

Geometric Sequences

Difficulty: Medium

Question Paper 2

Level	A Level only
Subject	Maths - Pure
Exam Board	Edexcel
Topic	Sequences & Series
Sub-Topic	Geometric Sequences
Difficulty	Medium
Booklet	Question Paper 2

Time allowed: 61 minutes

Score: /51

Percentage: /100

Grade Boundaries:

A*	A	B	C	D	E	U
>76%	61%	52%	42%	33%	23%	<23%

Question 1

A geometric series has first term 5 and common ratio $\frac{4}{5}$.

Calculate

(a) the 20th term of the series, to 3 decimal places,

(2)

(b) the sum to infinity of the series.

(2)

Given that the sum to k terms of the series is greater than 24.95,

(c) show that $k > \frac{\log 0.002}{\log 0.8}$,

(4)

(d) find the smallest possible value of k .

(1)

(Total 9 marks)

Question 2

A car was purchased for £18 000 on 1st January.

On 1st January each following year, the value of the car is 80% of its value on 1st January in the previous year.

- (a) Show that the value of the car exactly 3 years after it was purchased is £9216. (1)

The value of the car falls below £1000 for the first time n years after it was purchased.

- (b) Find the value of n . (3)

An insurance company has a scheme to cover the maintenance of the car.

The cost is £200 for the first year, and for every following year the cost increases by 12% so that for the 3rd year the cost of the scheme is £250.88

- (c) Find the cost of the scheme for the 5th year, giving your answer to the nearest penny. (2)

- (d) Find the total cost of the insurance scheme for the first 15 years. (3)

(Total 9 marks)

Question 3

The first term of a geometric series is 20 and the common ratio is $\frac{7}{8}$

The sum to infinity of the series is S_{∞}

(a) Find the value of S_{∞} (2)

The sum to N terms of the series is S_N

(b) Find, to 1 decimal place, the value of S_{12} (2)

(c) Find the smallest value of N , for which

$$S_{\infty} - S_N < 0.5 \quad (4)$$

(Total 8 marks)

Question 4

- (i) All the terms of a geometric series are positive. The sum of the first two terms is 34 and the sum to infinity is 162

Find

- (a) the common ratio,

(4)

- (b) the first term.

(2)

- (ii) A different geometric series has a first term of 42 and a common ratio of $\frac{6}{7}$.

Find the smallest value of n for which the sum of the first n terms of the series exceeds 290

(4)

(Total 10 marks)

Question 5

The first 3 terms of a geometric sequence are $k + 2, 4k, 2k^2$, $k > 0$. Find the value of k .

(4 marks)

(Total 4 marks)

Question 6

The first three terms of a geometric series are $4p$, $(3p + 15)$ and $(5p + 20)$ respectively, where p is a **positive** constant.

(a) Show that $11p^2 - 10p - 225 = 0$ (4)

(b) Hence show that $p = 5$ (2)

(c) Find the common ratio of this series. (2)

(d) Find the sum of the first ten terms of the series, giving your answer to the nearest integer. (3)

(Total 11 marks)