Question number	Scheme	Marks
7 (a)	$\frac{61}{6}=\frac{a\left(1-r^3\right)}{1-r}$ $\rightarrow$ **1**	M1
	$\frac{125}{6}=\frac{a}{1-r}$ $\rightarrow$ **2**	M1
(i)	$1\div 2 \Rightarrow \frac{\frac{61}{6}}{\frac{125}{6}}=\frac{\frac{a\left(1-r^3\right)}{1-r}}{\frac{a}{1-r}} \Rightarrow \frac{61}{125}=1-r^3 \Rightarrow r=\frac{4}{5}*$	dM1A1 cso
(ii)	$\frac{125}{6}=\frac{a}{1-\frac{4}{5}} \Rightarrow a=\frac{25}{6}$	M1A1
		[6]
	ALT	
	$a+ar+ar^2=a\left(1+r+r^2\right)=\frac{61}{6}$ and $\frac{a}{1-r}=\frac{125}{6}$	[M1M1
	$\Rightarrow \frac{125}{6}\left(1-r\right)\left(1+r+r^2\right)=\frac{61}{6} \Rightarrow 125\left(1-r^3\right)=61$	dM1
(i)	$\Rightarrow 1-r^3=\frac{61}{125} \Rightarrow r^3=\frac{64}{125} \Rightarrow r=\frac{4}{5}*$	A1 cso
(ii)	$\frac{125}{6}=\frac{a}{1-\frac{4}{5}} \Rightarrow a=\frac{25}{6}$	M1A1]
(b)	$19.8<\frac{\frac{25}{6}\left(1-0.8^n\right)}{1-0.8} \Rightarrow \frac{19.8\times 6\times 0.2}{25}<1-0.8^n$	M1
	$\frac{594}{625}<1-0.8^n \Rightarrow 0.8^n<\frac{31}{625}$	
	$n\lg(0.8)<\lg\left(\frac{31}{625}\right)*$	A1 cso
		[2]
(c)	$n>\frac{\lg\left(\frac{31}{625}\right)}{\lg(0.8)} \Rightarrow n>13.461... \Rightarrow n=14$	M1A1
		[2]
		Total 10 marks

Part	Mark	Notes
(a)(i)	**M1**	Forms a correct equation for the sum of the first 3 terms or the sum to infinity. Either $\frac{61}{6}=\frac{a\left(1-r^3\right)}{1-r}$ or $\frac{125}{6}=\frac{a}{1-r}$ These formulae must be correct as they are given in the Formulae sheet

(i)	**M1**	For both $\frac{61}{6}=\frac{a\left(1-r^3\right)}{1-r}$ and $\frac{125}{6}=\frac{a}{1-r}$ correct
	dM1	For a valid method to eliminate a from both equations by division or substitution and attempting to re-arrange to find a value for r^3. Eg., $\frac{125}{6}=\frac{a}{1-r}\Rightarrow a=\frac{125(1-r)}{6}\Rightarrow\frac{61}{6}=\frac{\left[\frac{125(1-r)}{6}\right]\left(1-r^3\right)}{1-r}\Rightarrow r^3=1-\frac{61}{125}$ This mark is dependent on **both** previous M marks.
	A1*	For $r=\frac{4}{5}$ This value is given, there must be no errors for the award of this mark
	ALT	
	M1	For either $a+ar+ar^2=\left[a\ 1+r+r^2\ \right]=\frac{61}{6}$ or $\frac{125}{6}=\frac{a}{1-r}$ correct
	M1	For both $a+ar+ar^2=\left[a\ 1+r+r^2\ \right]=\frac{61}{6}$ and $\frac{125}{6}=\frac{a}{1-r}$ correct
	dM1	For a valid method to eliminate a from both equations by division or substitution and attempting to re-arrange to find a value for r^3. E.g. $\Rightarrow\frac{125}{6}\ 1-r\ \ 1+r+r^2\ =\frac{61}{6}\Rightarrow 125\ 1-r^3\ =61\Rightarrow r^3=1-\frac{61}{125}$ This mark is dependent on **both** previous M marks.
	A1	For $r=\frac{4}{5}$ This value is given, there must be no errors for the award of this mark
	M1	For substituting $\frac{4}{5}$ into either **their** $\frac{61}{6}=\frac{a\left(1-r^3\right)}{1-r}$ or **their** $\frac{125}{6}=\frac{a}{1-r}$ or **their** $a+ar+ar^2=\frac{61}{6}$ (where their expression for a sum has been seen earlier) to find a value of a
	A1	For $a=\frac{25}{6}$
(b)	**M1**	For using the **correct** formula for the sum of a geometric series with $r = 0.8$ [oe] and their a, setting up an inequality (allow < or > for this mark) using the value of 19.8 and attempting to achieve the given result.
	A1*	For the correct inequality as shown with no errors as this is a given result. $n\lg(0.8)<\lg\left(\frac{31}{625}\right)$
(c)	**M1**	For solving the given inequality in n using logarithms. They must achieve a value for n for this mark. Allow use of <, >, or = for this mark.
	A1	For $n = 14$