

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
	5	

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_∞ 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
	11	

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_{∞}

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

M1 Attempt to find value for r or evaluate S_{∞}

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

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

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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

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