Sequences and Series - Edexcel Past Exam Questions

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1. The second and fourth terms of a geometric series are 7.2 and 5.832 respectively.

The common ratio of the series is positive.

For this series, find

(*a*) the common ratio, **(2)**

(*b*) the first term, **(2)**

(*c*) the sum of the first 50 terms, giving your answer to 3 decimal places, **(2)**

(*d*) the difference between the sum to infinity and the sum of the first 50 terms, giving your answer to 3 decimal places. **(2)**

Jan 05 Q6

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2. The first term of a geometric series is 120. The sum to infinity of the series is 480.

(*a*) Show that the common ratio, *r*, is $\dfrac{3}{4}$. **(3)**

(*b*) Find, to 2 decimal places, the difference between the 5th and 6th terms. **(2)**

(*c*) Calculate the sum of the first 7 terms. **(2)**

The sum of the first *n* terms of the series is greater than 300.

(*d*) Calculate the smallest possible value of *n*. **(4)**

Jan 06 Q4

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3. A geometric series has first term a and common ratio r. The second term of the series is 4 and the sum to infinity of the series is 25.

(a) Show that $25r^2 - 25r + 4 = 0$.

(4)

(b) Find the two possible values of r.

(2)

(c) Find the corresponding two possible values of a.

(2)

(d) Show that the sum, S_n, of the first n terms of the series is given by

$$S_n = 25(1 - r^n).$$

(1)

Given that r takes the larger of its two possible values,

(e) find the smallest value of n for which S_n exceeds 24.

(2)

June 06 Q9

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4. A geometric series is $a + ar + ar^2 + ...$

(a) Prove that the sum of the first n terms of this series is given by

$$S_n = \frac{a(1 - r^n)}{1 - r}.$$

(4)

(b) Find

$$\sum_{k=1}^{10} 100(2^k).$$

(3)

(c) Find the sum to infinity of the geometric series

$$\frac{5}{6} + \frac{5}{18} + \frac{5}{54} + ...$$

(3)

(d) State the condition for an infinite geometric series with common ratio r to be convergent.

(1)

Jan 07 Q10

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5. The fourth term of a geometric series is 10 and the seventh term of the series is 80.

For this series, find

(*a*) the common ratio, **(2)**

(*b*) the first term, **(2)**

(*c*) the sum of the first 20 terms, giving your answer to the nearest whole number. **(2)**

Jan 08 Q2

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

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 $k > \dfrac{\log\ 0.002}{\log\ 0.8}$, **(4)**

(*d*) find the smallest possible value of *k*. **(1)**

June 08 Q6

7. The first three terms of a geometric series are $(k + 4)$, k and $(2k - 15)$ respectively, where *k* is a positive constant.

(*a*) Show that $k^2 - 7k - 60 = 0$. **(4)**

(*b*) Hence show that $k = 12$. **(2)**

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

(*d*) Find the sum to infinity of this series. **(2)**

Jan 09 Q9

8. The third term of a geometric sequence is 324 and the sixth term is 96.

(*a*) Show that the common ratio of the sequence is $\dfrac{2}{3}$. **(2)**

(*b*) Find the first term of the sequence. **(2)**

(*c*) Find the sum of the first 15 terms of the sequence. **(3)**

(*d*) Find the sum to infinity of the sequence. **(2)**

June 09 Q5

9. The second and fifth terms of a geometric series are 750 and –6 respectively.

Find

(*a*) the common ratio of the series, **(3)**

(*b*) the first term of the series, **(2)**

(*c*) the sum to infinity of the series. **(2)**

Jan 11 Q3

10. The second and third terms of a geometric series are 192 and 144 respectively.

For this series, find

(*a*) the common ratio, **(2)**

(*b*) the first term, **(2)**

(*c*) the sum to infinity, **(2)**

(*d*) the smallest value of *n* for which the sum of the first *n* terms of the series exceeds 1000.

(4)

June 11 Q6