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MATH-SAGE ACADEMY

NATIONAL SENIOR CERTIFICATE

MATHEMATICS

GRADE 12

SEQUENCE AND SERIES

**2026
TEST 1**

MARKS: 40

DURATION: 1 HOUR



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INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This paper consists of **FOUR** question.
2. Answer **ALL** the questions.
3. Clearly show **ALL** calculations, diagrams, graphs, etc. that you have used in determining your answers.
4. Answers only will **NOT** necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round answers off to **TWO** decimal places, unless stated otherwise.
7. Diagrams are **NOT** necessarily drawn to scale.
8. Write neatly and legibly.



**QUESTION 1**

1. Given the quadratic sequence: 5, 12, 21, 32, ...
 - 1.1 Write down the NEXT term. (1)
 - 1.2 Determine the general term (T_n) in the form of $an^2 + bn + c$ (4)
 - 1.3 Calculate the value of 15th term of the sequence. (1)
 - 1.4 Between which two consecutive terms is the first difference equal to 195 (3)

[09]**QUESTION 2**

- 2.1 Consider an arithmetic sequence: 17, 11, 5, ...
 - 2.1.1 Determine the nth term of the sequence (2)
 - 2.1.2 How many terms are there in the sequence if the last term is -217 (2)
 - 2.1.3 Calculate the sum of the first 30 terms of the sequence. (2)
 - 2.1.4 Express the series: $17 + 11 + 5 + \dots$ using sigma notation (2)
 - 2.1.5 If every term of the sequence is increased by 2, what will be the new common difference. (1)

[09]

**QUESTION 3**

3.1 Given the sum of first n terms of a sequences as: $S_n = n^2 + 3n$

3.1.1 Determine the sum of the first 100 terms of a sequence. (1)

3.1.2 Calculate the value of 10th term of the sequence. (3)

3.1.3 Determine the expression for nth term of the sequence. (3)

[07]**QUESTION 4**

4.1 In a geometric sequence, 5th term and 8th term are 48 and 384 respectively. Determine the common ratio. (3)

4.2 If the first term is 3, calculate the sum of the first 15 terms of the sequence. (2)

4.3 Prove that for any geometric series, $S_n = \frac{a(r^n - 1)}{r - 1}$, $r \neq 1$ (4)

4.4 Given the converging series: $(x - 3) + (x - 3)^2 + (x - 3)^3 + \dots$

4.4.1 For which values of x will the series converge? (3)

4.3.2 If $x = 3,5$. Calculate S_∞ . (3)

[15]