

Geometric Sequences Exam Questions (From OCR 4722)

Jun 2007

1 A geometric progression u_1, u_2, u_3, \dots is defined by

$$u_1 = 15 \quad \text{and} \quad u_{n+1} = 0.8u_n \quad \text{for } n \geq 1.$$

(i) Write down the values of u_2, u_3 and u_4 . [2]

(ii) Find $\sum_{n=1}^{20} u_n$. [3]

Jan 2008

8 The first term of a geometric progression is 10 and the common ratio is 0.8.

(i) Find the fourth term. [2]

(ii) Find the sum of the first 20 terms, giving your answer correct to 3 significant figures. [2]

(iii) The sum of the first N terms is denoted by S_N , and the sum to infinity is denoted by S_∞ .

Show that the inequality $S_\infty - S_N < 0.01$ can be written as

$$0.8^N < 0.0002,$$

and use logarithms to find the smallest possible value of N . [7]

Jan 2011

5 In a geometric progression, the sum to infinity is four times the first term.

(i) Show that the common ratio is $\frac{3}{4}$. [3]

(ii) Given that the third term is 9, find the first term. [3]

(iii) Find the sum of the first twenty terms. [2]

Jun 2013

6 Sarah is carrying out a series of experiments which involve using increasing amounts of a chemical. In the first experiment she uses 6 g of the chemical and in the second experiment she uses 7.8 g of the chemical.

(i) Given that the amounts of the chemical used form an arithmetic progression, find the total amount of chemical used in the first 30 experiments. [3]

(ii) Instead it is given that the amounts of the chemical used form a geometric progression. Sarah has a total of 1800 g of the chemical available. Show that N , the greatest number of experiments possible, satisfies the inequality

$$1.3^N \leq 91,$$

and use logarithms to calculate the value of N . [6]
