Question number	Scheme	Marks
4	$(S_4=)\dfrac{a(1-r^4)}{1-r}=80$ or $(S_\infty=)\dfrac{a}{1-r}=81$ or $a+ar+ar^2+ar^3=80$	B1
	$\dfrac{81(1-r)(1-r^4)}{1-r}=80\Rightarrow\left(81(1-r^4)=80\right)$	
	or	
	$81(1-r)=\dfrac{80(1-r)}{1-r^4}$	M1
	$\left(\Rightarrow(81-81r)(1-r^4)=80(1-r)\Rightarrow 81r^5-81r^4-r+1=0\Rightarrow(81r^4-1)(r-1)=0\right)$	
	or	
	$81(1-r)+81(1-r)r+81(1-r)r^2+81(1-r)r^3=80$	
	$r^4=\dfrac{1}{81}$	M1
	$r=\pm\dfrac{1}{3}$	A1
	[a = 54]	
	$S_7=\dfrac{"54"\left(1-\left("\frac{1}{3}"\right)^7\right)}{1-"\frac{1}{3}"}$ or $\dfrac{2186}{27}$ or $81\left(1-\left("\frac{1}{3}"\right)^7\right)$	M1
	$81-"\dfrac{2186}{27}"=\dfrac{1}{27}$ *	dM1 A1* cso (7)
ALT	FINAL THREE MARKS	
	$S_7=\dfrac{"54"\left(1-\left("\frac{1}{3}"\right)^7\right)}{1-"\frac{1}{3}"}$ or $\dfrac{2186}{27}$	M1
	$81-\dfrac{1}{27}=\dfrac{2186}{27}$	ddM1 A1
		Total 7 marks

Marks	Notes
B1	For $\frac{a(1-r^4)}{1-r}=80$ or $\frac{a}{1-r}=81$ or $a+ar+ar^2+ar^3=80$
M1	For substituting S_∞ into S_4 and eliminating a Students may also rearrange to make a the subject of both and then substitute to eliminate a. Allow one error in manipulation. Must use a valid method to eliminate. Using their S_∞ and S_4
M1	For reaching $r^4=...$ or for reaching $81r^5-81r^4-r+1=0$
A1	For $r=\frac{1}{3}$ (accept $\pm$)
M1	Correct substitution into $\frac{a(1-r^7)}{1-r}$ or $a+ar+ar^2+ar^3+ar^4+ar^5+ar^6$ or $81\left(1-r^7\right)$ - using their a and their r. r must be positive. Or $\frac{2186}{27}$
dM1	For $81-"\frac{2186}{27}"$ Dependant on previous method mark. Their r must be positive. If a and r are correct, the evaluation of each part of these calculations need not be shown (can be done on a calculator). If either a or r are incorrect, their $\frac{2186}{27}$ must have been evaluated and 81 used.
A1 cso*	Obtains the given answer. No incorrect work.
ALT	Final 3 marks
M1	Correct substitution into $\frac{a(1-r^7)}{1-r}$ or $a+ar+ar^2+ar^3+ar^4+ar^5+ar^6$ - using their a and their r. r must be positive.
dM1 **A1**	Must state $81-\frac{1}{27}=\frac{2186}{27}$ (for this ALT, candidates must evaluate and get $\frac{2186}{27}$ It isn't possible to get dM1 A0 on the ALT Dependent on previous method mark.