

**Geometric Sequences Exam Questions MS (from OCR 4722)**

**Jun 2007, Q1**

(i)  $u_2 = 12$   
 $u_3 = 9.6, u_4 = 7.68$  (or any exact equivalents)

(ii)  $S_{20} = \frac{15(1-0.8^{20})}{1-0.8}$   
 $= 74.1$

OR

B1		State $u_2 = 12$
B1√	2	Correct $u_3$ and $u_4$ from their $u_2$
M1		Attempt use of $S_n = \frac{a(1-r^n)}{1-r}$ , with $n = 20$ or $19$
A1		Obtain correct unsimplified expression
A1	3	Obtain 74.1 or better
M1		List all 20 terms of GP
A2		Obtain 74.1
	<b>5</b>	

**Jan 2008, Q8**

(i)  $u_4 = 10 \times 0.8^3$   
 $= 5.12$

(ii)  $S_{20} = \frac{10(1-0.8^{20})}{1-0.8}$   
 $= 49.4$

(iii)  $\frac{10}{1-0.8} - \frac{10(1-0.8^N)}{(1-0.8)} < 0.01$

$50 - 50(1 - 0.8^N) < 0.01$

$0.8^N < 0.0002$  **A.G.**

$\log 0.8^N < \log 0.0002$

$N \log 0.8 < \log 0.0002$

$N > 38.169$ , hence  $N = 39$

M1		Attempt $u_4$ using $ar^{n-1}$
A1	2	Obtain 5.12 aef
M1		Attempt use of correct sum formula for a GP
A1	2	Obtain 49.4
M1		Attempt $S_\infty$ using $\frac{a}{1-r}$
A1		Obtain $S_\infty = 50$ , or unsimplified equiv
M1		Link $S_\infty - S_N$ to 0.01 and attempt to rearrange
A1		Show given inequality convincingly
M1		Introduce logarithms on both sides
M1		Use $\log a^b = b \log a$ , and attempt to find $N$
A1	7	Obtain $N = 39$ only
	<b>11</b>	

**Jan 2011, Q5**

**5 (i)**  $4a = \frac{a}{1-r}$

**M1**      Equate  $\frac{a}{1-r}$  to  $4a$ , or substitute  $r = \frac{3}{4}$  into  $S_\infty$

$1 - r = \frac{1}{4}$

**M1**      Attempt to find value for  $r$  or evaluate  $S_\infty$

$r = \frac{3}{4}$

**A1**      **3**      Obtain  $r = \frac{3}{4}$  (or show  $S_\infty = 4a$ )

**(ii)**  $\left(\frac{3}{4}\right)^2 a = 9$

**M1\***      Attempt use of  $ar^2$

$a = 16$

**M1d\***      Equate to 9 and attempt to find  $a$

**A1**      **3**      Obtain  $a = 16$

**(iii)**  $S_{20} = \frac{16\left(1 - \frac{3}{4}^{20}\right)}{1 - \frac{3}{4}}$   
 $= 63.8$

**M1**      Attempt use of correct sum formula for a GP

**A1**      **2**      Obtain 63.8, or better

**8**

**Jun 2013, Q6**

**(i)**  $S_{30} = \frac{30}{2} (2 \times 6 + 29 \times 1.8)$

**M1**      Use  $d = 1.8$  in AP formula

**A1**      Correct unsimplified  $S_{30}$

$= 963$

**A1**      Obtain 963

**[3]**

<b>(ii)</b>	$r = \frac{7.8}{6} = 1.3$	M1	Use $r = 1.3$ in GP formula
	$\frac{6(1-1.3^N)}{1-1.3} \leq 1800$	A1	Correct unsimplified $S_N$
	$1 - 1.3^N \geq -90$	M1	Link sum of GP to 1800 and attempt to rearrange to $1.3^N \leq k$
	$1.3^N \leq 91$ <b>AG</b>	A1	Obtain given inequality
	$N \log 1.3 \leq \log 91$	M1	Introduce logs throughout and attempt to solve equation / inequality
$N \leq 17.19$ hence $N = 17$	A1	Conclude $N = 17$	
<b>[6]</b>			