1	Either	State or imply non-modular inequality $(3x-2)^2 > (x+4)^2$ or corresponding equation or pair of linear equations	B1	
		Attempt solution of 3-term quadratic equation or of 2 linear equations	M1	
		Obtain critical values $-\frac{1}{2}$ and 3	A1	
		State answer $x < -\frac{1}{2}$, $x > 3$	A1	[4]
	Or	Obtain critical value $x = 3$ from graphical method, inspection, equation	B1	
		Obtain critical value $x = -\frac{1}{2}$ similarly	B2	
		State answer $x < -\frac{1}{2}$, $x > 3$	B1	[4]
2	**(i)**	Differentiate to obtain form $k_1 \cos x + k_2 \sec^2 2x$	M1	
		Obtain correct second term $2\sec^2 2x$	A1	
		Obtain $3\cos x + 2\sec^2 2x$ and hence answer 5	A1	[3]
	(ii)	Differentiate to obtain form $ke^{2x}\left(1+e^{2x}\right)^{-2}$	M1	
		Obtain correct $-12e^{2x}\left(1+e^{2x}\right)^{-2}$ or equivalent (may be implied)	A1	
		Obtain –3	A1	[3]
3	**(i)**	Divide at least as far as x term in quotient, use synthetic division correctly or make use of an identity	M1	
		Obtain at least $6x^2 - x$	A1	
		Obtain quotient $6x^2 - x - 2$ and confirm remainder is 7 (AG)	A1	[3]
	(ii)	State equation in form $\left(x^2-4\right)\left(6x^2+kx-2\right)=0$, any constant k (may be implied)	M1	
		Obtain two of the roots $-2,\ 2,\ -\frac{1}{2},\ \frac{2}{3}$	A1	
		Obtain remaining two roots and no others	A1	[3]
4	**(i)**	Sketch, showing the correct shape of each, $y = 3\ln x$ and $y = 15 - x^3$	B1	
		Indicate the correct intercepts (1,0) and (0,15)	B1	
		Indicate one real root from two correct sketches	B1	[3]
	(ii)	Consider sign of $3\ln x + x^3 - 15$ for 2.0 and 2.5 or equivalent	M1	
		Justify conclusion with correct calculations (–4.9 and 3.4 or equivalents)	A1	[2]
	(iii)	Use the iteration process correctly at least once	M1	
		Obtain final answer 2.319	A1	
		Show sufficient iterations to 5 decimal places to justify answer or show a sign change in the interval (2.3185, 2.3195)	A1	[3]
5	**(i)**	Express left-hand side as a single fraction	M1	
		Use $\sin 2\theta = 2\sin\theta\cos\theta$ at some point	B1	
		Complete proof with no errors seen (AG)	A1	[3]

(ii)	**(a)**	State $\dfrac{2}{\sin\frac{1}{4}\pi}$ or equivalent	B1	
		Obtain $2\sqrt{2}$ or exact equivalent (dependent on first B1)	B1	[2]
	(b)	State or imply $k\sin 2\theta$ for any k	B1	
		Integrate to obtain $-\frac{3}{2}\cos 2\theta$	B1	
		Substitute both limits correctly to obtain 3	B1	[3]
6	**(a)**	Integrate to obtain form $k\ln(2x-7)$	M1	
		Obtain correct $3\ln(2x-7)$	A1	
		Substitute limits correctly (dependent on first M1)	DM1	
		Use law for logarithm of a quotient or power (dependent on first M1)	DM1	
		Confirm $\ln 125$ following correct work and sufficient detail (AG)	A1	[5]
	(b)	Evaluate y at (1), 5, 9, 13, 17	M1	
		Use correct formula, or equivalent, with $h = 4$ and five y-values	M1	
		Obtain 13.5	A1	[3]
7	**(i)**	Obtain $3y + 3x\frac{dy}{dx}$ as derivative of $3xy$	B1	
		Obtain $2y\frac{dy}{dx}$ as derivative of y^2	B1	
		State $4x + 3y + 3x\frac{dy}{dx} + 2y\frac{dy}{dx} = 0$	B1	
		Substitute 2 and –1 to find gradient of curve (dependent on at least one B1)	M1	
		Form equation of tangent through $(2, -1)$ with numerical gradient (dependent on previous M1)	DM1	
		Obtain $5x + 4y - 6 = 0$ or equivalent of required form	A1	[6]
	(ii)	Use $\frac{dy}{dx} = 0$ to find relation between x and y (dependent on at least one B1 from part(i))	M1	
		Obtain $4x + 3y = 0$ or equivalent	A1	
		Substitute for x or y in equation of curve	M1	
		Obtain $-\frac{1}{8}y^2 = 3$ or $-\frac{2}{9}x^2 = 3$ or equivalent and conclude appropriately	A1	[4]