Question	Answer	Marks	Guidance
4(b)	Writes as a quadratic in e^{2y+1} or states $u = e^{2y+1}$ and writes as a quadratic in u oe, soi	**M1**	condone one error
	$(e^{2y+1})^2 - e^{2y+1} - 6 \quad [=0]$ oe or $u^2 - u - 6 \quad [=0]$ oe	**A1**	
	$(e^{2y+1} + 2)(e^{2y+1} - 3) \quad [=0]$ leading to $e^{2y+1} = 3$ or $(u + 2)(u - 3)$ [=0] leading to $e^{2y+1} = 3$	**A1**	
	$y = 0.0493$ and no other solutions	**A1**	
5(a)	$\frac{dy}{dx} = -(\cos 2x)^{-2} \times -2\sin 2x = \frac{2\sin 2x}{\cos^2 2x}$ or $\frac{dy}{dx} = \frac{0[\cos 2x] - (-2\sin 2x)}{\cos^2 2x} = \frac{2\sin 2x}{\cos^2 2x}$	**B2**	**B1** for $-(\cos 2x)^{-2} \times m\sin 2x$ or $\frac{0[\cos 2x] - (m\sin 2x)}{\cos^2 2x}$ where $m = 2$ or $m < 0$
5(b)	$2\tan^2 2x = 5$ or $7\cos^2 2x = 2$ or $7\sin^2 2x = 5$	**M1**	**FT** *their k*
	$\tan 2x = [\pm]\sqrt{\frac{5}{2}}$ or $\cos 2x = [\pm]\sqrt{\frac{2}{7}}$ or $\sin 2x = [\pm]\sqrt{\frac{5}{7}}$	**A1**	
	0.503 or 0.5034[26…] rot to 4 or more sf 1.07 or 1.067[36…] rot to 4 or more sf and no extras in range	**A2**	**A1** for either, ignoring extras
6(a)	$3\left(x + \frac{5}{2}\right)^2 - \frac{155}{4}$	**B4**	**B2** for $3\left(x + \frac{5}{2}\right)^2$ or $3(x + 2.5)^2$ or **B1** for $\left(x + \frac{5}{2}\right)^2$ or $(x + 2.5)^2$ **B2** for $c = -\frac{155}{4}$ or -38.75 or **B1** for $-\frac{25}{4} \times 3 - 20$ oe
6(b)	Min value $-\frac{155}{4}$ when x is $-\frac{5}{2}$	**B2**	**FT** *their c* from part **a** and **–***their b* from **(a)** **B1** for either without contradiction

Question	Answer	Marks	Guidance
6(c)	$3\left(y^{\frac{1}{3}}+\frac{5}{2}\right)^2=\frac{155}{4}$ soi	**M1**	**FT** an expression of correct form from **(a)**
	Rearranges as far as: $y^{\frac{1}{3}}=-\frac{5}{2}\pm\sqrt{\frac{155}{12}}$ soi	**A1**	
	$y = 1.31$ or -226	**A1**	
7	$\frac{a(1-r^3)}{1-r}=17.5$ oe or $a+ar+ar^2=17.5$ oe	**B1**	
	$\frac{a}{1-r}=20$	**B1**	
	Correctly eliminates a or eliminates r	**M1**	**FT** *their* equations providing at least **B1** awarded
	$20(1-r^3) = 17.5$ or $a^3-60a^2+1200a-7000=0$	**A1**	
	$r=\frac{1}{2}$, $a = 10$	**A2**	**A1** for either
8(a)	Product rule attempted	**M1**	at most one error
	$\left[\frac{dy}{dx}=\right]\sin x+x\cos x$ oe	**A1**	
8(b)	$\left[\text{When } x=\frac{\pi}{2}\right] y=\frac{\pi}{2}$	**B1**	
	$\left[\text{When } x=\frac{\pi}{2}\right]\frac{dy}{dx}=1$	**M1**	**FT** *their* derivative providing at least M1 awarded in **(a)**
	$y = x$	**A1**	
8(c)	$x\sin x + \cos x + c$	**B3**	**B2** for $x\sin x + \cos x$ or **B1** for $\left[\int x\cos x\,dx=\right] x\sin x-\int \sin x\,dx$
8(d)	$\frac{\pi}{4}\sin\frac{\pi}{4}+\cos\frac{\pi}{4}-(0+\cos 0)$	**M1**	
	0.26	**A1**	
9(a)	$(\ln(3x + 2))^2 + 1$ oe isw	**B1**	