Question Number	Scheme	Notes	Marks
5	Solutions that rely entirely on solving the equation are generally unlikely to score but there may be attempts which include some of the work below which can receive appropriate credit.		
(a)	$\alpha+\beta=6 \quad \alpha\beta=3$	Correct sum and product. Could be implied. Allow $\frac{6}{1}$ and $\frac{3}{1}$	B1
	$\left(\alpha^2+1\right)\left(\beta^2+1\right)=\alpha^2\beta^2+\alpha^2+\beta^2+1$	Multiplies $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ to obtain 3 or 4 terms with 3 correct. Do not condone $\alpha\beta^2$ for $(\alpha\beta)^2$ unless implied later	M1
	$=\alpha^2\beta^2+(\alpha+\beta)^2-2\alpha\beta+1$	Uses $\alpha^2+\beta^2=(\alpha+\beta)^2-2\alpha\beta$	M1
	$\{=3^2+6^2-2\times3+1\}$ $=40$	Correct answer from correct work. Use of e.g., $\alpha+\beta=-6$ is A0	A1
			(4)
(b)	Allow use of their $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ which could be from (a) or a first or reattempt in (b). Numerator must be correct		
	$\frac{\alpha}{\left(\alpha^2+1\right)}+\frac{\beta}{\left(\beta^2+1\right)}=\frac{\alpha\left(\beta^2+1\right)+\beta\left(\alpha^2+1\right)}{"\left(\alpha^2+1\right)\left(\beta^2+1\right)"}$	Any correct expression with their $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ for the new sum as a single fraction (or two fractions both with the common denominator)	B1
	$=\frac{\alpha\beta(\beta+\alpha)+(\alpha+\beta)}{"\left(\alpha^2+1\right)\left(\beta^2+1\right)"}=\frac{"3"\times"6"+"6"}{"40"}=\ldots$	Uses a correct expression with their $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ for the new sum to obtain a correct numerical expression with their denominator, $\alpha+\beta$ & $\alpha\beta$ and achieves a value.	M1
	$\frac{\alpha\beta}{"\left(\alpha^2+1\right)\left(\beta^2+1\right)"}=\frac{"3"}{"40"}$	Uses a correct expression with their $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ for the new product to obtain a correct value with their denominator and $\alpha\beta$	M1
	$\text{new sum}=\frac{24}{40}\ \left\{=\frac{3}{5}\right\}$ **or** $\text{new product}=\frac{3}{40}$	One value for new sum or new product correct. Any equivalent fractions. Not ft. **Requires appropriate previous M mark.**	A1
	$x^2-\frac{24}{40}x+\frac{3}{40} \quad \{=0\}$	Correctly uses $x^2-(\text{sum of roots})x+(\text{product of roots})$ or equivalent work with their new sum and product. Condone use of a different variable. Allow appropriate values for p, q and r	M1
	$40x^2-24x+3=0$	Any correct equation with integer coefficients and "= 0". Condone use of a different variable. Allow e.g., $p = 40$, $q = -24$, $r = 3$. Requires all marks.	A1
			(6)
	Note that although $\left(\alpha^2+1\right)\left(\beta^2+1\right)$ may be attempted or reattempted in (b) there is no credit for work in (a) that is only seen in (b)		**Total 10**