Question	Answer	Marks	Guidance
4(a)	$\frac{(2x-1)+4}{(2x-1)^2}=\frac{2x+3}{(2x-1)^2}$	**B1**	
	Alternative method		
	$\frac{(2x-1)^2+4(2x-1)}{(2x-1)^3}=\frac{4x^2+4x-3}{(2x-1)^3}$ $=\frac{(2x-1)(2x+3)}{(2x-1)^3}=\frac{2x+3}{(2x-1)^2}$	**(B1)**	
4(b)	Use of $\int \frac{1}{2x-1}+\frac{4}{(2x-1)^2}\,dx$ to obtain $\frac{1}{2}\ln(2x-1)-\frac{2}{(2x-1)}$	**2**	**B1** for $\frac{1}{2}\ln(2x-1)$ or equivalent **B1** for $-\frac{2}{(2x-1)}$, allow unsimplified
	$\left[\frac{1}{2}\ln(2x-1)-\frac{2}{(2x-1)}\right]_2^5$ $\left(\frac{1}{2}\ln 9-\frac{2}{9}\right)-\left(\frac{1}{2}\ln 3-\frac{2}{3}\right)$	**M1**	For application of limits, must be in the form $a\ln(2x-1)+\frac{b}{(2x-1)}$
	$=\frac{4}{9}+\ln\sqrt{3}$	**2**	**A1** for $\ln\sqrt{3}$ **A1** for $\frac{4}{9}$
5(a)	$\frac{dy}{dx}=\frac{\left(3x\times\frac{4x}{(2x^2-3)}\right)-3\ln(2x^2-3)}{9x^2}$ oe	**3**	**B1** for $\frac{4x}{(2x^2-3)}$ **M1** for attempt to differentiate a quotient or product **A1** for all terms other than $\frac{4x}{(2x^2-3)}$ correct.
5(b)	When $x=2$, $\frac{dy}{dx}=0.133$	**M1**	For substitution of $x=2$ into *their* $\frac{dy}{dx}$ and use of h
	$0.133h$	**A1**	
5(c)	$\frac{dx}{dt}=\frac{4}{0.133}$	**M1**	For $\frac{4}{\text{their value of } \frac{dy}{dx} \text{ from (b)}}$
	30.2	**A1**	

Question	Answer	Marks	Guidance
6	$\frac{dy}{dx} = 3\sec^2 3x$	**2**	**M1** for $a\sec^2 3x$
	When $x = \frac{\pi}{12}$, $y = 2$	**B1**	
	When $x = \frac{\pi}{12}$, $\frac{dy}{dx} = 6$	**M1**	
	Gradient of perpendicular is $-\frac{1}{6}$	**M1**	For $-\frac{1}{their\ \frac{dy}{dx}}$, must be numeric
	Equation of normal $y - 2 = -\frac{1}{6}\left(x - \frac{\pi}{12}\right)$	**M1**	For attempt at a normal equation using *their* $-\frac{1}{6}$ and 2
	Area of triangle = 12	**2**	**M1 dep** for attempt at correct area using *their* 2 and *their* $12 + \frac{\pi}{12}$
7	$-\frac{1}{2}(2-3x)^{\frac{2}{3}}$	**2**	**M1** for $a(2-3x)^{\frac{2}{3}}$, $a \neq -\frac{1}{2}$ Allow unsimplified
	When $x = -2$, $\frac{dy}{dx} = -6$ leading to $c = -4$	**2**	**M1 Dep** for correct attempt to find the value of the arbitrary constant
	$\frac{1}{10}(2-3x)^{\frac{5}{3}}$ nfww	**2**	**M1** for $b(2-3x)^{\frac{5}{3}}$, $b \neq \frac{1}{10}$ Allow unsimplified
	When $x = -2$, $y = 10.2$ leading to $d = -1$	**M1**	**Dep** on previous M mark for attempt to find the value of a second arbitrary constant
	$y = \frac{1}{10}(2-3x)^{\frac{5}{3}} - 4x - 1$	**A1**	
8(a)	$\begin{pmatrix} -40 \\ 42 \end{pmatrix}$	**B1**	Allow $2\begin{pmatrix} -20 \\ 21 \end{pmatrix}$