Complex numbers, polar form and loci

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A sample from this topic. The complete topic collection contains three different resources and worked solutions.

Read the worked example, then show each step in the practice questions. Show the mathematical steps. A calculator, graphing tool or CAS may be used to check results where useful.

What you will practise

• Complex numbers

Useful starting skills: Year 10 and relevant Year 10A algebra, functions and trigonometry; concurrent Methods supports these topics.

Write $z=a+bi$ with $i^2=-1$. Its modulus is $\sqrt{(a^2+b^2)}$; conjugation changes the sign of the imaginary component.

Polar form $r(\cos \theta+i \sin \theta)$ makes multiplication geometric: multiply moduli and add arguments. Locus conditions such as$|z-a|=r$ describe distances in the Argand plane.

Worked example

Multiply $(2+i)(3-2 i)$.

Expand $6-4 i+3 i-2 i^2$

replace i^2 by -1.

Answer: 8-i.

Try it yourself

Name: _____ Date: _____

1. Find modulus and conjugate of 3-4 i.

2. Simplify (1+i)/(1-i).

Answers and explanations

Check the method as well as the final answer. An alternative correct method is also valid.

1. 5; 3+4 i.

Modulus sqrt(9+16); conjugate negates the imaginary part.

2. i.

Multiply top and bottom by 1+i; numerator 2 i, denominator 2.

Curriculum reference: Specialist Mathematics Units 1–2 — Complex numbers

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