1	Either	State or imply non-modular inequality $(3x-1)^2 < (2x+5)^2$ or corresponding quadratic equation or pair of linear equations $3x-1 = \pm(2x+5)$	B1	
		Solve a three-term quadratic or two linear equations $5x^2 - 26x - 24 < 0$	M1	
		Obtain $-\frac{4}{5}$ and 6	A1	
		State $-\frac{4}{5} < x < 6$	A1	
	Or	Obtain value 6 from graph, inspection or solving linear equation	B1	
		Obtain value $-\frac{4}{5}$ similarly	B2	
		State $-\frac{4}{5} < x < 6$	B1	[4]

2	Use correct product rule or correct chain rule to differentiate y	M1	
	Use $\frac{dy}{dx} = \frac{\frac{dy}{d\theta}}{\frac{dx}{d\theta}}$	M*1	
	Obtain $\frac{-4\cos\theta\sin^2\theta + 2\cos^3\theta}{\sec^2\theta}$ or equivalent	A1	
	Express $\frac{dy}{dx}$ in terms of $\cos\theta$	DM*1	
	Confirm given answer $6\cos^5\theta - 4\cos^3\theta$ legitimately	A1	[5]

3	(i)	Either	Equate p(–1) or p(–2) to zero or divide by $(x+1)$ or $(x+2)$ and equate constant remainder to zero.	M*1	
			Obtain two equations $a - b = 6$ and $4a - 2b = 34$ or equivalents	A1	
			Solve pair of equations for a or b	DM*1	
			Obtain $a = 11$ and $b = 5$	A1	
		Or	State or imply third factor is $4x - 1$	B1	
			Carry out complete expansion of $(x+1)(x+2)(4x-1)$ or $(x+1)(x+2)(Cx+D)$	M1	
			Obtain $a = 11$	A1	
			Obtain $b = 5$	A1	[4]
	(ii)		Use division or equivalent and obtaining linear remainder	M1	
			Obtain quotient $4x + a$, following their value of a	A1√	
			Indicate remainder $x - 13$	A1	[3]

4	(i)	Either	Use $\cos(A \pm B)$ correctly at least once	M1	
			State correct complete expansion	A1	
			Confirm given answer $\cos\theta$ with explicit use of $\cos 60^o = \frac{1}{2}$	A1	
			SR: "correct" answer from sign errors in both expansions is B1 only		
		Or	Use correct $\cos A + \cos B$ formula	M1	
			State correct result e.g. $2\cos\left(\frac{2\theta}{2}\right)\cos\left(\frac{-120}{2}\right)$	A1	
			Confirm given answer $\cos\theta$ with explicit use of $\cos(\pm 60^o) = \frac{1}{2}$	A1	[3]
	(ii)	State or imply $\frac{\cos 2x}{\cos x} = 3$		B1	
		Obtain equation $2\cos^2 x - 3\cos x - 1 = 0$		B1	
		Solve a three-term quadratic equation for $\cos x$		M1	
		Obtain $\frac{1}{4}\left(3 - \sqrt{17}\right)$ or exact equivalent and, finally, no other		A1	[4]
5	(i)	State or imply $\mathrm{i}w = -3 + 5\mathrm{i}$		B1	
		Carry out multiplication by $\frac{4-\mathrm{i}}{4-\mathrm{i}}$		M1	
		Obtain final answer $-\frac{7}{17} + \frac{23}{17}\mathrm{i}$ or equivalent		A1	[3]
	(ii)	Multiply w by z to obtain $17 + 17\mathrm{i}$		B1	
		State $\arg w = \tan^{-1}\frac{3}{5}$ or $\arg z = \tan^{-1}\frac{1}{4}$		B1	
		State $\arg wz = \arg w + \arg z$		M1	
		Confirm given result $\tan^{-1}\frac{3}{5} + \tan^{-1}\frac{1}{4} = \frac{1}{4}\pi$ legitimately		A1	[4]
6	(i)	State or imply correct ordinates 1, 0.94259…, 0.79719…, 0.62000…		B1	
		Use correct formula or equivalent with $h = 0.1$ and four y values		M1	
		Obtain 0.255 with no errors seen		A1	[3]
	(ii)	Obtain or imply $a = -6$		B1	
		Obtain x^4 term including correct attempt at coefficient		M1	
		Obtain or imply $b = 27$		A1	
		Either	Integrate to obtain $x - 2x^3 + \frac{27}{5}x^5$, following their values of a and b	B1√	
			Obtain 0.259	B1	
		Or	Use correct trapezium rule with at least 3 ordinates	M1	
			Obtain 0.259 (from 4)	A1	[5]

7	**(i)**	State at least two of the equations $1+\lambda = a+\mu$, $4 = 2+2\mu$, $-2+3\lambda = -2+3a\mu$	B1	
		Solve for λ or for μ	M1	
		Obtain $\lambda = a$ (or $\lambda = a+\mu-1$) and $\mu = 1$	A1	
		Confirm values satisfy third equation	A1	[4]
	(ii)	State or imply point of intersection is $(a+1, 4, 3a-2)$	B1	
		Use correct method for the modulus of the position vector and equate to 9, following their point of intersection	M*1	
		Solve a three-term quadratic equation in a $\quad (a^2 - a - 6 = 0)$	DM*1	
		Obtain –2 and 3	A1	[4]
8	**(i)**	Sensibly separate variables and attempt integration of at least one side	M1	
		Obtain $2y^{\frac{1}{2}} = \ldots$ or equivalent	A1	
		Correct integration by parts of $x\sin\frac{1}{3}x$ as far as $ax\cos\frac{1}{3}x \pm \int b\cos\frac{1}{3}x\,dx$	M1	
		Obtain $-3x\cos\frac{1}{3}x + \int 3\cos\frac{1}{3}x\,dx$ or equivalent	A1	
		Obtain $-3x\cos\frac{1}{3}x + 9\sin\frac{1}{3}x$ or equivalent	A1	
		Obtain $y = \left(-\frac{3}{10}x\cos\frac{1}{3}x + \frac{9}{10}\sin\frac{1}{3}x + c\right)^2$ or equivalent	A1	[6]
	(ii)	Use $x = 0$ and $y = 100$ to find constant	M*1	
		Substitute 25 and calculate value of y	DM*1	
		Obtain 203	A1	[3]
9	**(i)**	Sketch increasing curve with correct curvature passing through origin, for $x \geq 0$	B1	
		Recognisable sketch of $y = 40 - x^3$, with equation stated, for $x > 0$	B1	
		Indicate in some way the one intersection, dependent on both curves being roughly correct and both existing for some $x < 0$	B1	[3]
	(ii)	Consider signs of $x^3 + \ln(x+1) - 40$ at 3 and 4 or equivalent or compare values of relevant expressions for $x = 3$ and $x = 4$	M1	
		Complete argument correctly with correct calculations (–11.6 and 25.6)	A1	[2]
	(iii)	Use the iterative formula correctly at least once	M1	
		Obtain final answer 3.377	A1	
		Show sufficient iterations to justify accuracy to 3 d.p. or show sign change in interval (3.3765, 3.3775)	A1	[3]
	(iv)	Attempt value of $\ln(x+1)$	M1	
		Obtain 1.48	A1	[2]

10 State or imply $\frac{du}{dx} = e^x$ — B1

Substitute throughout for x and dx — M1

Obtain $\int \frac{u}{u^2 + 3u + 2}\,du$ or equivalent (ignoring limits so far) — A1

State or imply partial fractions of form $\frac{A}{u+2} + \frac{B}{u+1}$, following their integrand — B1

Carry out a correct process to find at least one constant for their integrand — M1

Obtain correct $\frac{2}{u+2} - \frac{1}{u+1}$ — A1

Integrate to obtain $a\ln(u+2) + b\ln(u+1)$ — M1

Obtain $2\ln(u+2) - \ln(u+1)$ or equivalent, follow their A and B — A1√

Apply appropriate limits and use at least one logarithm property correctly — M1

Obtain given answer $\ln\frac{8}{5}$ legitimately — A1 [10]

SR for integrand $\frac{u^2}{u(u+1)(u+2)}$

State or imply partial fractions of form $\frac{A}{u} + \frac{B}{u+1} + \frac{C}{u+2}$ — (B1)

Carry out a correct process to find at least one constant — (M1)

Obtain correct $\frac{2}{u+2} - \frac{1}{u+1}$ — (A1)

…complete as above.