AQA – Complex numbers – AS Further Mathematics P1

1. June/2020/Paper_1/No.1

Express the complex number $1 - i\sqrt{3}$ in modulus-argument form.

Tick (✓) **one** box.

[1 mark]

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

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

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

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

2. June/2020/Paper_1/No.2

Given that $1 - i$ is a root of the equation $z^3 - 3z^2 + 4z - 2 = 0$, find the other two roots.

Tick (✓) **one** box.

[1 mark]

$-1 + i$ and -1 ☐

$1 + i$ and 1 ☐

$-1 + i$ and 1 ☐

$1 + i$ and -1 ☐

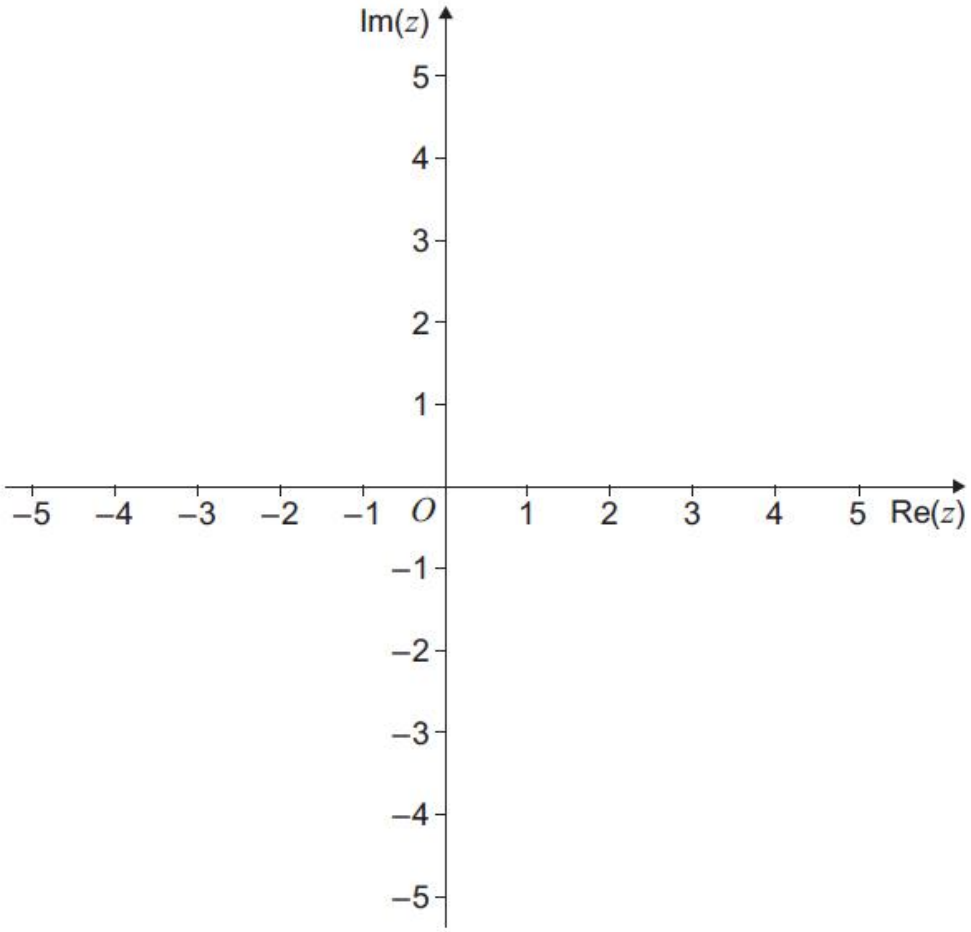
3. June/2020/Paper_1/No.18

The locus of points L_1 satisfies the equation $|z| = 2$

The locus of points L_2 satisfies the equation $\arg(z + 4) = \frac{\pi}{4}$

(a) Sketch L_1 on the Argand diagram below.

[1 mark]



(b) Sketch L_2 on the Argand diagram above.

[1 mark]

(c) The complex number $a + \mathrm{i}b$, where a and b are real, lies on L_1

The complex number $c + \mathrm{i}d$, where c and d are real, lies on L_2

Calculate the least possible value of the expression

$$(c - a)^2 + (d - b)^2$$

[3 marks]

4. June/2019/Paper_1/No.8

Given that $z_1 = 2\left(\cos\frac{\pi}{6} + i\sin\frac{\pi}{6}\right)$ and $z_2 = 2\left(\cos\frac{3\pi}{4} + i\sin\frac{3\pi}{4}\right)$

(a) Find the value of $|z_1 z_2|$

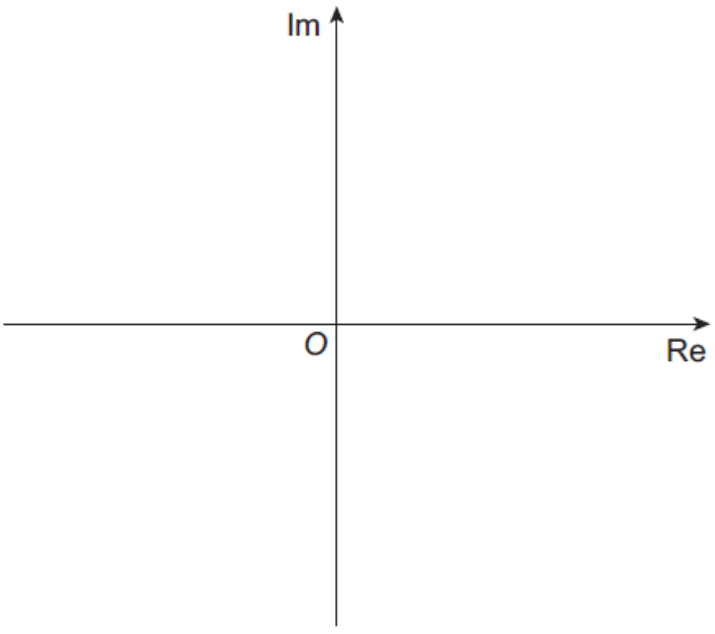
[1 mark]

(b) Find the value of $\arg\left(\frac{z_1}{z_2}\right)$

[1 mark]

(c) Sketch z_1 and z_2 on the Argand diagram below, labelling the points as P and Q respectively.

[2 marks]



(d) A third complex number w satisfies both $|w| = 2$ and $-\pi < \arg w < 0$

Given that w is represented on the Argand diagram as the point R, find the angle $P\hat{R}Q$.

Fully justify your answer.

[3 marks]