Question	Scheme	Marks
4(a)	$4-3\text{i}$	B1
		(1)
(b)	$\left(x-(4+3\text{i})\right)\left(x-\left(4-3\text{i}\right)\right)=...$	M1
	$x^2-8x+25$	A1
		(2)
(c)	E.g. Product of roots is 225, so product of real roots is $\frac{225}{25}=9$ Or $x^4+Ax^3+Bx^2+Cx+225=\left(x^2-8x+25\right)\left(x^2+...+9\right)$	M1
	Hence (as root is positive) repeated real root is 3	A1
		(2)
(d)	$\left(x^2-8x+25\right)\left(x^2-6x+9\right)$ $=x^4-6x^3+9x^2-8x^3+48x^2-72x+25x^2-150x+225$	M1
	$=x^4-14x^3+82x^2-222x+225$ Two correct middle term coefficients	A1
	So $A=-14$, $B=82$ and $C=-222$ (or accept in the quartic)	A1
		(3)
		(8 marks)

Notes:

(a)

B1: For 4 – 3i

(b)

M1: Correct strategy to find a quadratic factor. May expand as shown in scheme, or may look for sum of roots and product of roots first and then write down the factor.

A1: Correct quadratic factor. Can be written down – give M1A1 if correct, M0A0 if incorrect. Ignore "= 0" with their quadratic factor.

Alt for (b):

M1: Product of complex roots is 25, so product of real roots is $\frac{225}{25}=9$, so the (positive) real root is "3", hence quadratic factor is $\left(x-"3"\right)^2$

A1: x^2-6x+9 **or** $\left(x-3\right)^2$

(c)

M1: A complete strategy to deduce the real root or its square. May consider product of roots, as in scheme, or may first attempt to factorise/long division to find the other quadratic factor – award at the point the quadratic factor with real roots is found. May have been seen in (b)

A1: Real root is 3. (No need to see rejection of the negative possibility.)

Not a "show that" so award M1A1 if correct root is written down with no working.

(d)

M1: Attempts to expand the two quadratic factors – one of which must have a repeated root, so $\left(x^2 \pm 9\right)$ scores M0. (Alternative, may apply –(sum of roots) to find A, pair sum to find B etc – accept method for at least two constants.)

A1: Two correct values of the three. Accept as embedded in a quartic equation.

A1: All three correct. Accept as embedded in their quartic equation.

If their answers are wrong a correct method would get M1A0A0 but w/o some working score M0