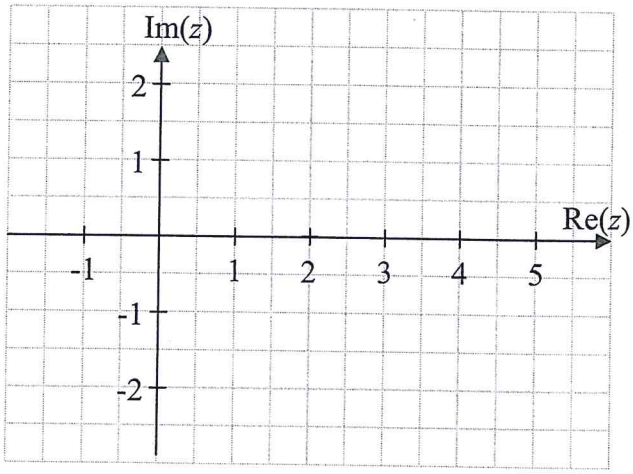
Question 2 LCH - 2014 - Paper 1 **(25 marks)**

Let $z_1 = 1 - 2i$, where $i^2 = -1$.

(a) The complex number z_1 is a root of the equation $2z^3 - 7z^2 + 16z - 15 = 0$.
Find the other two roots of the equation.

(b) **(i)** Let $w = z_1\overline{z}_1$, where $\overline{z}_1$ is the conjugate of z_1. Plot z_1, $\overline{z}_1$ and w on the Argand diagram and label each point.



(ii) Find the measure of the acute angle, $\overline{z}_1 w z_1$, formed by joining $\overline{z}_1$ to w to z_1 on the diagram above. Give your answer correct to the nearest degree.

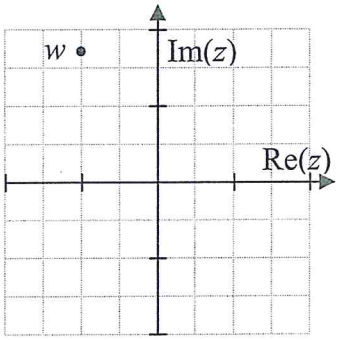
LCH - 2014 SEC SAMPLE - Paper 1

Section A — Concepts and Skills — 150 marks

Answer **all six** questions from this section.

Question 1 (25 marks)

(a) $w = -1 + \sqrt{3}i$ is a complex number, where $i^2 = -1$.



(i) Write w in polar form.

(ii) Use De Moivre's theorem to solve the equation $z^2 = -1 + \sqrt{3}i$. Give your answer(s) in rectangular form.

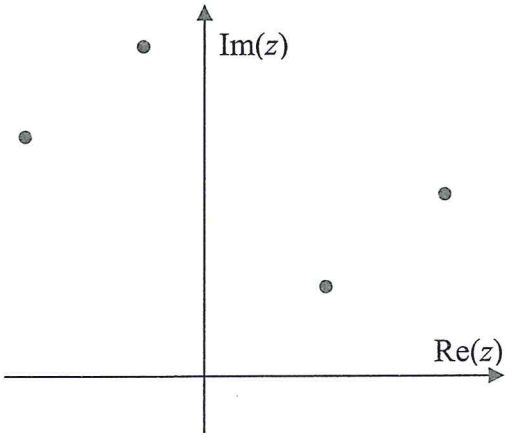
(b) Four complex numbers z_1, z_2, z_3 and z_4 are shown on the Argand diagram. They satisfy the following conditions:

$z_2 = iz_1$

$z_3 = kz_1$, where $k \in \mathbb{R}$

$z_4 = z_2 + z_3$.

The same scale is used on both axes.



(i) Identify which number is which, by labelling the points on the diagram.

(ii) Write down the approximate value of k.

Answer: _____

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