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 nth 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

Question 2 :

(a) Write down a single expression for the sum of the first n terms of the geometric series $1 + x^2 + x^4 + ...$
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.

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 therm 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) $S_n = \dfrac{a(1-r^n)}{1-r}$; $-1 < r < 1$

Question 5 :

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

(a) Write down a formula for the nth 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 $\frac{1}{3} - \frac{1}{6} + \frac{1}{12} - \ldots$ 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