Question	Answer	Marks	Guidance
9	$\frac{(2x+6)}{3} = 3 + \frac{4}{2x+1}$ $4x^2 - 4x - 15 (= 0)$	**2**	**M1** for equating the line and curve and obtaining a 3 term quadratic expression in terms of x.
	$x = \frac{5}{2}$	**A1**	For x-coordinate of the point of intersection.
	Either $\int \left(3 + \frac{4}{2x+1}\right) \mathrm{d}x = 3x + 2\ln(2x+1)$	**2**	**M1** for attempt to integrate with one term correct
	$\left[3x + 2\ln(2x+1)\right]_0^{\frac{5}{2}} = \frac{15}{2} + 2\ln 6$	**2**	**Dep M1** for using *their* x-coordinate of C in *their* integral. Must have a term in $\ln(2x+1)$ Allow for awrt 11.1. **A1** Must be exact but allow unsimplified
	Area of trapezium $\frac{1}{2}\left(2 + \frac{11}{3}\right) \times \frac{5}{2}$ or $\left[\frac{x^2}{3} + 2x\right]_0^{their\ \frac{5}{2}}$ or $\left[\frac{(2x+6)^2}{12}\right]_0^{their\ \frac{5}{2}} = \frac{85}{12}$	**2**	**M1** for attempt at the trapezium, must have at least one side correct. If using integration, the integral must be correct using *their* $\frac{5}{2}$
	Shaded area = $2\ln 6 + \frac{5}{12}$ or $\ln 36 + \frac{5}{12}$ or $\ln 6^2 + \frac{5}{12}$	**A1**	
	Or $\int \left\lvert 1 + \frac{4}{2x+1} - \frac{2}{3}x \right\rvert \mathrm{d}x$ $x + 2\ln(2x+1) - \frac{x^2}{3}$ or $-x - 2\ln(2x+1) + \frac{x^2}{3}$	**(5)**	**M2** for attempt to subtract and integrate with at least one term correct, allow x terms considered separately. If subtraction is reversed allow accuracy marks. Separate x terms should be considered as one term for A marks. **A1** for one term only correct **A2** for two terms only correct
	$\left[x + 2\ln(2x+1) - \frac{x^2}{3}\right]_0^{\frac{5}{2}} = \frac{5}{2} + 2\ln 6 - \frac{25}{12}$ or $\left[\frac{x^2}{3} - x - 2\ln(2x+1)\right]_0^{\frac{5}{2}} = \frac{25}{12} - \frac{5}{2} - 2\ln 6$	**(M1)**	**Dep M1** for using *their* x-coordinate of the point of intersection in *their* integral, must have a term in $\ln(2x+1)$ Allow for awrt ± 4 as appropriate

Question	Answer	Marks	Guidance
9	Shaded area = $2\ln 6+\frac{5}{12}$ or $\ln 36+\frac{5}{12}$ or $\ln 6^2+\frac{5}{12}$	**(A1)**	
	Or $\int\left\lvert 3+\frac{4}{2x+1}-\frac{11}{3}\right\rvert \mathrm{d}x$ $2\ln(2x+1)-\frac{2x}{3}$	**(3)**	**M1** for attempt to subtract and integrate with at least one term correct, allow x terms considered separately. Separate x terms should be considered as one term for A marks. **A1** for one term only correct
	$\left[2\ln(2x+1)-\frac{2x}{3}\right]_0^{\frac{5}{2}}=2\ln 6-\frac{5}{3}$	**(M1)**	**Dep M1** for using *their* x-coordinate of the point of intersection in *their* integral, must have a term in $\ln(2x+1)$
	Area of triangle $=\frac{1}{2}\times\left(\frac{11}{3}-2\right)\times\frac{5}{2}$ $=\frac{25}{12}$	**(2)**	**M1** for attempt at the area of the triangle
	Shaded area = $2\ln 6+\frac{5}{12}$ or $\ln 36+\frac{5}{12}$ or $\ln 6^2+\frac{5}{12}$	**(A1)**	
	Alternative $3y^2-14y+11(=0)$	**(2)**	**M1** for a correct attempt to equate the line and curve and obtain a 3 term quadratic expression in terms of y.
	$y=\frac{11}{3}$	**(A1)**	
	$\int\left(\frac{2}{y-3}-\frac{1}{2}\right)\mathrm{d}y=2\ln(y-3)-\frac{1}{2}y$	**(2)**	**M1** for attempt to integrate with one term correct
	$\left[2\ln(y-3)-\frac{1}{2}y\right]_{\frac{11}{3}}^{7}=2\ln 6-\frac{5}{3}$	**(2)**	**Dep M1** for using *their* y-coordinate of C in *their* integral. Allow for awrt 1.92 **A1** Must be exact
	Area of triangle $\frac{1}{2}\left(\frac{11}{3}-2\right)\times\frac{5}{2}$ or $\left[\frac{3y^2}{4}-3y\right]_2^{their\ \frac{11}{3}}$ $=\frac{25}{12}$	**(2)**	**M1** for attempt at the triangle, must have at least one side correct. If using integration, the integral must be correct using *their* $\frac{11}{3}$
	Shaded area = $2\ln 6+\frac{5}{12}$ or $\ln 36+\frac{5}{12}$ or $\ln 6^2+\frac{5}{12}$	**(A1)**	

Question	Answer	Marks	Guidance
10(a)(i)	$\frac{n}{2}(2x+1)(3n-1)$	**2**	**B1** for $\frac{n}{2}\left(2(2x+1)+3(n-1)(2x+1)\right)$ or $\frac{n}{2}\left(2(2x+1)+(6x+3)(n-1)\right)$ oe
10(a)(ii)	$\frac{n}{2}(2x+1)(3n-1)=(54n+37)(2x+1)$ $3n^2-109n-74=0$	**M1**	For equating *their* answer to **(a)** to $(54n+37)(2x+1)$ and attempt to solve a 3-term quadratic equation in n to obtain n = ...
	37 only	**A1**	
10(a)(iii)	$1017.5=(54(\textit{their } n)+37)(2x+1)$	**M1**	For attempt to solve to obtain a value for x. n must be a positive integer
	$x=-\frac{1}{4}$	**A1**	
10(b)	$(2y+1)(3(2y+1))^{n-1}=$ $4(2y+1)(3(2y+1))^{n+1}$ Or $(3(2y+1))^{n-1}=4(3(2y+1))^{n+1}$ Or $(2y+1)r^{n-1}=4(2y+1)r^{n+1}$ Or $ar^{n-1}=4ar^{n+1}$	**B1**	Award when a correct statement is first seen
	Either $(2y+1)^2=\frac{1}{36}$ oe or $(6y+3)^2=\frac{1}{4}$ oe or $r^2=\frac{1}{4}$ oe	**M1**	**Either M1** for an equation of the form $(2y+1)^2=k$ or $(6y+3)^2=m$ where k and m are numerical and not zero (may be expanded) with no terms in n **Or M1** for $r^2=p$, where p is numerical and not zero
	$2y+1=\pm\frac{1}{6}$ or $6y+3=\pm\frac{1}{2}$	**A1**	
	$-\frac{5}{12}$, $-\frac{7}{12}$ and no others	**A1**	For both
10(c)	$-1<2\sin^2\theta<1$ oe soi or $0<2\sin^2\theta<1$ soi	**B1**	Allow $2\sin^2\theta<1$ May be implied by $\theta<\frac{\pi}{4}$
	$\theta<\frac{\pi}{4}$ or $\theta<0.785$	**B1**	
	$0<\theta<\frac{\pi}{4}$ Or $0<\theta<0.785$ or better	**B1**	