Question	Answer	Marks	Guidance
7(a)	$\frac{dy}{dx}=\frac{(2x+1)\frac{6x}{3x^2-5}-2\ln(3x^2-5)}{(2x+1)^2}$ or $\frac{dy}{dx}=(2x+1)^{-1}\frac{6x}{3x^2-5}-2(2x+1)^{-2}\ln(3x^2-5)$	**3**	**B1** for $\frac{6x}{3x^2-5}$ **M1** for attempt at a quotient or equivalent product **A1** for all terms other than $\frac{6x}{3x^2-5}$ correct
	When $x=\sqrt{2}$, $y=0$	**B1**	May be implied
	When $x=\sqrt{2}$, $\frac{dy}{dx}=\frac{6\sqrt{2}}{2\sqrt{2}+1}$ or $\frac{24-6\sqrt{2}}{7}$ or 2.22 oe Normal: $y=-\frac{(2\sqrt{2}+1)}{6\sqrt{2}}(x-\sqrt{2})$ oe or $y=-\frac{7}{24-6\sqrt{2}}(x-\sqrt{2})$ oe or $y=-\frac{1}{2.22}(x-\sqrt{2})$ oe or $y=-\frac{4+\sqrt{2}}{12}(x-\sqrt{2})$ oe or $y=-\frac{9+4\sqrt{2}}{24+6\sqrt{2}}(x-\sqrt{2})$ oe $y=-0.451x+0.638$	**2**	**M1** for attempt at normal using *their* y and *their* perp gradient **A1** Allow equivalent surd forms
7(b)	$\left(\frac{6\sqrt{2}}{2\sqrt{2}+1}\right)h$ or $\frac{24-6\sqrt{2}}{7}h$ or other equivalent surd forms, or $2.22h$	**B1**	**FT** on *their* $\frac{dy}{dx}$ from **(a)**
8(a)	${}^{12}C_3\times{}^{9}C_4=220\times126$ or ${}^{12}C_5\times{}^{7}C_4=792\times35$ or ${}^{12}C_4\times{}^{8}C_5=495\times56$ or other equivalents 27720	**3**	**B1** for one correct combination in a product of 2 or 3 combinations Must be numeric **B1** for a second appropriate combination in the same product Must be numeric
8(b)(i)	120	**B1**	
8(b)(ii)	48	**B1**	

<table>
<tr><th>Question</th><th>Answer</th><th>Marks</th><th>Guidance</th></tr>
<tr><td rowspan="6">8(b)(iii)</td><td>Starts with 7 or 9 24</td><td>B1</td><td>May be implied by 12 and 12</td></tr>
<tr><td>Starts with 8 18</td><td>B1</td><td></td></tr>
<tr><td>42</td><td>B1</td><td></td></tr>
<tr><td>Alternative
Ends with 3 18</td><td>(B1)</td><td></td></tr>
<tr><td>Ends with 7 or 9 24</td><td>(B1)</td><td>May be implied by 12 and 12</td></tr>
<tr><td>42</td><td>(B1)</td><td></td></tr>
<tr><td rowspan="3">9(a)</td><td>$\frac{dy}{dx}=(2x-1)\times\frac{1}{2}\times4(4x+3)^{-\frac{1}{2}}+2(4x+3)^{\frac{1}{2}}$</td><td>3</td><td>B1 for $\frac{1}{2}\times4(4x+3)^{-\frac{1}{2}}$ oe
M1 for a correct attempt at a product
A1 for all other terms correct</td></tr>
<tr><td>$\frac{dy}{dx}=2(4x+3)^{-\frac{1}{2}}(2x-1+4x+3)$ or equivalent</td><td>M1</td><td>For attempt to simplify to the given form</td></tr>
<tr><td>$\frac{dy}{dx}=\frac{4(3x+1)}{(4x+3)^{\frac{1}{2}}}$</td><td>A1</td><td></td></tr>
<tr><td>9(b)</td><td>$-\frac{1}{3}$</td><td>B1</td><td>FT on their $3x+1=0$</td></tr>
<tr><td rowspan="2">9(c)</td><td>For a complete method using 2nd derivative, or gradient or y values either side or one side of their stationary point e.g.
<table><tr><td>x</td><td>$<-\frac{1}{3}$</td><td>$-\frac{1}{3}$</td><td>$>-\frac{1}{3}$</td></tr><tr><td>$\frac{dy}{dx}$</td><td>–</td><td>0</td><td>+</td></tr></table><table><tr><td>x</td><td>$<-\frac{1}{3}$</td><td>$-\frac{1}{3}$</td><td>$>-\frac{1}{3}$</td></tr><tr><td>y</td><td><-2.15</td><td>-2.15</td><td>>-2.15</td></tr></table></td><td>M1</td><td>Must be using values of $x>-\frac{3}{4}$</td></tr>
<tr><td>Minimum</td><td>A1</td><td>Must be from correct work</td></tr>
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