

SAMPLE PAPER 2: PAPER 1

QUESTION 2 (25 MARKS)

Question 2 (a)

$$z = 4 + 3i \quad (A(4, 3))$$

(i) $-z = -4 - 3i \quad (B(-4, -3))$

(ii) $\bar{z} = 4 - 3i \quad (C(4, -3))$

(iii) $iz = 4i + 3i^2 = -3 + 4i \quad (D(-3, 4))$

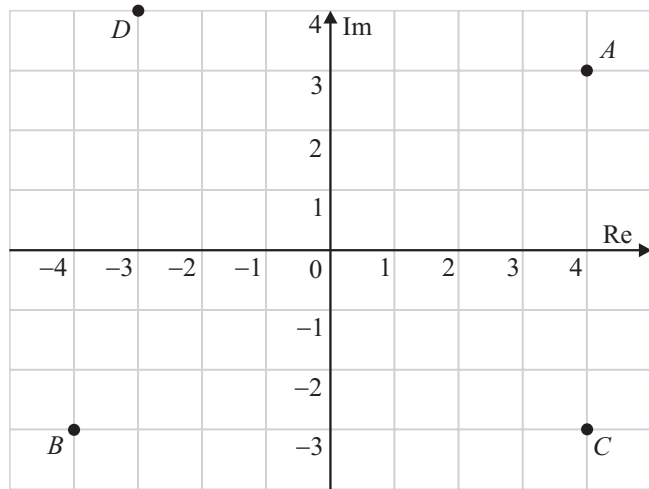
(iv) $O(0, 0), A(4, 3)$

$$\text{Slope of } OA = \frac{3-0}{4-0} = \frac{3}{4} \quad \boxed{m = \frac{y_2 - y_1}{x_2 - x_1}}$$

$O(0, 0), D(-3, 4)$

$$\text{Slope of } OD = \frac{4-0}{-3-0} = -\frac{4}{3}$$

$$\frac{3}{4} \times -\frac{4}{3} = -1 \Rightarrow OA \perp OD \quad \boxed{\text{Perpendicular lines: } m_1 \times m_2 = -1}$$



Question 2 (b) (i)

$$w = 3 + 4i$$

$$\begin{aligned} w^2 &= (3 + 4i)^2 = (3 + 4i)(3 + 4i) \\ &= 9 + 12i + 12i + 16i^2 \\ &= 9 + 24i - 16 \\ &= -7 + 24i \end{aligned}$$

Question 2 (b) (ii)

$$w = 3 + 4i \Rightarrow \bar{w} = 3 - 4i$$

$$\begin{aligned} (\bar{w})^2 &= (3 - 4i)^2 = (3 - 4i)(3 - 4i) \\ &= 9 - 12i - 12i + 16i^2 \\ &= 9 - 24i - 16 \\ &= -7 - 24i \end{aligned}$$

Question 2 (b) (iii)

$$\begin{aligned} \frac{25}{w} &= \frac{25}{3 + 4i} \\ &= \frac{25}{(3 + 4i)} \times \frac{(3 - 4i)}{(3 - 4i)} \quad [\text{Multiply above and below by the conjugate of the denominator.}] \\ &= \frac{25(3 - 4i)}{9 + 12i - 12i - 16i^2} \\ &= \frac{25(3 - 4i)}{9 + 16} = \frac{25(3 - 4i)}{25} \\ &= 3 - 4i = \bar{w} \end{aligned}$$