

5.

<p><i>Either</i></p> $1 - \frac{3i}{4}$ $\sum \alpha = -\frac{a}{4}$ $a = -24$ $\sum \alpha\beta = \frac{b}{4} \text{ or } \alpha\beta\gamma = -\frac{c}{4}$ $b = 45, c = -52$	<p>B1 B1 M1 A1</p>	<p>State or use other complex root State or use real root Use correct symmetric function, must include -ve Obtain correct answer</p>
<p><i>Or</i></p> $1 - \frac{3i}{4}$ $a = -24, b = 45, c = -52$	<p>B1 B1 M1 M1 A1A1A1</p>	<p>State or use other complex root State or use real root Express as product of 3 linear factors Expand to obtain a cubic expression $4x^3 \dots\dots$ Obtain correct answers</p>
<p><i>Or</i></p> $\sum \alpha = -\frac{a}{4}$ $a = -24$ $b = 45$ $c = -52$	<p>M1 A1 M1 M1 A1 M1 A1</p>	<p>Use correct symmetric function, must include -ve Obtain correct answer Substitute given complex root into the cubic equation and attempt to simplify, use their a Use imaginary part Obtain correct answer Use real part Obtain correct answer</p>
<p><i>Or</i></p> $256 + 16a + 4b + c = 0$ $a = -24, b = 45, c = -52$	<p>B1 B1 M1 M1 A1A1A1</p>	<p>State of use real root Use this root in cubic equation Substitute given complex root into the cubic equation and attempt to simplify Use real and imaginary parts to obtain 2 more equations for a and b Obtain correct answers</p>

6.

<p>(i) <i>Either</i></p> $\alpha + \beta = \frac{1}{2}, \alpha\beta = \frac{3}{2}$ $\alpha + \beta + \frac{\alpha + \beta}{\alpha\beta} \text{ or } \alpha + \beta + \frac{2}{3}(\alpha + \beta)$ $p = \frac{5}{6}$	<p>B1 M1 M1 A1</p>	<p>State or use both correct results in (i) or (ii) Express sum of new roots in terms of $\alpha + \beta$ and $\alpha\beta$ Substitute their values into their expression Obtain given answer correctly</p>
<p><i>Or</i></p> $3u^2 - u + 2(= 0)$ $p = \frac{5}{6}$	<p>B1 M1 M1 A1</p>	<p>Substitute $x = \frac{1}{u}$ and obtain correct quadratic (equation) Use sum of roots of new equation Substitute their values into their expression Obtain given answer correctly</p>
<p>(ii) $\alpha' \beta' = \alpha\beta + \frac{1}{\alpha\beta} + \frac{\beta}{\alpha} + \frac{\alpha}{\beta}$</p> $\frac{\beta}{\alpha} + \frac{\alpha}{\beta} = \frac{(\alpha + \beta)^2 - 2\alpha\beta}{\alpha\beta}$ $q = \frac{1}{3}$	<p>B1 M1 A1 M1 A1</p>	<p>Correct expansion Show how to deal with $\alpha^2 + \beta^2$ Obtain correct expression Substitute their values into $\alpha' \beta'$ Obtain correct answer a.e.f.</p>

7.

<p>(i) $x^2 - y^2 = 2, 2xy = \sqrt{5}$</p> <p>$4x^4 - 8x^2 - 5 = 0$</p> <p>$x = \pm \frac{\sqrt{10}}{2}, y = \pm \frac{\sqrt{2}}{2}$</p> <p>$\pm (\frac{\sqrt{10}}{2} + i \frac{\sqrt{2}}{2})$</p>	<p>M1 A1</p> <p>M1 M1 A1</p> <p>A1</p>		<p>Attempt to equate real and imaginary parts Obtain both results a.e.f.</p> <p>Eliminate to obtain quadratic in x^2 or y^2 Solve to obtain x (or y) values Correct values for both x & y obtained a.e.f.</p>
<p>(ii) $z^2 = 2 \pm i\sqrt{5}$</p> <p>$z = \pm (\frac{\sqrt{10}}{2} \pm i \frac{\sqrt{2}}{2})$</p>	<p>M1 A1 M1 A1ft</p>	<p>6</p> <p>4</p>	<p>Correct answers as complex numbers</p> <p>Solve quadratic in z^2 Obtain correct answers Use results of (i)</p> <p>Obtain correct answers, ft must include root from conjugate</p>
<p>(iii)</p>	<p>B1ft</p>	<p>1</p>	<p>Sketch showing roots correctly</p>
<p>(iv)</p>	<p>B1 B1ft B1ft</p>	<p>3 14</p>	<p>Sketch of straight line, \perp to α Bisector</p>