

SAMPLE PAPER 4: PAPER 1

QUESTION 2 (25 MARKS)

Question 2 (a)

$$\begin{aligned} & 3 + 2i(5 + 8i) - 11i \\ &= 3 + 10i + 16i^2 - 11i \\ &= 3 + 10i - 16 - 11i \\ &= -13 - i \end{aligned}$$

Question 2 (b) (i)

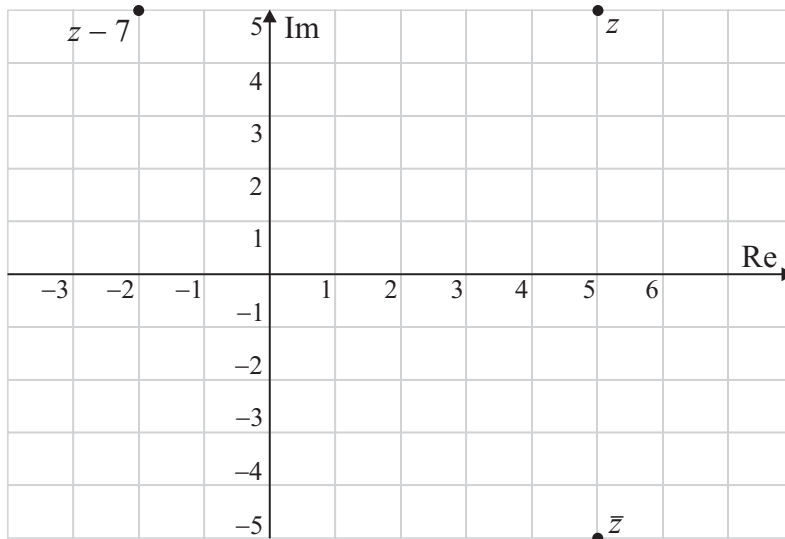
$$\begin{aligned} z &= (1 + 3i)(-i + 2) \\ &= -i + 2 - 3i^2 + 6i \\ &= -i + 2 - 3(-1) + 6i \\ &= -i + 2 + 3 + 6i \\ &= 5 + 5i \end{aligned}$$

Question 2 (b) (ii)

$$\begin{aligned} z &= 5 + 5i \\ z - 7 &= 5 + 5i - 7 \\ &= -2 + 5i \end{aligned}$$

Question 2 (b) (iii)

$$z = 5 + 5i \Rightarrow \bar{z} = 5 - 5i$$



Question 2 (c)

$$z = \frac{2 + 4i}{1 - i} \quad \text{[Multiply above and below by the conjugate of the denominator.]}$$

$$z = a + ib \Rightarrow \bar{z} = a - ib$$

$$= \frac{(2 + 4i)}{(1 - i)} \times \frac{(1 + i)}{(1 + i)} = \frac{2 + 2i + 4i + 4i^2}{1 + i - i - i^2}$$

$$= \frac{2 + 2i + 4i - 4}{1 + i - i + 1} = \frac{-2 + 6i}{2}$$

$$= -1 + 3i$$

$$z = -1 + 3i$$

$$|z| = \sqrt{(-1)^2 + 3^2} = \sqrt{10}$$

$$|a + ib| = \sqrt{a^2 + b^2}$$

$$\bar{z} = -1 - 3i$$

$$\begin{aligned} z\bar{z} &= |z|^2 \\ (-1 + 3i)(-1 - 3i) &= (\sqrt{10})^2 \\ 1 + 3i - 3i - 9i^2 &= 10 \\ 1 + 9 &= 10 \end{aligned}$$