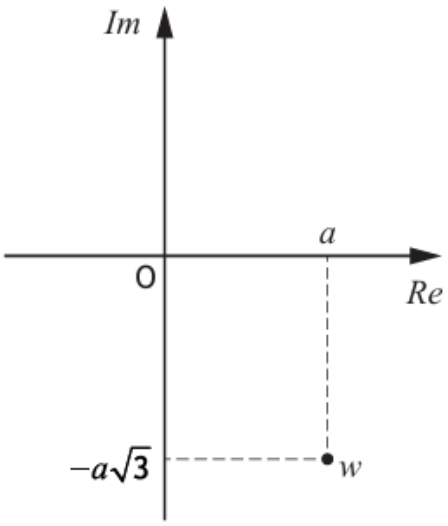
Advanced Higher Maths
SQA 2019 Paper
Question 18

The complex number w has been plotted on an Argand diagram, as shown below.



(a) Express w in

(i) Cartesian form 1

(ii) polar form. 3

(b) The complex number z_1 is a root of $z^3 = w$, where

$$z_1 = k\left(\cos\frac{\pi}{m} + i\sin\frac{\pi}{m}\right)$$

for integers k and m.

Given that $a = 4$,

(i) use de Moivre's theorem to obtain the values of k and m, and 4

(ii) find the remaining roots. 2

Answers:

(a) (i) $a - a\sqrt{3}i$

(ii) $2a\left(\cos\left(-\frac{\pi}{3}\right)+i\sin\left(-\frac{\pi}{3}\right)\right)$

(b) (i) $k = 2$, $m = -9$

(ii) $z_2 = 2\left(\cos\frac{5\pi}{9}+i\sin\frac{5\pi}{9}\right)$

$z_3 = 2\left(\cos\left(-\frac{7\pi}{9}\right)+i\sin\left(-\frac{7\pi}{9}\right)\right)$