LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P1

SEPTEMBER 2025

MARKS: 150

TIME: 3 hours

EMATHP1

This question paper consists of 9 pages and 1 information sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 Questions.
2. Answer **ALL** the questions.
3. Number your answers correctly according to the numbering system used in this question paper.
4. Clearly show **ALL** calculations, diagrams and graphs that you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.
7. If necessary, answers should be rounded off to **TWO** decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Information sheet with formulae is included at the end of the question paper.
10. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $(3x+1)(x-2)=0$ (2)

1.1.2 $5x(x-2)=2$ (correct to **TWO** decimal places) (4)

1.1.3 $(3x-2)^2>3x$ (4)

1.1.4 $x-7=\sqrt{x-5}$ (4)

1.1.5 $3^{2x}-12.3^x+27=0$ (3)

1.2 Solve for x and y simultaneously:

$3^y=9^{x-3}$

$y^2=20-x^2$ (6)

1.3 Given : $5^n=x$ and $n=\log_2 y$

Express 50^{n+1} in terms of x and y. (4)

[27]

QUESTION 2

2.1 Given: $-4\ ;\ 0\ ;\ 4\ ;\ 8;\ldots\ldots\ldots$

2.1.1 Write down the next three terms of the sequence. (1)

2.1.2 Determine the general term of the sequence. (2)

2.1.3 Determine the term of the sequence that is equal to 56. (2)

2.1.4 Calculate the value of the 12^{th} term of the sequence. (1)

2.2 Given the following quadratic sequence: $x\ ;\ y\ ;\ 2\ ;\ -2\ ;\ -8\ ;\ -16$

2.2.1. Calculate the values of x and y. (5)

2.2.2. The nth term of this sequence is $T_n = an^2 + bn + c$. Determine the values of a, b and c. (5)

[16]

QUESTION 3

Given: $3(2)^5 + 3(2)^4 + 3(2)^3 + \ldots\ldots\ldots\ldots$

3.1 Will the series converge? Give a reason for your answer (2)

3.2 Calculate the sum of the first seven terms of the series. (2)

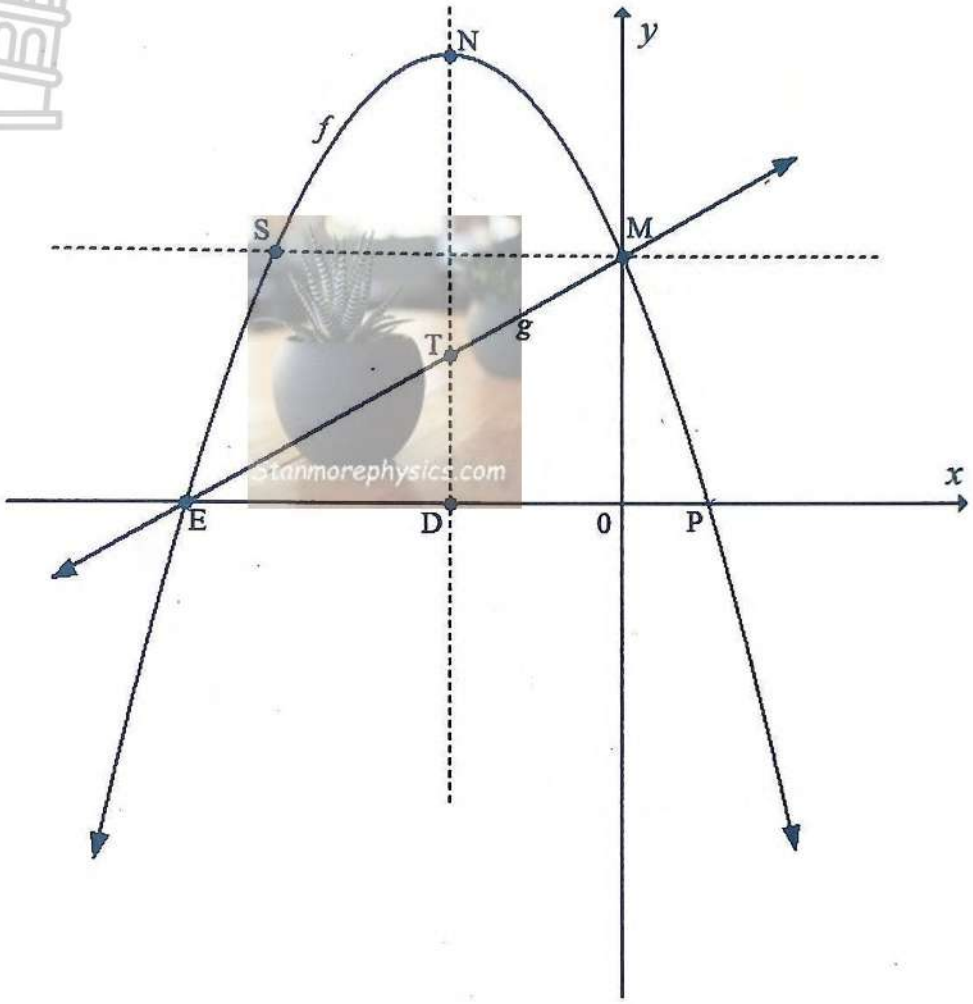
3.3 Calculate the sum to infinity of the series. (2)

3.4 Calculate: $\sum_{k=8}^{\infty} 3(2)^{6-k}$ (2)

[8]

QUESTION 4

4.1 The graphs of $f(x) = -x^2 - 4x + 5$ and $g(x) = mx + c$ are given below.
Points E, M and P are the intercepts of the graphs with the axes. N is the turning point of f and NTD is the axes of symmetry of f. T is a point on the graph of g.



4.1.1 Determine the coordinates of points E and P. (3)

4.1.2 Calculate the value of m and c. (2)

4.1.3 Calculate the length of NT. (6)

4.1.4 Determine the coordinates of point S, the mirror image of point M with respect to the axis of symmetry. (2)

4.2 Given: $f(x)=\frac{x+3}{x+1}$

4.2.1 Show that f can be written as $f(x)=\frac{2}{x+1}+1$. (2)

4.2.2 Determine the intercepts of f with the axes. (4)

4.2.3 Write down the equation of the axes of symmetry of f with the negative gradient. (2)

4.2.4 Sketch the graph of f (show the coordinates of the intercepts). (3)

4.2.5 For which value(s) of x will $\frac{2}{x+1}\geq -1$. (2)

[26]

QUESTION 5

Given: $f(x)=2^{-x}$

5.1 Determine the equation of f^{-1} in the form $y=.....$ (2)

5.2 Sketch the graphs of f and f^{-1} on the same set of axes (name each graph accordingly). (4)

5.3 Write down the domain of f^{-1}. (1)

[7]

QUESTION 6

Elton buys a car for R375 000. He secures a loan at an interest rate of 8% p.a., compounded monthly. The monthly instalment is R7 000. He pays the first instalment one month after the loan was secured.

6.1 Calculate the effective annual interest rate on the loan. Leave your answer correct to TWO decimal places. (2)

6.2 Calculate the number of months it will take Elton to repay the loan. (5)

6.3 Calculate the value of the final instalment. (4)

6.4 The value of the car depreciates at i % p.a. After 4 years its value is R270 000. Calculate i. (3)

[14]

QUESTION 7

7.1 Determine $f'(x)$ from first principles if $f(x) = x^2 - 3x$. (5)

7.2 Determine:

7.2.1 $D_x\left[(x+1)(5x+9)\right]$ (3)

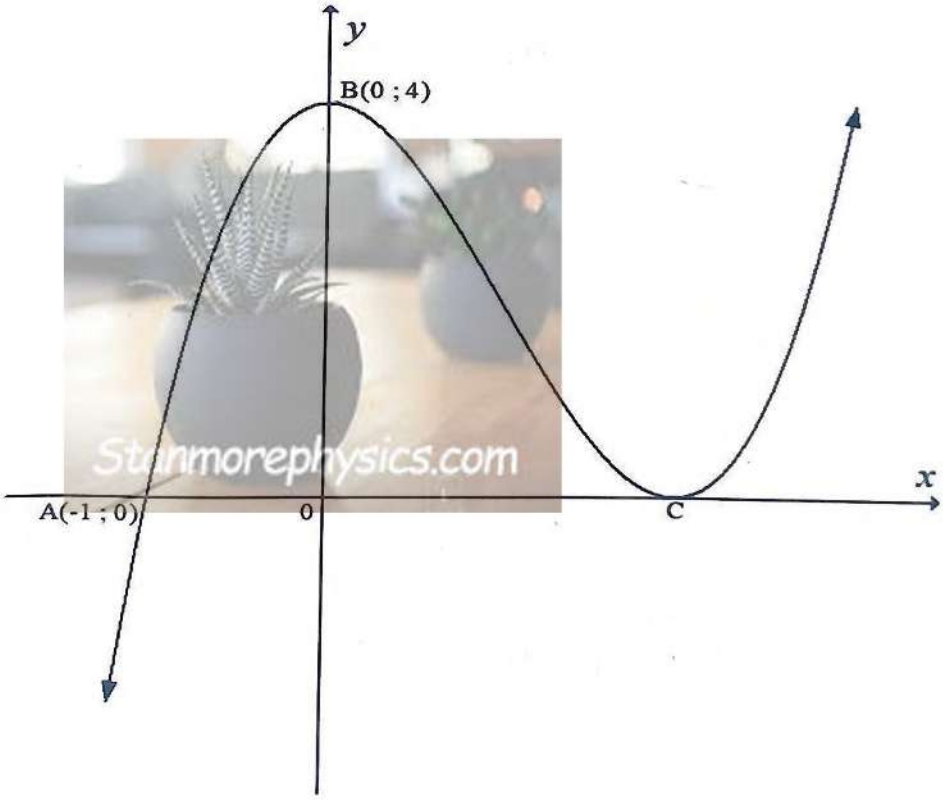
7.2.2 $\frac{dy}{dx}$ if $y = \frac{-5}{\sqrt{x}} - x^5$ (3)

7.2.3 $f'(x)$ if $f(x) = \frac{x^3 + x^2 - 2x}{x-1}$ (4)

[15]

QUESTION 8

The diagram below represents the graph of $f(x) = x^3 + bx^2 + cx + 4$. B is the turning point and there is a relative minimum at C.



Determine:

8.1 The values of b and c. (4)

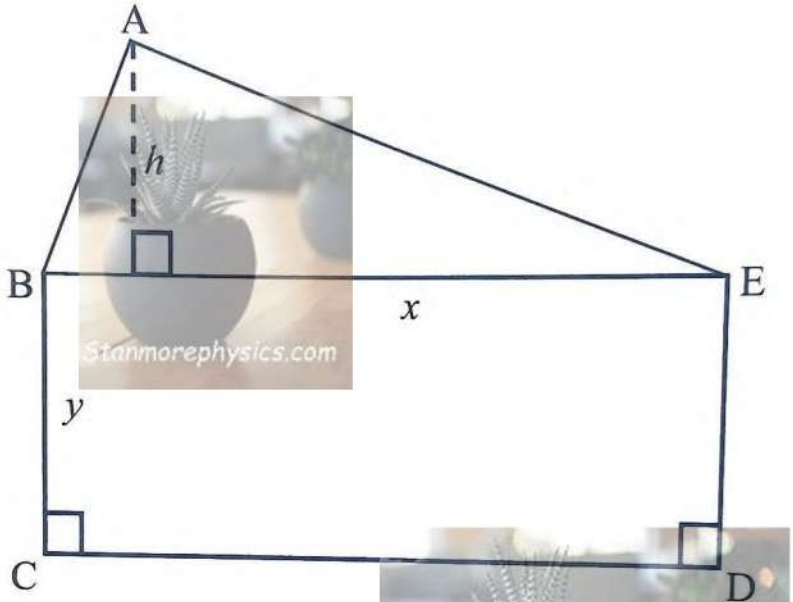
8.2 The coordinates of the point of inflection. (4)

8.3 The equation of the tangent to the curve at $x = 3$. (4)

[12]

QUESTION 9

In the figure below, ΔABE is mounted on a rectangle BCDE. ΔABE has a base of length x metres. The base and the perpendicular height of the triangle add up to 10 metres. y is the breath of rectangle BCDE. The perimeter of the rectangle is 32m.



9.1 Show that the Area of the figure ABCDE is $A(x) = -\frac{x}{2}(3x-42)\,m^2$ (4)

9.2 Calculate the value of x for which ABCDE has a maximum area. (2)

9.3 Calculate the maximum area of ABCDE. (2)

[8]

QUESTION 10

10.1 If $P(A) = 0,25$; $P(B) = 0,5$ and $P(A \text{ or } B) = 0,625$

10.1.1 Calculate $P(A \text{ and } B)$ (2)

10.1.2 Are events A and B complementary? Give reasons for your answer. (2)

10.2 In a survey, a group of 100 grade 8 learners were asked if they listen to Jazz or Soul music.

- 48 learners listened to Jazz music
- 52 learners listened to Soul music
- 10 learners listened to neither
- x learners listened to both Jazz and Soul music

10.2.1 Calculate the value of x and represents a survey of this 100 grade 8 learners on a venn diagram. (5)

10.2.2 Determine the probability of selecting a learner that listens to Soul music. (1)

10.2.3 Determine the probability of selecting a learner that listens to Jazz or Soul music. (1)

10.3 Four - digit codes (not beginning with 0), are to be constructed from the following set of digits: { 1 ; 2 ; 3 ; 4 ; 6 ; 7 ; 8 ; 0 }.

10.3.1 How many four – digit codes can be constructed, if repetition of digits is allowed? (2)

10.3.2 How many four – digit codes can be constructed, if repetition of digits is not allowed? (2)

10.3.3 Calculate the probability of randomly constructing a four – digit code which is divisible by 5 if repetition of digits is allowed. (2)

[17]

TOTAL [150]