Question	Answer	Marks	Partial Marks
4	$\frac{dy}{dx} = -\sec^2(1-x)$ oe	**B2**	**must be seen** **B1** for $\frac{dy}{dx} = k\sec^2(1-x)$ oe, $k \neq -1$ or **SC1** for $\frac{dy}{dx} = -\sec^2 1-x$ or $\frac{dy}{dx} = -\sec^2(1-x)+c$
	Solves $3 = 2 + \tan(1-x)$ as far as $1 - x = \tan^{-1}1$	**M1**	
	$1-x = \frac{\pi}{4}$ isw or 0.7853[98…] $x = 1-\frac{\pi}{4}$ isw or 0.2146[01…]	**A1**	
	Correct use of chain rule **and** correctly writes in terms of cosine or tangent: $\frac{their(-1)}{\cos^2\left(their\frac{\pi}{4}\right)} \times 0.04$ oe, soi or $their(-1)\left\{1+\tan^2\left(their\frac{\pi}{4}\right)\right\} \times 0.04$ oe soi	**M1**	**dep** on at least **B1** and an attempt to solve $3 = 2 + \tan(1-x)$
	−0.08 oe, nfww	**A1**	**dep** on all previous marks awarded
5(a)	$\lg P = \lg A + T\lg b$ oe nfww **and** correct comparison with $y = mx + c$ soi	**B2**	Must be seen and not from wrong working **B1** for $\lg P = \lg A + T\lg b$ isw, nfww
5(b)	$A = 10^6$ oe isw and $b = 10^{\frac{3}{7}}$ oe isw	**4**	**B2** for $A = 10^6$ oe isw **or B1**correct method which could be used to find A e.g. $\lg A = 6$ or $12 = \frac{3}{7}\times 14 + \lg A$ **B2** for $b = 10^{\frac{3}{7}}$ oe isw or **B1**correct method which could be used to find b e.g. $\lg b = \frac{12-6}{14-0}$ oe or $12 = 14\lg b + 6$

Question	Answer	Marks	Partial Marks
5(c)	lg $P_1 = 8$ and lg $P_2 = 9$ soi leading to $T_1 = 4.6$ to 4.8 or $T_2 = 6.8$ to 7.2	**M1**	If graph not used then allow **M1** for substitution of *their A* and *their b* in the exponential equation as far as $\frac{10^8}{theirA} = (theirb)^T$ and $\frac{10^9}{theirA} = (theirb)^T$ OR substitution of *their A* and *their b* or *their* lg*A* and *their* lg *b* in the log equation $\lg 10^8 = their \lg A + T(their \lg b)$ or better and $\lg 10^9 = their \lg A + T(their \lg b)$ or better
	Difference of correct times: $T_2 - T_1$ where $T_2 = 6.8$ to 7.2 $T_1 = 4.6$ to 4.8	**M1**	
	Answer in range 2.2 to 2.4 nfww	**A1**	
	Alternative method		
	Change in $T = \frac{9-8}{\frac{3}{7}}$	**(M2)**	**M1** for $\lg 10^8 = 8$ and $\lg 10^9 = 9$ **and** $\frac{\text{Change in } \lg P}{\text{Change in } T} = \frac{3}{7}$
	Answer in range 2.2 to 2.4 nfww	**(A1)**	
6(a)(i)	$1 + \frac{5}{7}x + \frac{10}{49}x^2$	**B2**	**B1** for any two correct terms or for the three terms listed but not summed
6(a)(ii)	12	**B2**	**B1** for $7n + 5 = 89$ or $7\left(n + \frac{5}{7}\right) = 89$ oe or ${}^nC_1 = 12$
6(b)	${}^8C_4 \times k^4 \times (-2)^4$ [$\times x^4$] oe or $1120k^4$ [x^4] soi	**B1**	
	${}^8C_2 \times k^6 \times (-2)^2$ [$\times x^2$] oe or $112k^6$ [x^2] soi	**B1**	
	$\frac{1120k^4}{112k^6} = \frac{5}{8}$ or $\frac{70 \times 16 \times k^4}{28 \times 4 \times k^6} = \frac{5}{8}$ oe, soi	**M1**	**FT** providing at least **B1** awarded and correct terms attempted
	$k^2 = 16$ soi	**A1**	
	[For coefficient of x to be positive $k < 0$, therefore] $k = -4$	**A1**	