SEQUENCES & SERIES (Q 5, PAPER 1)

LESSON NO. 8: GEOMETRIC SERIES

2007

- 5 (c) The first two terms of a geometric series are $\frac{1}{3} + \frac{1}{9} + \dots$
 - (i) Find *r*, the common ratio.
 - (ii) Find an expression for S_n , the sum of the first *n* terms.

Write your answer in the form
$$\frac{1}{k} \left(1 - \frac{1}{3^n} \right)$$
 where $k \in \mathbb{N}$.

(iii) The sum of the first *n* terms of the geometric series $\frac{p}{3} + \frac{p}{9} + \dots$ is $1 - \frac{1}{3^n}$. Find the value of *p*.

2006

- 5 (b) The *n*th term of a geometric series is
 - $T_n = 4(\frac{1}{2})^n.$
 - (i) Find *a*, the first term.
 - (ii) Find *r*, the common ratio.
 - (iii) Write $4 S_{10}$ in the form $\frac{1}{2^k}$, $k \in \mathbf{N}$, where S_{10} is the sum of the first ten terms.

2004

- 5 (c) The first term of a geometric series is 1 and the common ratio is -4.
 - (i) Write down the first three terms of the series.
 - (ii) Find S_6 , the sum of the first 6 terms.
 - (iii) Show that $16S_4 3 = S_6$, where S_4 is the sum of the first 4 terms.

2003

- 5 (b) The first two terms of a geometric series are 32 + 8 + ...
 - (i) What us the value of *r*, the common ratio?
 - (ii) Find an expression for S_n , the sum of the first *n* terms.
 - (iii) Find S_{10} , the sum of the first 10 terms. Given your answer correct to four decimal places.

2001

- 5 (b) The *n*th term of a geometric series is given by $T_n = 3^n$.
 - (i) What is the value of *a*, the first term?
 - (ii) What is the value of *r*, the common ratio?
 - (iii) Show that S_{10} , the sum of the first ten terms, is $\frac{3}{2}(3^{10}-1)$.

2000

- 5 (b) The first term of a geometric series is 1 and the common ratio is $\frac{11}{10}$.
 - (i) Write down the second, thirds and fourth terms of the series.
 - (ii) Calculate S_4 , the sum of the first four terms. Give your answer as a decimal.

1999

- 5 (b) The first two terms of a geometric series are $2 + \frac{2}{3} + ...$
 - (i) Find *r*, the common ratio.
 - (ii) Write down the third and fourth terms of the series.
 - (iii) Show that S_6 , the sum to 6 terms, is $3 \frac{1}{3^5}$.

1998

5 (b) The *n*th term of a geometric sequence is

$$T_n = \frac{2^n}{3^n}$$

- (i) Find the first three terms of the sequence.
- (ii) Show that S_5 , the sum of the first five terms, is $\frac{422}{243}$.



Answers			
2007	5 (c) (i) $\frac{1}{3}$	(ii) $\frac{1}{2}\left(1-\frac{1}{3^n}\right)$	(iii) <i>p</i> = 2
2006	5 (b) (i) $a = 2$	(ii) $r = \frac{1}{2}$	(iii) $\frac{1}{2^8}$
2004	5 (c) (i) 1, -4, 16	(ii) -819	
2003	5 (b) (i) $\frac{1}{4}$	(ii) $\frac{128}{3}(1-(\frac{1}{4})^n)$	(iii) 42·6666
2001	5 (b) (i) 3	(ii) 3	
2000	5 (b) (i) $\frac{11}{10}, \frac{121}{100}, \frac{1331}{1000}$	(ii) 4.641	
1999	5 (b) (i) $r = \frac{1}{3}$	(ii) $\frac{2}{9}, \frac{2}{27}$	
1998	5 (b) (i) $\frac{2}{3}, \frac{4}{9}, \frac{8}{27}$		
1996	5 (b) (i) 1	(ii) <i>r</i> = 3	(iii) $S_n = \frac{1}{2}(3^n - 1)$; Yes