

Complex Numbers – Q6 (22/5/21)

Exam Boards

OCR : Pure Core (Year 1)

MEI: Core Pure (Year 1)

AQA: Pure (Year 1)

Edx: Core Pure (Year 1)

Find the equation of the line satisfying

$$|z + 10| = |z - 6 - 4i\sqrt{2}| \quad [4 \text{ marks}]$$

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Solution

Writing $z = x + yi$,

$$|z + 10| = |z - 6 - 4i\sqrt{2}| \Rightarrow |x + 10 + yi| = |x - 6 + (y - 4\sqrt{2})i|$$

[1 mark]

$$\text{Squaring both sides, } (x + 10)^2 + y^2 = (x - 6)^2 + (y - 4\sqrt{2})^2$$

[1 mark]

$$\Rightarrow 20x + 100 = -12x + 36 - 8\sqrt{2}y + 32$$

$$\Rightarrow 8\sqrt{2}y = -32x - 32$$

$$\Rightarrow y = -2\sqrt{2}x - 2\sqrt{2} \quad [2 \text{ marks}]$$