

## 12 Complex Number Revision Questions



LC HL Project Maths

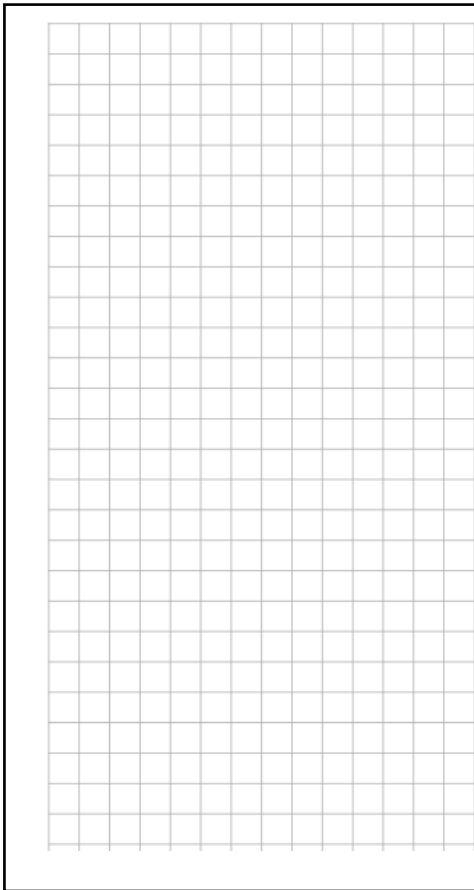
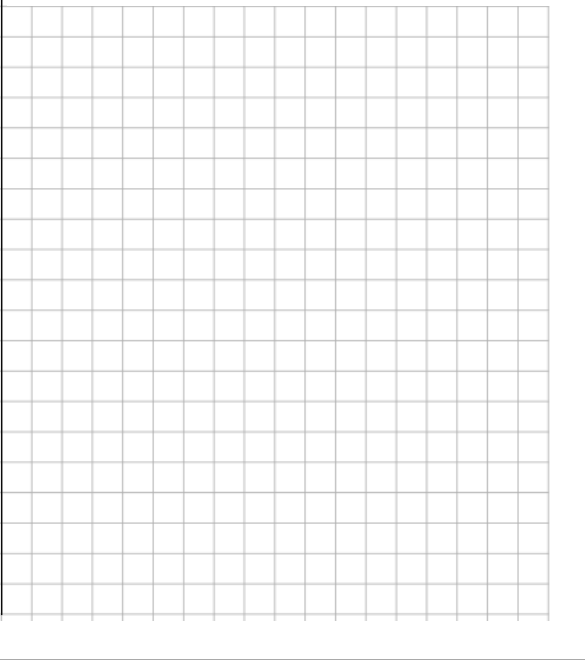
**1. Equality of complex numbers**

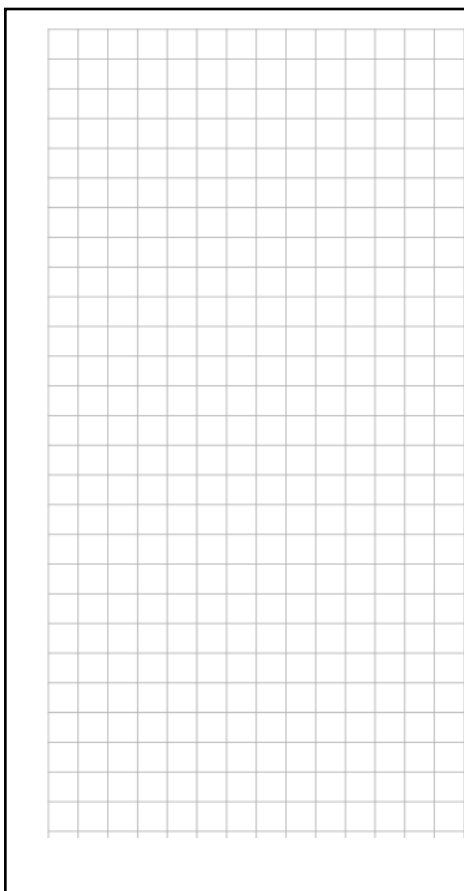
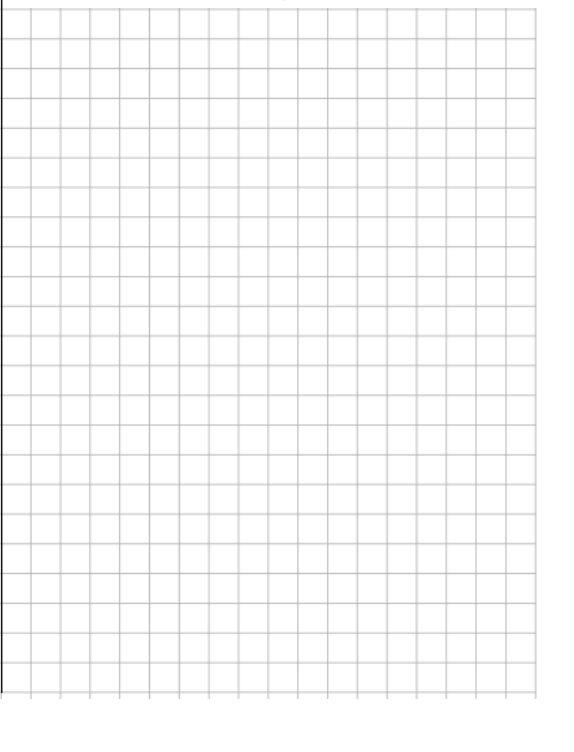
e.g. find the complex number  $z = x + yi$   
if

$$4z + 3i\bar{z} = 11 + 10i,$$

where  $\bar{z}$  is the conjugate of  $z$

## Complex Number Revision Questions

	<p><b>2. Addition, subtraction and multiplication</b> e.g. if <math>z = 3 - 2i</math> and <math>w = -3 + 7i</math>, express in the form <math>a + ib</math>: <math>w(2\bar{z} - w)</math></p> 
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	<p><b>3. Conjugate and division</b> e.g. express <math>\frac{10 + 5i}{4 - 3i}</math> in the form <math>a + bi</math></p> 
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## Complex Number Revision Questions

### 4. Square roots

e.g. find the real numbers  $a$  and  $b$  if

$$(a + bi)^2 = 5 - 12i$$

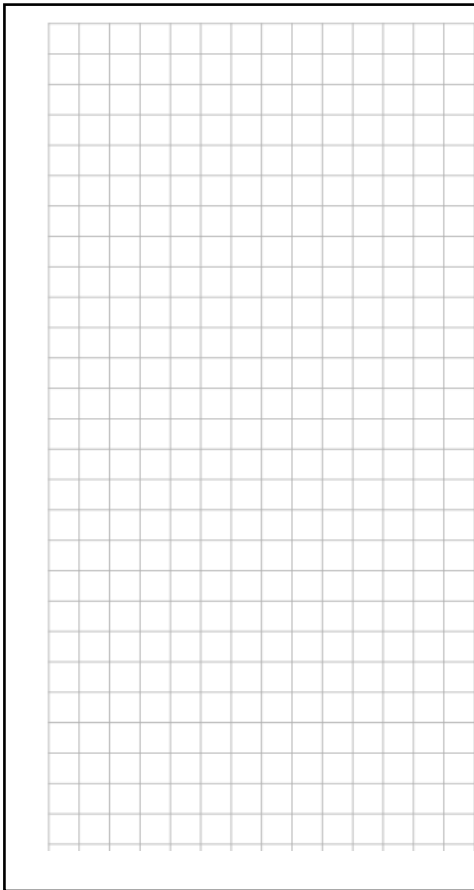
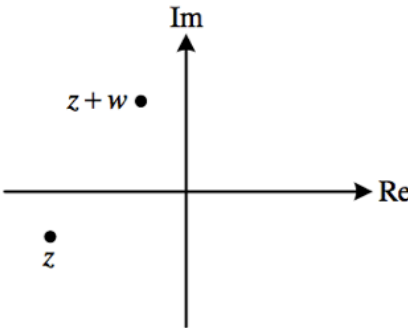
### 5. Argand diagram and modulus

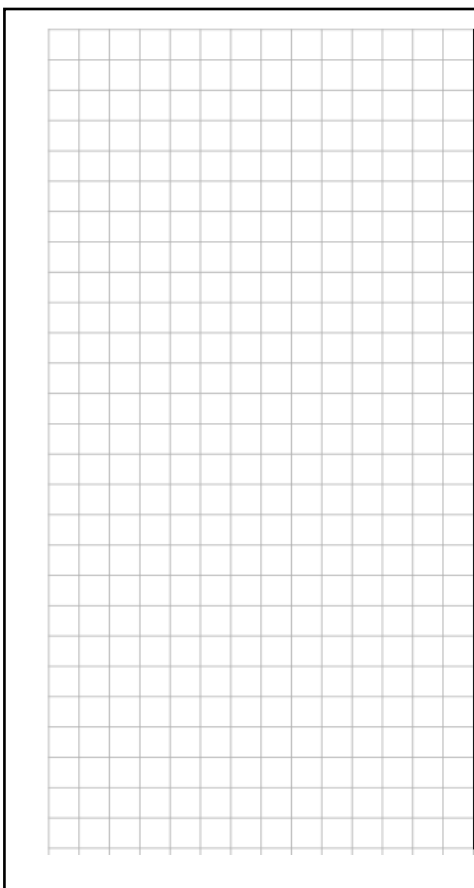
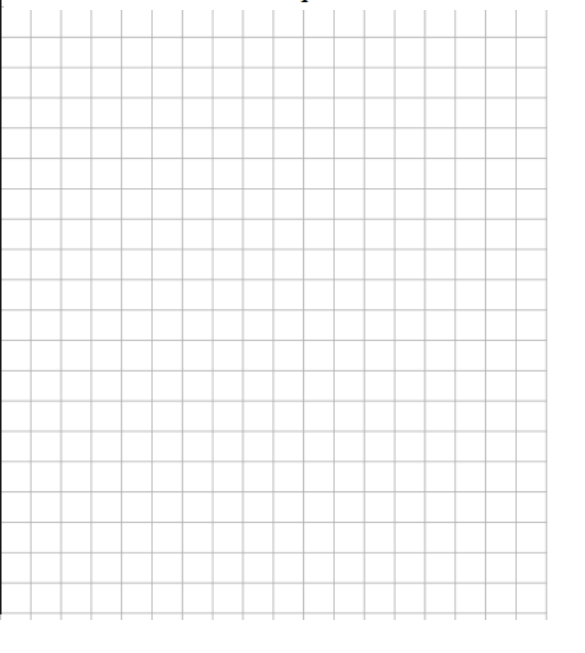
e.g.  $z = 3 + 4i$  and  $w = 1 - 2i$ . Plot

$z + w$  on an Argand diagram and investigate if

$$|z + w| = |z| + |w|$$

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	<p><b>6. Interpreting an Argand diagram</b> e.g. The Argand diagram below shows points representing the complex numbers <math>z</math> and <math>z + w</math>.</p>  <p>Copy the diagram and show, with construction, how to locate the points representing the complex numbers</p> <ol style="list-style-type: none"><li><math>w</math></li><li><math>z - w</math></li><li><math>2z - w</math></li><li><math>u</math>, if <math>2u + w = z</math>.</li></ol>
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	<p><b>7. Complex equations</b> e.g. if <math>3 + i</math> is a root of the equation <math display="block">z^2 - (a + 2i)z + (b + i) = 0,</math>find the values of <math>a, b \in \mathbb{R}</math>, and find the other root of this equation</p> 
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## Complex Number Revision Questions

### 8. Conjugate Roots Theorem

e.g. if  $1 - 2i$  is a root of the equation

$$z^3 + az^2 + bz - 40 = 0, \quad a, b \in \mathbb{R},$$


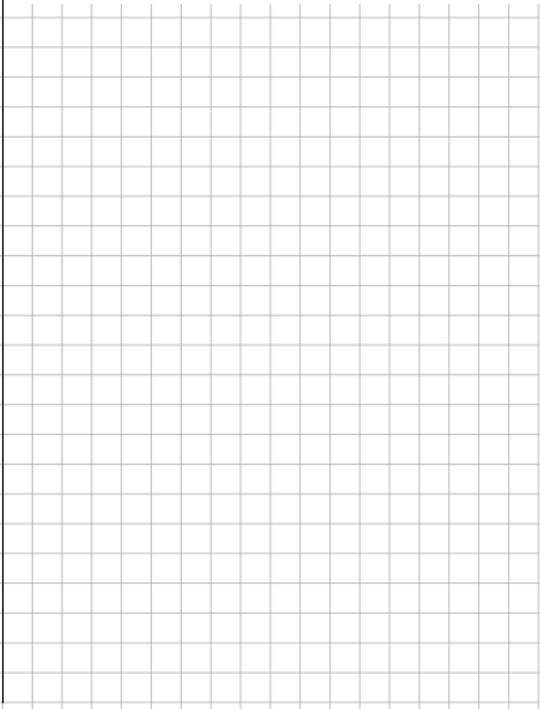
find the values of  $a$  and  $b$  and the other roots of the equation


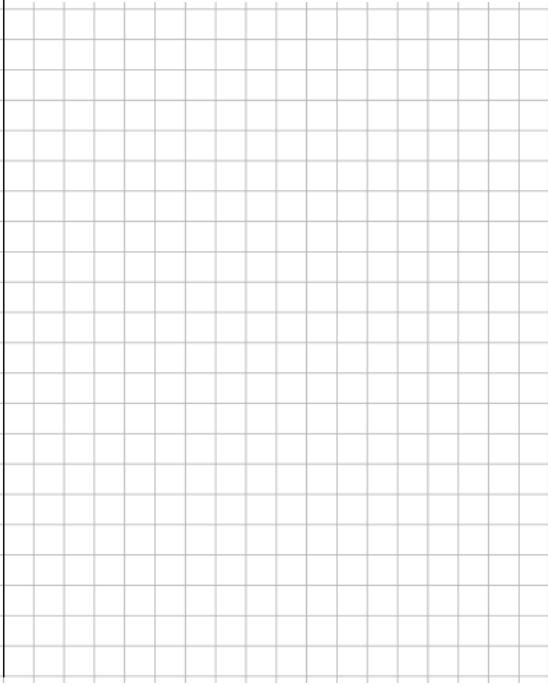
### 9. Polar Form

e.g. express  $-1 - \sqrt{3}i$  in the form

$$r(\cos \alpha + i \sin \alpha)$$

## Complex Number Revision Questions

	<p><b>10. De Moivre: Trigonometric identities</b> e.g. use De Moivre's Theorem to express <math>\cos 3\theta</math> as a polynomial in <math>\cos \theta</math></p> 
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	<p><b>11. De Moivre: Large powers</b> e.g. express <math>(2\sqrt{3} - 2i)^6</math> in the form <math>a + bi</math></p> 
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## Complex Number Revision Questions

### 12. De Moivre: Roots

e.g. express the solutions of the equation

$$z^4 = -81$$

in the form  $a + bi$ . Show these solutions on an Argand diagram.

