Question	Answer	Marks	Partial Marks
7(a)	$(2x+1)(x+1)=5+2(x+1)$ or $(2x-1)(x+1)=5$ oe	**M1**	
	$2x^2+x-6[=0]$	**A1**	
	Factorises or solves *their* 3-term quadratic e.g. $(x + 2)(2x – 3)$	**M1**	
	$\left(\frac{3}{2}, 4\right)$	**A1**	
7(b)	Correct plan, difference of integrals oe: $\int_0^k\left(\frac{5}{x+1}+2\right)\mathrm{d}x$ – area correct trapezium soi where $k > 0$	**M1**	or $\int_0^k\left(\frac{5}{x+1}+2\right)\mathrm{d}x - \int_0^k(2x+1)\mathrm{d}x$ soi
	Area of trapezium: $\frac{1}{2}(their4+1)\left(their\frac{3}{2}\right)$ oe	**B1**	or $\left(their\frac{3}{2}\right)^2+their\frac{3}{2}$ [–0] or $\frac{15}{4}$ oe
	Integral: $\left[5\ln(x+1)+2x\right]_0^{their1.5}$	**B2**	**B1** for $5\ln x + 1$ or for $n\ln(x + 1)$ where n is a constant and $n > 0$
	Correct substitution of upper and lower limits into $5\ln(x+1)+2x$	**M1**	**FT** *their* integral providing at least **B1** awarded and *their* 1.5
	Area of shaded region: $5\ln\left(\frac{5}{2}\right)-\frac{3}{4}$ isw	**A1**	
	Alternative method		
	Correct plan, integral of difference of functions: $\int_0^k\left(\frac{5}{x+1}-2x+1\right)\mathrm{d}x$ soi where $k > 0$	**(M1)**	
	Integral: $\left[5\ln(x+1)+x-x^2\right]_0^{their1.5}$	**(B3)**	**B2** for $5\ln(x + 1)$ and one other correct term or $n\ln(x + 1) + x – x^2$ where n is a constant and $n > 0$ or **B1**for $5\ln x + 1$ or for $n\ln(x + 1)$ where n is a constant and $n > 0$
	Area of shaded region: $5\ln\left(\frac{5}{2}\right)-\frac{3}{4}$ isw	**(2)**	**M1FT** for correct substitution of upper and lower limits; **FT** *their* integral providing at least **B1** awarded and *their* 1.5

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Question	Answer	Marks	Partial Marks
8(a)	$10r = 10 + 3d$ soi	**B1**	
	$10r^2 = 10 + 5d$ soi	**B1**	
	$10\left(\frac{10+3d}{10}\right)^2 = 10 + 5d$ oe or $10r^2 = 10 + \frac{5(10r-10)}{3}$ oe	**M1**	
	$9d^2 + 10d = 0$ or $3r^2 - 5r + 2 = 0$ oe	**A1**	
	Correct method to find d or r	**A1**	**FT** *their* quadratic in d or r
	$d = -\frac{10}{9}$ and $r = \frac{2}{3}$	**A1**	
8(b)	Appropriate determination for *their r* e.g. $\lvert r \rvert < 1$ so the geometric progression has a sum to infinity oe	**B1**	**STRICT FT** *their r*
9	Correct change of base e.g. $\log_2(x+1) - \frac{4\log_2 2}{\log_2(x+1)} = 3$ or $\frac{\log_{(x+1)}(x+1)}{\log_{(x+1)} 2} - 4\log_{(x+1)} 2 = 3$	**B1**	
	$(\log_2(x+1))^2 - 3\log_2(x+1) - 4 \quad [=0]$ oe or $4(\log_{(x+1)} 2)^2 + 3\log_{(x+1)} 2 - 1 \quad [=0]$ oe	**B1**	
	Factorises or solves e.g. $(\log_2(x+1) - 4)(\log_2(x+1) + 1) = 0$ or $(4\log_{(x+1)} 2 - 1)(\log_{(x+1)} 2 + 1) = 0$	**M1**	**FT** *their* 3-term quadratic in a suitable logarithm providing correct change of base seen
	$\log_2(x+1) = their\, 4$ and $\log_2(x+1) = their(-1)$ or $\log_{(x+1)} 2 = their\, \frac{1}{4}$ and $\log_{(x+1)} 2 = their(-1)$ **and** correctly solves as far as $x =$ … at least once	**M1**	**dep** on previous **M1** **FT** $\log_2(x+1) = a$ or $\log_{(x+1)} 2 = b$ where a and b are constants
	$x = 15, \; x = -\frac{1}{2}$ nfww mark final answer	**A1**	

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