

4.3 Geometric Progressions

Question Paper

Course	CIEAS Maths
Section	4. Sequences & Series
Topic	4.3 Geometric Progressions
Difficulty	Hard

Time allowed: 60
Score: /42
Percentage: /100

Question 1

The first three terms of a geometric sequence are given by $x + 12$, $3x$, and x^2 respectively, where x is a non-zero real number.

Find the value of the 102nd term in the sequence.

[5 marks]

Question 2

The sum of the first three terms in a geometric series is 8.75.

The sum of the first six terms in the same series is 13.23.

Find the common ratio, r , of the series.

[4 marks]

Question 3

A geometric series has first term a and common ratio $\sqrt{5}$.

Show that the sum of the first ten terms of the series is equal to $ka(\sqrt{5} + 1)$, where k is a positive integer to be determined.

[4 marks]

Question 4a

The first three terms in a geometric series are $(2k + 3)$, k , $(k - 2)$, where $k < 0$ is a constant.

(a) Find the value of k .

[5 marks]

Question 4b

(b) Find the sum of the first 12 terms in this series.

[3 marks]

Question 5a

The second and fifth terms of a geometric series are 13.44 and 5.67 respectively. The series has first term a and common ratio r .

(a) By first determining the values of a and r , calculate the sum to infinity of the series.

[6 marks]

Question 5b

(b) Calculate the difference between the sum to infinity of the series and the sum of the first 20 terms of the series. Give your answer accurate to 2 decimal places.

[2 marks]

Question 6a

A geometric progression has first term 9, and the sum of the first three terms of the progression is 19. The common ratio of the progression is r .

(a) Show that $9r^2 + 9r - 10 = 0$.

[3 marks]

Question 6b

(b) Find the two possible values of r .

[2 marks]

Question 6c

(c) Given that the sum to infinity of the progression exists, find the sum to infinity of the progression.

[3 marks]

Question 7a

The k th term of a geometric progression is given by $u_k = 2401 \left(\frac{2}{7}\right)^k$.

Calculate, giving your answers as exact values

(a) The sum to infinity of the progression starting with the seventh term.

[3 marks]

Question 7b

(b) The sum to infinity of the progression whose k th term is given by $v_k = u_{k+4}$, where u_k is defined as above.

[2 marks]

