ASSESSMENT SCHEDULE (Sample)

Mathematics with Calculus: Manipulate real and complex numbers and solve equations (90638)

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
ACHIEVEMENT	Manipulate real and complex numbers, and solve equations.	One (a)	$8 + 6i$	A1	No alternative.	**ACHIEVEMENT:** Three of Code A1 **and** Two of Code A2
		(b)	$\frac{3}{2}\text{cis}\frac{\pi}{6}$	A1	Any equivalent polar form.	
		(c)	$1+\sqrt{3}\,i$ $1+1.732\,i$	A1	Any equivalent rectangular form.	
		(d)	$-12-5\sqrt{3}$	A1	No alternative.	
		Two (a)	$x = 1$ $x = -2$ $x = 3$	A2	No alternative (must be 3 solutions and not factors).	
		(b)	$3x-1=10^{1.4}$ $x = 8.706$	A2	No alternative (accept any correct rounding to at least two sf).	
		(c)	$x = \frac{4 \pm \sqrt{16-20}}{2}$ $x = 2 + i$ $x = 2 - i$	A2	Both solutions. No alternative.	

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
ACHIEVEMENT WITH MERIT	Solve more complicated equations.	Three	$3\text{cis}\frac{\pi}{6}$, $3\text{cis}\frac{2\pi}{3}$ $3\text{cis}\frac{-5\pi}{6}$, $3\text{cis}\frac{-\pi}{3}$	A1 or A2 M	Must have four solutions (or equivalent) in polar form with some valid method (algebraic or graphical).	**MERIT:** Achievement **plus** Two of Code M **or** All three Code M
		Four	$x = -2.58$	A2 M	Correct answer, any method (any rounding to at least two sf).	
		Five	Square equation to get $2x - 1 = x^2 - 4x + 4$ $x^2 - 6x + 5 = 0$ $x = 1,\ \ x = 5$ $x = 1$ is not valid Solution is $x = 5$	A2 M	Any valid method but answer must have only one solution.	

	Achievement Criteria	No.	Evidence	Code	Judgement	Sufficiency
ACHIEVEMENT WITH EXCELLENCE	Solve problem(s) involving real or complex numbers	Six (a)	$z+\frac{1}{z}=x+\frac{x}{x^2+y^2}+(y+\frac{y}{x^2+y^2})\mathrm{i}$ Equating real and imaginary $y-\frac{y}{x^2+y^2}=0$ Solve to get $y(1-\frac{1}{x^2+y^2})=0$ $y=0$ or $x^2+y^2=1$	A1 A2 M E	Any valid proof.	**EXCELLENCE:** Merit **plus** Both code E
		(b)	Show $\lvert k\rvert=\left\lvert x+\frac{1}{x}\right\rvert\ge 2$ Graphical proof could be: (a) correct graph of $y=x+\frac{1}{x}$ showing that $y\ge 2$ or $y\le 2$ only OR (b) Correct graph of $y=\left\lvert x+\frac{1}{x}\right\rvert$ showing that $y\ge 2$ always Algebraic proof could be As $y=0$ $k=x+\frac{1}{x}$ ie $x^2-kx+1=0$ There are real roots so " $b^2-4ac\ge 0$ " $k^2-4\ge 0$ $\lvert k\rvert\ge 2$	E	And show $\lvert \boldsymbol{k}\rvert\ge 2$ A valid explanation (could be algebraic, graphical or other). Some minor error or omission may be accepted.	