

## LC 2016 (SET A): PAPER 1

### QUESTION 2 (25 MARKS)

#### Question 2 (a)

$$\begin{aligned} z_1 &= 1 + 3i, z_2 = 2 - i \\ z_3 &= z_1 + 2z_2 \\ &= 1 + 3i + 2(2 - i) \\ &= 1 + 3i + 4 - 2i \\ &= 5 + i \end{aligned}$$

#### MARKING SCHEME NOTES

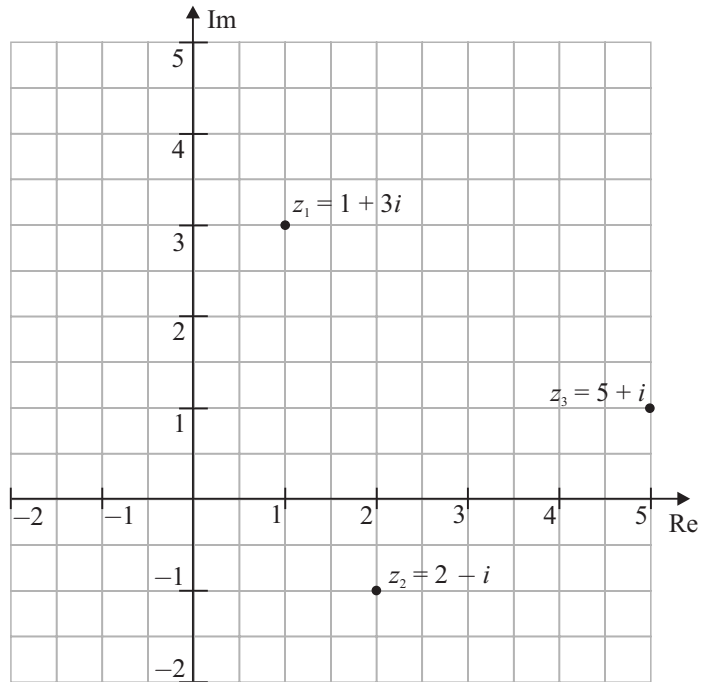
##### Question 2 (a) [Scale 5C (0, 2, 4, 5)]

- 2: • Any correct substitution  
4: • Correct multiplication

##### Question 2 (b) [Scale 5C (0, 2, 4, 5)]

- 2: • One Point correctly plotted  
• 2 points correctly plotted but without labels  
4: • 2 points correctly plotted and labelled  
• 3 points correctly plotted without labels  
• Mixes up real and imaginary axes with label of 3 correct points

#### Question 2 (b)



#### Question 2 (c)

$$\begin{aligned} |z_2 - z_3| &= |2 - i - (5 + i)| & |z_1 + z_2| &= |1 + 3i + 2 - i| \\ &= |2 - i - 5 - i| & &= |3 + 2i| \\ &= |-3 - 2i| & &= \sqrt{(3)^2 + (2)^2} \\ &= \sqrt{(-3)^2 + (-2)^2} & &= \sqrt{9 + 4} = \sqrt{13} \\ &= \sqrt{9 + 4} = \sqrt{13} \end{aligned}$$

$$\therefore |z_2 - z_3| = |z_1 + z_2|$$

#### Question 2 (d)

$$\begin{aligned} w &= \frac{z_1}{z_2} = \frac{1 + 3i}{2 - i} \\ &= \frac{(1 + 3i)}{(2 - i)} \times \frac{(2 + i)}{(2 + i)} \quad \leftarrow \text{Multiply above and below by the conjugate of } (2 - i). \\ &= \frac{2 + i + 6i + 3i^2}{4 + 2i - 2i - i^2} \\ &= \frac{2 + i + 6i - 3}{4 + 2i - 2i + 1} = \frac{-1 + 7i}{5} \\ &= -\frac{1}{5} + \frac{7}{5}i \end{aligned}$$

**MARKING SCHEME NOTES**

**Question 2 (c) [Scale 5A (0, 5)]**

**Question 2 (d) [Scale 10D (0, 2, 4, 6, 10)]**

**2:** • Any correct substitution

**4:** • Conjugate identified

• Some multiplication above and below, even if by wrong conjugate

**6:** • multiply out correctly

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