Exercise 1

Paper 1 style · No calculator

1 6 marks AHL 1.12 ●●○ Typical

The complex number z satisfies $2z - \mathrm{i}z^* = 6 + 3\mathrm{i}$.

(a) Find z, giving your answer in the form $a + b\mathrm{i}$, where $a, b \in \mathbb{R}$. **[4]**

(b) Hence find z^2 in the form $c + d\mathrm{i}$. **[2]**

The markscheme is on the next page: try the question first. Written and verified by a practising IB mathematics teacher, produced with AI assistance; solved twice and recomputed by software. Not affiliated with or endorsed by the International Baccalaureate Organization.
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MARKSCHEME (a)

$z = a + b\mathrm{i}$: $2a + 2b\mathrm{i} - \mathrm{i}(a - b\mathrm{i}) = (2a - b) + (2b - a)\mathrm{i}$ **M1**

$2a - b = 6$ and $2b - a = 3$ **M1A1**

$z = 5 + 4\mathrm{i}$ **A1**

Total 4 marks

Note $-\mathrm{i} \times (-b\mathrm{i}) = b\mathrm{i}^2 = -b$.

MARKSCHEME (b)

$(5 + 4\mathrm{i})^2 = 25 + 40\mathrm{i} - 16$ **(M1)**

$= 9 + 40\mathrm{i}$ **A1**

Total 2 marks