

Complex Numbers – Q3 (21/5/21)

Exam Boards

OCR : Pure Core (Year 2)

MEI: Core Pure (Year 2)

AQA: Pure (Year 2)

Edx: Core Pure (Year 2)

Find the square roots of $3 - 4i$ [5 marks]

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Solution

We need to find z such that $z^2 = 3 - 4i$

Let $z = a + bi$

Then $a^2 - b^2 + 2abi = 3 - 4i$ [1 mark]

Equating real and imaginary parts, $a^2 - b^2 = 3$ and $2ab = -4$

[1 mark]

Hence $b = -\frac{2}{a}$ and $a^2 - \frac{4}{a^2} = 3$, so that $a^4 - 3a^2 - 4 = 0$

[1 mark]

Then $(a^2 - 4)(a^2 + 1) = 0$

As a is real, $a = \pm 2$ and $b = \mp 1$

Thus the square roots are $2 - i$ and $-2 + i$ or $\pm(2 - i)$

[2 marks]