Question number	Scheme	Marks
5 (a)	$\left[S_\infty =\right]\dfrac{12}{1-\dfrac{3}{8}}=\dfrac{96}{5}$	M1 A1 (2)
(b)	$ar^5 = 12\left(\dfrac{3}{8}\right)^5$	M1
	$=\dfrac{2^2\times3\times3^5}{2^{15}}=\dfrac{3^6}{2^{13}}$ *	M1 A1cso (3)
(c)	e.g. $u_n = 12\left(\dfrac{3}{8}\right)^{n-1}$	M1
	$\log_2 u_n = \log_2 12 + \log_2\left(\dfrac{3}{8}\right)^{n-1}$	M1
	$\log_2 u_n = \log_2 12 + (n-1)\left[\log_2 3 - \log_2 8\right]$	M1
	$\log_2 u_n = \log_2 3 + 2\log_2 2 + (n-1)[\log_2 3 - 3\log_2 2]$	M1
	$\log_2 u_n = n\log_2 3 - 3n + 5$ *	A1 cso (5)
		Total 10 marks

Part	Mark	Notes
(a)	M1	For the correct use of $\dfrac{a}{1-r}$
	A1	For the correct value $\dfrac{96}{5}$
(b)	M1	For the correct use of ar^{n-1}
	M1	For expressing 12 $\left(2^2 \times 3\right)$ and 8 $\left(2^3\right)$ as powers of 2
	A1cso	For obtaining the given expression with no errors seen.
(c)	M1	For the correct use of ar^{n-1} and the given values of *a* and *r* to give $u_n = 12\left(\dfrac{3}{8}\right)^{n-1}$
	M1	For taking logs [base 2] of both sides and applying the addition law.
	M1	For applying the power law and subtraction laws to $\log_2\left(\dfrac{3}{8}\right)^{n-1}$ $\log_2\left(\dfrac{3}{8}\right)^{n-1} = (n-1)\left[\log_2 3 - \log_2 8\right]$
	M1	For obtaining $\log_2 12 = \log_2 3 + 2\log_2 2$
	A1cso	For obtaining the given equation with no errors seen.
	ALT	
	M1	For the correct use of ar^{n-1} and the given values of *a* and *r* to give $u_n = 12\left(\dfrac{3}{8}\right)^{n-1}$
	M1	For rearranging the equation to obtain: $U_n = 12\left(\dfrac{3}{8}\right)^{n-1} = 2^2 \times 3 \times \dfrac{3^{n-1}}{2^{3(n-1)}} = \dfrac{3^n}{2^{3n-5}}$
	M1	For taking logs of both sides and applying the addition (subtraction) law. $\log_2 U_n = \log_2 3^n - \log_2 (3n-5)$
	M1	For applying the power law to obtain: $\log_2 U_n = n\log_2 3 - \log_2 (3n-5)$
	A1 cso	For obtaining the given equation with no errors seen.