1	Use law for the logarithm of a power at least once		*M1	
	Obtain correct linear equation, e.g. $5x\ln 2 = (2x+1)\ln 3$		A1	
	Solve a linear equation for x		M1 dep *M	
	Obtain $x = 0.866$		A1	[4]
2	Attempt calculation of at least 3 ordinates		M1	
	Obtain 9, 7, 1, 17		A1	
	Use trapezium rule with $h = 1$		M1	
	Obtain $\frac{1}{2}(9+14+2+17)$ or equivalent and hence 21		A1	[4]
3	Either	Obtain correct (unsimplified) version of x^2 or x^4 term in $(1-2x^2)^{-2}$	M1	
		Obtain $1+4x^2$	A1	
		Obtain … $+12x^4$	A1	
		Obtain correct (unsimplified) version of x^2 or x^4 term in $(1+6x^2)^{\frac{2}{3}}$	M1	
		Obtain $1+4x^2-4x^4$	A1	
		Combine expansions to obtain $k = 16$ with no error seen	A1	
	Or	Obtain correct (unsimplified) version of x^2 or x^4 term in $(1+6x^2)^{\frac{2}{3}}$	M1	
		Obtain $1+4x^2$	A1	
		Obtain … $-4x^4$	A1	
		Obtain correct (unsimplified) version of x^2 or x^4 term in $(1-2x^2)^{-2}$	M1	
		Obtain $1+4x^2+12x^4$	A1	
		Combine expansions to obtain $k = 16$ with no error seen	A1	[6]
4	Differentiate to obtain form $a\sin 2x + b\cos x$		M1	
	Obtain correct $-6\sin 2x + 7\cos x$		A1	
	Use identity $\sin 2x = 2\sin x\cos x$		B1	
	Solve equation of form $c\sin x\cos x + d\cos x = 0$ to find at least one value of x		M1	
	Obtain 0.623		A1	
	Obtain 2.52		A1	
	Obtain 1.57 or $\frac{1}{2}\pi$ from equation of form $c\sin x\cos x + d\cos x = 0$		A1	
	Treat answers in degrees as MR – 1 situation			[7]

5	**(a)**	Use identity $\tan^2 2x = \sec^2 2x - 1$	B1	
		Obtain integral of form $ax + b\tan 2x$	M1	
		Obtain correct $3x + \frac{1}{2}\tan 2x$, condoning absence of $+c$	A1	[3]
	(b)	State $\sin x \cos\frac{1}{2}\pi + \cos x\ \sin\frac{1}{6}\pi$	B1	
		Simplify integrand to $\cos\frac{1}{6}\pi + \frac{\cos x \sin\frac{1}{6}\pi}{\sin x}$ or equivalent	B1	
		Integrate to obtain at least term of form $a\ \text{In}(\sin x)$	*M1	
		Apply limits and simplify to obtain two terms	M1 dep *M	
		Obtain $\frac{1}{8}\pi\sqrt{3} - \frac{1}{2}\ln(\frac{1}{\sqrt{2}})$ or equivalent	A1	[5]
6	**(i)**	Obtain $\pm\begin{pmatrix}2\\-3\\-4\end{pmatrix}$ as direction vector of l_1	B1	
		State that two direction vectors are not parallel	B1	
		Express general point of l_1 or l_2 in component form, e.g. $(2\lambda, 1-3\lambda, 5-4\lambda)$ or $(7+\mu, l+2\mu, 1+5\mu)$	B1	
		Equate at least two pairs of components and solve for λ or for μ	M1	
		Obtain correct answers for λ and μ	A1	
		Verify that all three component equations are not satisfied (with no errors seen)	A1	[6]
	(ii)	Carry out correct process for evaluating scalar product of $\begin{pmatrix}1\\2\\5\end{pmatrix}$ and $\begin{pmatrix}1\\0\\0\end{pmatrix}$	M1	
		Use correct process for finding modulus and evaluating inverse cosine	M1	
		Obtain $79.5°$ or 1.39 radians	A1	[3]
7		Separate variables and factorise to obtain $\frac{dy}{(3y+1)(y+3)} = 4x\,dx$ or equivalent	B1	
		State or imply the form $\frac{A}{3y+1} + \frac{B}{y+3}$ and use a relevant method to find A or B	M1	
		Obtain $A = \frac{3}{8}$ and $B = -\frac{1}{8}$	A1	
		Integrate to obtain form $k_1\ln(3y+1) + k_2\ln(y+3)$	M1	
		Obtain correct $\frac{1}{8}\ln(3y+1) - \frac{1}{8}\ln(y=3) = 2x^2$ or equivalent	A1	
		Substitute $x = 0$ and $y = 1$ in equation of form $k_1\ln(3y+1) + k_2\ln(y+3) = k_3x^2 + c$ to find a value of c	M1	
		Obtain $c = 0$	A1	
		Use correct process to obtain equation without natural logarithm present	M1	
		Obtain $y = \frac{3e^{16x^2} - 1}{3 - e^{16x^2}}$ or equivalent	A1	[9]

8	(i)	Either	Expand $(2-i)^2$ to obtain $3-4i$ or unsimplified equivalent	B1	
			Multiply by $\frac{3+4i}{3+4i}$ and simplify to $x+iy$ form or equivalent	M1	
			Confirm given answer $2+4i$	A1	
		Or	Expand $(2-i)^2$ to obtain $3-4i$ or unsimplified equivalent	B1	
			Obtain two equations in x and y and solve for x or y	M1	
			Confirm given answer $2+4i$	A1	[3]
	(ii)		Identify $4+4$ or $-4+4i$ as point at either end or state $p=2$ or state $p=-6$	B1	
			Use appropriate method to find both critical values of p	M1	
			State $-6 \leqslant p \leqslant 2$	A1	[3]
	(iii)		Identify equation as of form $\lvert z-a\rvert = a$ or equivalent	M1	
			Form correct equation for a not involving modulus, e.g. $(a-2)^2+4^2=a^2$	A1	
			State $\lvert z-5\rvert = 5$	A1	[3]
9	(i)		Use product rule to find first derivative	M1	
			Obtain $2xe^{2-x}-x^2e^{2-x}$	A1	
			Confirm $x=2$ at M	A1	[3]
	(ii)		Attempt integration by parts and reach $\pm x^2e^{2-x} \pm \int 2xe^{2-x}\,dx$	*M1	
			Obtain $-x^2e^{2-x} + \int 2xe^{2-x}\,dx$	A1	
			Attempt integration by parts and reach $\pm x^2e^{2-x} \pm 2xe^{2-x} \pm 2e^{2-x}$	*M1	
			Obtain $-x^2e^{2-x}-2xe^{2-x}-2e^{2-x}$	A1	
			Use limits 0 and 2 having integrated twice	M1 dep *M	
			Obtain $2e^2-10$	A1	[6]
10	(i)		Obtain $\frac{dx}{dt}=\frac{2}{t+2}$ and $\frac{dy}{dt}=3t^2+2$	B1	
			Use $\frac{dy}{dx}=\frac{dy}{dt}\div\frac{dx}{dt}$	M1	
			Obtain $\frac{dy}{dx}=\frac{1}{2}(3t^2+2)(t+2)$	A1	
			Identify value of t at the origin as -1	B1	
			Substitute to obtain $\frac{5}{2}$ as gradient at the origin	A1	[5]
	(ii)	(a)	Equate derivative to $\frac{1}{2}$ and confirm $p=\frac{1}{3p^2+2}-2$	B1	[1]
		(b)	Use the iterative formula correctly at least once	M1	
			Obtain value $p=-1.924$ or better $(-1.92367\ldots)$	A1	
			Show sufficient iterations to justify accuracy or show a sign change in appropriate interval	A1	
			Obtain coordinates $(-5.15, -7.97)$	A1	[4]