Question	Scheme	Marks
8(a)	$U_5 = \left(\frac{25}{4}\right)\left(\frac{3}{5}\right)^5 = \frac{243}{500}$ oe	B1 [1]
(b)	$U_1 = \left(\frac{25}{4}\right)\left(\frac{3}{5}\right)^1 = \frac{15}{4}$ oe	B1
	$S_n = \left(\frac{15}{4}\right)\left(\frac{3}{5}\right)^0 + \left(\frac{15}{4}\right)\left(\frac{3}{5}\right)^1 + \ldots\ldots + \left(\frac{15}{4}\right)\left(\frac{3}{5}\right)^{n-1}$	M1
	$\Rightarrow S_n = \sum_{r=1}^{n}\left(\frac{15}{4}\right)\left(\frac{3}{5}\right)^{r-1}$ oe	A1
		[3]
	ALT 1	
	$U_1 = \left(\frac{25}{4}\right)\left(\frac{3}{5}\right)^1 = \frac{15}{4}$	[B1
	$r = \frac{3}{5} \qquad U_n = \frac{15}{4} \times \left(\frac{3}{5}\right)^{n-1}$	M1
	$S_n = \sum_{r=1}^{n} \frac{15}{4} \times \left(\frac{3}{5}\right)^{r-1}$	A1]
	ALT 2	
	$S_n = \sum_{r=1}^{n} \frac{25}{4}\left(\frac{3}{5}\right)^{r}$	[B1
	$= \sum_{r=1}^{n} \frac{25}{4} \times \frac{3}{5} \times \left(\frac{3}{5}\right)^{r-1}$	M1
	$= \sum_{r=1}^{n} \frac{15}{4} \times \left(\frac{3}{5}\right)^{r-1}$	A1]
(c)	$S_\infty = \frac{\frac{15}{4}}{1-\frac{3}{5}} = \frac{75}{8}$ or $9.375 \qquad S_n = \frac{\frac{15}{4}\left(1-\left[\frac{3}{5}\right]^n\right)}{1-\frac{3}{5}}$	M1M1
	$9.375 - \frac{\frac{15}{4}\left(1-\left[\frac{3}{5}\right]^n\right)}{1-\frac{3}{5}} < 0.045 \Rightarrow \frac{\frac{15}{4}\left(1-\left[\frac{3}{5}\right]^n\right)}{1-\frac{3}{5}} > 9.33$	
	$\frac{\frac{15}{4}\left(1-\left[\frac{3}{5}\right]^n\right)}{1-\frac{3}{5}} > 9.33 \Rightarrow 1-\left[\frac{3}{5}\right]^n > 0.9952 \Rightarrow \left[\frac{3}{5}\right]^n < \frac{3}{625}$	dM1
	$n \lg\left[\frac{3}{5}\right] < \lg\frac{3}{625} \Rightarrow n > 10.45$	ddM1A1
	$n = 11$	A1 [6]
		Total 10 marks

Part	Mark	Notes
		Mark (a) and (b) together
(a)	B1	For the correct value only. Decimal value is 0.486.
(b)	B1	Finds the value of the first term. Must be identified as U_1 / first term.
	M1	Forms the sum of the series with at least the first term and the *n*th term.
	A1	For the correct expression.
	ALT 1	
	B1	Finds the value of the first term. Must be identified as U_1 / first term.
	M1	For finding *r* and writing $U_n = \frac{15}{4} \times \left(\frac{3}{5}\right)^{n-1}$
	A1	For the correct expression.
	ALT 2	
	B1	For correct summation statement using U_n from the question
	M1	For showing process to change index from r to $r - 1$ and find the value of $\frac{A}{B}$ Minimum working is $\frac{25}{4} \times \left(\frac{3}{5}\right)^r = \frac{25}{4} \times \frac{3}{5} \times \left(\frac{3}{5}\right)^{r-1}$. May be with n as index.
	A1	For the correct expression.
(c)	Trial and improvement approaches for (c) should be sent to review.	
	M1	Correct method to find the sum to infinity using the correct formula with their $a = \frac{15}{4}$ and $r = \frac{3}{5}$. Their a should be $\frac{A}{B}$ if found in (b). Condone if working with $a = \frac{25}{4}$, r must be correct.
	M1	Using the correct formula, forms the sum to n terms using their $a = \frac{15}{4}$ and $r = \frac{3}{5}$. Their a should be $\frac{A}{B}$ if found in (b). Condone if working with $a = \frac{25}{4}$, r must be correct.
	dM1	Forms the inequality in terms of n with their S_∞ and S_n and simplifies to $\left[\frac{3}{5}\right]^n <' \frac{3}{625}'$ Must have dealt with negative. Allow for working with equation if inequality sign reinstated later. Reinstatement can be implied by rounding up to the next integer value once n found. Dep M1M1
	ddM1	Uses logarithms correctly to attempt to find the value of n They must reverse the inequality for this mark. Allow for working with equation if inequality sign reinstated later. Reinstatement can be implied by rounding up to the next integer value once n found. Dep previous M mark. Allow use of log base $\frac{3}{5}$.
	A1	For correct n awrt 10.5 Can be implied by $n = 11$ if decimal not seen.
	A1	For $n = 11$