Question	Scheme	Marks
8(a)	$a + ar = 360$ oe e.g. $\frac{a(1-r^2)}{1-r} = 360$ $ar + ar^2 = 288$ oe	M1M1 (B1B1on ePen
	$r = \left\{\frac{a(1+r)}{ar(1+r)} =\right\} \frac{288}{360} = \frac{4}{5}$	dM1A1
	$a = \frac{360}{1 + "\frac{4}{5}"} = 200$	M1A1
	$U_n = 200\left(\frac{4}{5}\right)^{n-1}$ *	A1cso(B1 on ePen) [7]
8(a) ALT	$a + ar = 360$ oe e.g. $\frac{a(1-r^2)}{1-r} = 360$ $ar + ar^2 = 288$ oe	M1M1 (B1B1 on ePen)
	$a\left(\frac{360}{a} - 1\right) + a\left(\frac{360}{a} - 1\right)^2 = 288$	dM1A1
	$\Rightarrow a = 200$	
	$r = \frac{360}{"200"} - 1 = \frac{4}{5}$	M1A1
	$U_n = 200\left(\frac{4}{5}\right)^{n-1}$ *	A1cso(B1 on ePen) [7]
(b)	{S is convergent because} $\left\|\frac{4}{5}\right\| < 1$	B1 [1]
(c)	$S_\infty = \frac{'200'}{1-'\left(\frac{4}{5}\right)'} = 1000$	M1A1cao [2]
(d)	$\frac{200\left(1-\left(\frac{4}{5}\right)^n\right)}{1-\left(\frac{4}{5}\right)} > 978$	M1
	$\left(\frac{4}{5}\right)^n < \frac{11}{500}$	dM1
	$n\,log\left(\frac{4}{5}\right) < log\left(\frac{11}{500}\right)$ $\Rightarrow n > 17.104\ldots$	ddM1
	$n = 18$	A1 [4]
		Total 14 marks

Part	Mark	Notes
(a)	**M1**	For either correct equation. Allow use of U_1 as the first term instead of a
	M1	For both correct equations. Allow use of U_1 as the first term instead of a
	dM1	For eliminating a from their equations, reaches r =... (Depends on previous mark)
	A1	For the correct value of r
	M1	Uses their value of r to find a value for a
	A1	For a = 200
	A1 cso	For the correct required expression of $\boldsymbol{U_n = 200\left(\frac{4}{5}\right)^{n-1}}$ (must have $\boldsymbol{U_n}$)
(a)ALT	**M1**	For either correct equation.
	M1	For both correct equations
	dM1	For eliminating r from their equations, reaches a =... (Depends on previous mark)
	A1	For the correct value of a
	M1	Uses their value of a to find a value for r
	A1	For the correct value of r
	A1 cso	For the correct required expression of $U_n = 200\left(\frac{4}{5}\right)^{n-1}$ (must have $\boldsymbol{U_n}$)
(b)	**B1**	For stating the correct reason, $\lvert r\rvert < 1$ or -1 < r < 1 or "0.8" < 1 or $\left\lvert "\frac{4}{5}" \right\rvert < 1$ **Do not accept** just r < 1 without a correct reason
(c)	**M1**	For using their value of A /a /first term of their geometric sequence and their r (provided their $\lvert r\rvert < 1$)in a correct formula for the sum to infinity. $S_\infty = \frac{'their\ A'}{1-'(their\ r)'}$
	A1cao	For the correct value of 1000
(d)	**M1**	Uses their a and r (their r can be $\lvert r\rvert < 1$ or $\lvert r\rvert > 1$) to set the correct formula for the sum of a geometric series > 978 or =978 or ≥ 978 (>978 or =978 or ≥ 978 may be implied by later work.)
	dM1	Attempts to rearrange and achieves $(their\ r)^n\ " < "k\ (k\ is\ non\ zero\ positive\ constant)$ **Allow strict or non-strict inequalities or equation**: <,>, ≥ , ≤ or =
	ddM1	For correctly takes logs (any base)/ln, and achieves a positive value for n, it maybe implied by 17.1…but not 18 **ALT**: trial and error to find a value of n (at least tries n=17 and n=18)
	A1	For n = 18 Must come from **correct** working, achieves n=18 with no incorrect inequalities in their working.

If a candidate does not score the dM1 mark but arrives at an answer of 17.1... this scores a maximum of M1 as clear use of calculator is not condoned.