

C.E.M. TUITION

Student Name : _____

Review Topic : Arithmetic and Geometric Series

(Preliminary Course - Paper 1)

Year 11 - 2 Unit

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Question 1

- (a) Write down the formulae for the n th term and the sum of the first n terms of an arithmetic series with first term a and common difference d .
- (b) The first term of an arithmetic series is 10, and the eighth term is 8.
What is the sum of the first 21 terms of this series?
- (c) The fifth term of an arithmetic series is 14, and the sum of the first ten terms is 165.
Find the first term of this series.

(a) $T_n = a + (n - 1)d$, $S_n = \frac{n}{2}(2a + (n - 1)d)$ (b) 150 (c) -6
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Question 2 :

- (a) Write down a single expression for the sum of the first n terms of the geometric series $1 + x^2 + x^4 + \dots$
What is the sum to infinity when $x = \frac{1}{3}$?
- (b) The first term of an arithmetic series is 4, and the fifth term is four times the third term.
Find the common difference.

(a) $\frac{1-x^{2n}}{1-x^2}, \frac{9}{8}$ (b) -3
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Question 3 :

- (a) The first term of an arithmetic series is 2, and the fourth term is three times the third term.
Find the sum of the first ten terms of the series.
- (b) The third term of a geometric series is 54, and the sixth term is 2. Find the common ratio, and the sum of the first 6 terms.

(a) -40 (b) $\frac{1}{3}, 728$

Question 4 :

- (a) The first term of an arithmetic series is 1, and the 26th term is 2. Find the sum of the first 50 terms of the series.
- (b) Write down an expression for the sum of n terms of a geometric series with first term a and common ratio r , where $r \neq 1$. For what values of r does this series have a limiting sum as n increases indefinitely?

(a) 99 (b) $S_n = \frac{a(1-r^n)}{1-r}, -1 < r < 1$

Question 5 :

The first three terms of an arithmetic series are 50, 43, 36.

- (a) Write down a formula for the n th term.
- (b) If the last term of the series is -27 , how many terms are there in the series.
- (c) Find the sum of the series.

(a) $57 - 7n$ (b) 12 terms (c) 138

Question 6 :

- (a) The series $\frac{1}{3} - \frac{1}{6} + \frac{1}{12} - \dots$ is geometric. Find the sum of the first ten terms. (Give the answer as a rational number in its lowest terms.)
- (b) Can there be an infinite geometric series with a limiting sum of $\frac{5}{8}$ and a first term of 2 ?
(All working and reasoning must be shown).
- (c) If $x^2 = (2a - x)(2b - x)$ show that $\frac{1}{a}$, $\frac{1}{x}$, $\frac{1}{b}$ are in arithmetic sequence.

(a) $\frac{341}{1536}$ (b) no; common ratio, $r = -\frac{11}{5}$ must be in the interval $-1 < r < 1$ for limiting sum to exist
