Question	Answer	Marks	Guidance
4(b)	$\left(2\left((2x+1)^{\frac{1}{2}}+4\right)+1\right)^{\frac{1}{2}}+4$	**B1**	
	$(2x+1)^{\frac{1}{2}}=8$	**B1**	**Dep**
	$x = 31.5$ oe	**B1**	**Dep** on both previous **B** marks
	Alternative		
	g(x) = 9, x = 12	**(B1)**	
	g(x) = 12	**(B1)**	**Dep**
	x = 31.5 oe	**(B1)**	**Dep** on both previous **B** marks
5(a)	$\frac{\text{cosec}^2\theta}{\cot^2\theta}=\frac{1}{\sin^2\theta}\times\frac{\sin^2\theta}{\cos^2\theta}$ $=\frac{1}{\cos^2\theta}=\sec^2\theta$	**B1**	Sufficient detail is needed Do not award if θ is consistently omitted
	Alternative 1		
	$\frac{\frac{\sin^2\theta+\cos^2\theta}{\sin^2\theta}}{\frac{\cos^2\theta}{\sin^2\theta}}$ $=\frac{1}{\cos^2\theta}=\sec^2\theta$	**(B1)**	Sufficient detail is needed Do not award if θ is consistently omitted
	Alternative 2		
	$\frac{1}{\cot^2\theta}+1$ $\tan^2\theta+1$	**(B1)**	Sufficient detail is needed Do not award if θ is consistently omitted
5(b)	$\sec^2\theta$	**B1**	
5(c)	$\int\left(\sec^2\theta-\sin\theta\right)\text{d}\theta$ soi	**B1**	
	$\tan\theta+\cos\theta$	**B2**	**B1** for each
	$\sqrt{3}-\frac{1}{2}$ or exact equivalent	**B1**	**Dep** on 3 previous **B** marks
6(a)	$x^{10}+20x^7+180x^4$	**3**	**B1** for each correct term

Question	Answer	Marks	Guidance
6(b)	${}^8C_4\left(4x^2\right)^4\left(\frac{1}{2x^2}\right)^4$	**M1**	May be implied by working to obtain $r = 4$
	1120	**A1**	From correct working
7	$\left(\frac{\mathrm{d}y}{\mathrm{d}x} =\right)\frac{(x+2)\left(\frac{6x}{3x^2-1}\right)-\ln\left(3x^2-1\right)}{(x+2)^2}$ or $\frac{6x}{\left(3x^2-1\right)}(x+2)^{-1}-(x+2)^{-2}\ln\left(3x^2-1\right)$ oe	**3**	**B1** for $\frac{6x}{3x^2-1}$ **M1** for correct attempt at differentiation of a quotient or a correct product **A1** for all terms apart from $\frac{6x}{3x^2-1}$ correct.
	When $x = 1$, $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{9-\ln 2}{9}$	**M1**	For use of $x = 1$ in *their* $\frac{\mathrm{d}y}{\mathrm{d}x}$, must see a substitution if in decimal form unless 0.923 obtained from a correct derivative
	$\frac{\mathrm{d}x}{\mathrm{d}t} = \frac{9h}{9-\ln 2}$ or exact equivalent	**2**	**M1** for $\frac{h}{\textit{their}\left(\frac{9-\ln 2}{9}\right)}$, with $x = 1$ substituted in **A0** if using small changes
8	$\frac{\mathrm{d}y}{\mathrm{d}x} = \mathrm{e}^x k(2x+5)^{-\frac{1}{2}} + \mathrm{e}^x(2x+5)^{\frac{1}{2}}$	**M1**	
	$\frac{\mathrm{d}y}{\mathrm{d}x} = \mathrm{e}^x(2x+5)^{-\frac{1}{2}} + \mathrm{e}^x(2x+5)^{\frac{1}{2}}$	**A1**	
	When $x = 2$, $\frac{\mathrm{d}y}{\mathrm{d}x} = \frac{10\mathrm{e}^2}{3}$	**M1**	**Dep** allow unsimplified Allow for using *their* $\frac{\mathrm{d}y}{\mathrm{d}x}$
	When $x = 2$, $y = 3\mathrm{e}^2$	**B1**	
	Tangent: $y - 3\mathrm{e}^2 = \frac{10\mathrm{e}^2}{3}(x-2)$	**M1**	Allow for using *their* $\frac{\mathrm{d}y}{\mathrm{d}x}$ and *their y*
	When $y = 0$, $x = \frac{11}{10}$	**A1**	Must be simplified Must be from correct work
	When $x = 0$, $y = -\frac{11\mathrm{e}^2}{3}$	**A1**	
	$\left(\frac{11}{20}, -\frac{11\mathrm{e}^2}{6}\right)$	**A1**	**FT** on *their* coordinates for *x* and *y*, but must be exact and simplified

© Cambridge University Press & Assessment 2024