k = -1$