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**	

Question	Answer	Marks	Partial Marks
7(a)	$\frac{10(4x-2)^4}{\sqrt{3+(4x-2)^5}}$ or $\frac{10(4x-2)^4}{\left(3+(4x-2)^5\right)^{\frac{1}{2}}}$ isw	**3**	**B2** for correct unsimplified form e.g. $\frac{1}{2}\left(3+(4x-2)^5\right)^{-\frac{1}{2}}\times 5\left(4x-\ 2\right)^4\times 4$ or $10\left(3+(4x-2)^5\right)^{-\frac{1}{2}}\left(4x-\ 2\right)^4$ or **B1** for $5(4x-2)^4\times 4$ soi or $\frac{1}{2}\left(3+(4x-2)^5\right)^{-\frac{1}{2}}\times \mathrm{g}(x)$
7(b)	$\frac{\mathrm{d}y}{\mathrm{d}x}=\frac{5(3x+2)-3(5x)}{(3x+2)^2}$ oe isw or $\frac{\mathrm{d}y}{\mathrm{d}x}=5x\left(-\left(3x+2\right)^{-2}\times 3\right)+5\left(3x+2\right)^{-1}$ oe isw	**B1**	
	[$y = 10$] $x = –0.8$	**B1**	
	$\frac{0.01}{\delta x}=\left(\textit{their}\left.\frac{\mathrm{d}y}{\mathrm{d}x}\right\|_{x=-0.8}\right)$ oe	**M1**	**FT** *their x* providing *their* $x \neq 10$ or 0.01and *their* genuine attempt at a derivative using product or quotient rule
	$\frac{1}{6250}$ or 0.00016 or 1.6×10^{-4} isw	**A1**	**dep** on all previous marks awarded
	Alternative method		
	$x=\frac{-2y}{3y-5}$ oe	**(B1)**	
	$\frac{\mathrm{d}x}{\mathrm{d}y}=\frac{-2(3y-5)-3(-2y)}{(3y-5)^2}$ oe isw or $\frac{\mathrm{d}x}{\mathrm{d}y}=-2y\left(-\left(3y-5\right)^{-2}\times 3\right)+(-2)\left(3y-5\right)^{-1}$	**(B1)**	
	$\frac{\delta x}{0.01}=\left(\textit{their}\left.\frac{\mathrm{d}x}{\mathrm{d}y}\right\|_{y=10}\right)$ oe	**(M1)**	**FT** *their* genuine attempt at a derivative using product or quotient rule
	$\frac{1}{6250}$ or 0.00016 or 1.6×10^{-4} isw	**(A1)**	**dep** on all previous marks awarded
7(c)(i)	$3x^2\ln x + x^3 \times \frac{1}{x}$ or better, isw	**B2**	**B1** for (*their* $3x^2$)ln$x + x^3 \times$ (*their* $\frac{1}{x}$)