Question	Answer	Marks	Partial Marks
4(b)(i)	$\left(1-\frac{1}{2}x^{-\frac{1}{2}}\right)\sec^2\left(x-\sqrt{x}\right)$ oe, isw	**2**	**M1** for $\mathrm{f}(x)\sec^2\left(x-\sqrt{x}\right)$
4(b)(ii)	Correctly writes $\left(1-\frac{1}{2}x^{-\frac{1}{2}}\right)\sec^2\left(x-\sqrt{x}\right)=$ $\frac{2\sqrt{x}-1}{2\sqrt{x}}\sec^2(x-\sqrt{x})$ or $\frac{2\sqrt{x}-1}{2\sqrt{x}\cos^2(x-\sqrt{x})}$ **and** states an answer $k\tan\left(x-\sqrt{x}\right)$ or states $\frac{1}{2}\int\frac{2\sqrt{x}-1}{\sqrt{x}\cos^2(x-\sqrt{x})}\,\mathrm{d}x=\tan(x-\sqrt{x})$	**M1**	where k is a non-zero constant; dependent on **part (b)(i)**
	$2\tan\left(x-\sqrt{x}\right)+c$ nfww	**A1**	
5	Correct quotient rule: $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{(\ln 3x)[1]-x\left(\frac{1}{3x}\times 3\right)}{(\ln 3x)^2}$ oe OR correct product rule using $y = x(\ln 3x)^{-1}$: $\frac{\mathrm{d}y}{\mathrm{d}x}=x\left(-(\ln 3x)^{-2}\times\frac{3}{3x}\right)+[1](\ln 3x)^{-1}$	**2**	**M1** for $\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{(\ln 3x)[1]-x\times \textit{their}\left(\frac{1}{3x}\times 3\right)}{(\ln 3x)^2}$ OR for $\frac{\mathrm{d}y}{\mathrm{d}x}=x\times \textit{their}\left(-(\ln 3x)^{-2}\times\frac{3}{3x}\right)$ $+[1](\ln 3x)^{-1}$
	$\frac{\delta y}{h}=\frac{\ln 3-1}{(\ln 3)^2}$ oe, soi	**M1**	**FT** *their* $\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\vert_{x=1}$ providing quotient rule or appropriate product rule attempted
	$\delta y=\frac{\ln 3-1}{(\ln 3)^2}h$ or $\delta y = 0.0817h$ nfww	**A1**	must have evidence of correct derivative
6	$\left[-\frac{1}{4}\mathrm{e}^{2-4x}\right]_{-0.25}^{0.5}$ oe	**B2**	**B1** for $k\mathrm{e}^{2-4x}$, $k \neq -4$
	Correct use of correct limits: $-\frac{1}{4}\mathrm{e}^{0}-\left(-\frac{1}{4}\mathrm{e}^{3}\right)$ oe	**M1**	**FT** *their* $-\frac{1}{4}\mathrm{e}^{2-4x}$ providing **B1** awarded
	$-\frac{1}{4}+\frac{1}{4}\mathrm{e}^{3}$ or exact equivalent, isw	**A1**	

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Question	Answer	Marks	Partial Marks
7(a)	Correctly eliminates x or y e.g. $4x^2 - 3\left(\frac{2}{x}\right)^2 + x\left(\frac{2}{x}\right) = 24$ oe or $4\left(\frac{2}{y}\right)^2 - 3y^2 + y\left(\frac{2}{y}\right) = 24$ oe	**M1**	
	Rearranges to a 3-term quadratic in x^2 or y^2 soi e.g. $4x^4 - 22x^2 - 12[=0]$ or $2x^4 - 11x^2 - 6[=0]$ or $3y^4 + 22y^2 - 16[=0]$ oe	**A1**	
	Factorises or solves *their* 3-term quadratic in x^2 or y^2 soi e.g. $(2x^2 + 1)(x^2 - 6)$ or $(3y^2 - 2)(y^2 + 8)$	**M1**	
	$x^2 = 6$ oe, nfww or $y^2 = \frac{2}{3}$ nfww	**A1**	
	$\left(\pm\sqrt{6}, \pm\frac{2}{\sqrt{6}}\right)$ or $\left(\pm\sqrt{6}, \pm\sqrt{\frac{2}{3}}\right)$ oe, nfww	**A1**	and no other values; **dep** on at least the first M1 A1
7(b)	$\sqrt{(x_P - x_Q)^2 + (y_P - y_Q)^2}$ oe, soi	**M1**	**FT** providing *their* x_P, x_Q and *their* y_P, y_Q are non-zero
	$\frac{4}{3}\sqrt{15}$	**A1**	
8(a)	Points plotted at x: 1, 3, 5, 10, 12 lg$y$: 1.6, 2.2, 2.8, 4.3, 4.9 soi and ruled, single straight line of best fit	**B2**	**B1** for at least 4 correctly plotted points
8(b)	lg$y$ = lg$A$ + $x$lg$b$ soi	**B1**	
	lg$A$ = *their* 1.3 soi	**M1**	**dep** on using linear points
	lg$b$ = *their* $\frac{4.9 - 1.6}{12 - 1}$ oe or lg$b$ = 0.3 oe soi	**M1**	**dep** on using linear points
	$A = 10^{1.3}$ isw and $b = 10^{\frac{3}{10}}$ isw	**A2**	**A1** for $A = 10^{1.3}$ isw or $b = 10^{\frac{3}{10}}$ isw
	A = 20 and b = 2 nfww	**A1**	If zero scored, award **SC1** for A = 20 and **SC1** for b = 2 found without using the graph in any way

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