Question Number	Scheme	Notes	Marks
4	$f(z) = 2z^4 - 19z^3 + Az^2 + Bz - 156$		
(a)	$(z =) 5 + i$	Correct complex number	B1
			(1)
	Mark (b) and (c) together – ignore any labelling seen. **Award marks in the order given for their choice of method**		
(b)/(c) With (b) first	$z = 5 \pm i \Rightarrow (z - (5+i))(z - (5-i)) = ...$ Or e.g. Sum of roots = 10 Product of roots = 26	Correct strategy to find the quadratic factor using the conjugate pair	M1
	$z^2 - 10z + 26$	Correct quadratic	A1
	$f(z) = (z^2 - 10z + 26)(2z^2 + ...z + k)$	Attempts to find the other quadratic. May use inspection (apply rules for quadratic factorisation ie $"26"\lvert k \rvert = 156$) or e.g. long division with quotient $2z^2 + ...z + ...$	M1
	NB long division gives quotient $2z^2 + z + (A - 42)$ and remainder $(10A + B - 446)z + 936 - 26A$		
	$2z^2 + z - 6$	Correct quadratic	A1
	$\Rightarrow z = \frac{3}{2},\ -2\ (, 5 \pm i)$	Correct real roots. The complex roots do not have to be stated.	A1
			(5)
	$f(z) = (z^2 - 10z + 26)(2z^2 + z - 6)$ = …	Multiplies out both quadratics or extracts the terms needed	M1
	$A = 36$, $B = 86$	Correct values (can be seen in the quartic equation)	A1
			(2)
			Total 8
(b)/(c) With (c) first	952+960i-2090-24*A*+10*A*i+5*B*i-156=0	Substitute $(5+i)$ into the quartic (by calculator) and equate real and imag parts (can be done with $(5-i)$)	M1
	-1294+24*A*+5*B*=0 -446+10A+B=0	Correct equations	A1
	A=36 *B*=86	M1 Solve simultaneously A1 One correct A1 Both correct	M1 A1A1
			(5)
	$2z^4 - 19z^3 + 36z^2 + 86z - 156 = 0$ $z = ...$	Solve the equation by long division, inspection or by calculator	M1
	$\Rightarrow z = \frac{3}{2},\ -2\ (, 5 \pm i)$	Correct real roots. The complex roots do not have to be stated.	A1
			(2)
			Total 8