COMPLEX NUMBERS (Q 4, PAPER 1)

2000

4 (a) Simplify

$$7(2+i)+i(11+9i)$$

and express your answer in the form $x + yi$ where $x, y \in \mathbf{R}$ and $i^2 = -1$.

(b) Let $w = 3 - i$.
   (i) Plot w and $w + 6i$ on an Argand diagram.

   (ii) Calculate $|w + 6i|$.

   (iii) Express $\dfrac{1}{w+6i}$ in the form $u + vi$ where $u, v \in \mathbf{R}$.

(c) Let $z = 2 + 4i$.
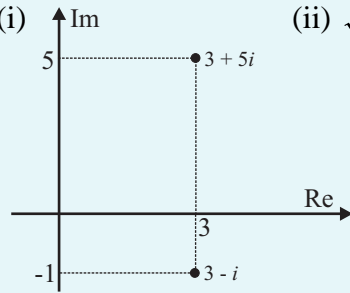   (i) Express $z^2 + 28$ in the form $p + qi$ where $p, q \in \mathbf{R}$.

   (ii) Solve for real k

   $$k(z^2 + 28) = |z|(1+i).$$

   Express your answer in the form $\frac{\sqrt{a}}{b}$ where $a, b \in \mathbf{N}$ and a is a prime number.

ANSWERS

4 (a) $5 + 18i$

(b) (i) (ii) $\sqrt{34}$ (iii) $\frac{3}{34} - \frac{5}{34}i$

(c) (i) $16 + 16i$ (ii) $k = \dfrac{\sqrt{5}}{8}$