



LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 12

MATHEMATICS P1
PRE-PREPARATORY EXAMINATION

AUGUST 2026

MARKS : 150

DURATION : 3 HOURS

This question paper consists of 14 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs, et cetera 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 off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Number the answers correctly according to the numbering system used in this question paper.
9. Write neatly and legibly.

QUESTION 11.1 Solve for x

1.1.1 $x(x + 2) = 24$ (3)

1.1.2 $3x^2 - 4x - 1 = 0$ (correct to TWO decimal places)

1.1.3 $(x + 4)(5 - x) \geq 0$ (3)

1.1.4 $2\sqrt{x + 5} + 2 = x - 1$ (6)

1.2 Solve simultaneously for x and y

$$3y + x = 2$$
 (6)

$$y^2 + x = xy + y$$

1.3 Simplify

$$\frac{a^{2m} - 2 + a^{-2m}}{a^m - a^{-m}} \quad (\text{in terms of } a \text{ and } m) \text{ and hence determine the value of}$$

$$a^m - a^{-m} \quad \text{if } a = \frac{1}{27} \text{ and } m = \frac{1}{3}$$
 (4)

[25]

QUESTION 2

2.1 The 100th term of an arithmetic sequence is 500 and its common difference is 6,

determine the first term of the sequence. (3)

2.2 The general term of the sequence is $T_n = 2n + 5$

2.2.1 Show that the sequence is arithmetic. (3)

2.2.2 Determine, in terms of n , a simplified expression for S_n , the sum of first n terms. (3)

2.3 Consider the quadratic sequence: 1, 3, 7, 13; . . .

Determine a simplified expression for the n th term of the sequence. (6)

[15]

QUESTION 3

$$\sum_{n=1}^x 112 \left(\frac{1}{4} \right)^n$$

3.1 Given:

3.1.1 Determine the first two terms. (2)

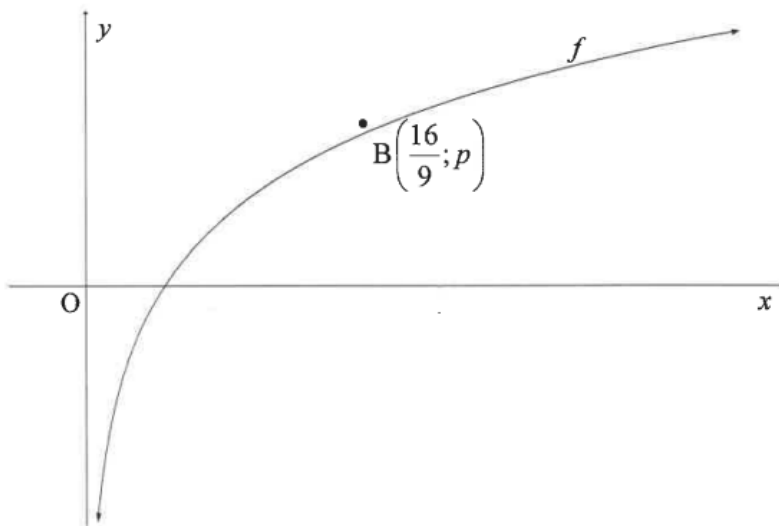
3.1.2 If $\sum_{n=1}^x 112 \left(\frac{1}{4} \right)^n = \frac{595}{16}$, determine the value of x . (5)3.2 Consider the geometric sequence: 4; 2; 1; $\frac{1}{2}$; ...

3.2.1 Determine the sum to infinity. (3)

[10]

QUESTION 4

The graph of $f(x) = \log_{\frac{4}{3}} x$ is drawn below. $B\left(\frac{16}{9}; p\right)$ is a point of f .



4.1 For which value(s) of x is $\log_{\frac{4}{3}} x \leq 0$? (2)

4.2 Determine the value of p , without the use of a calculator. (3)

4.3 Determine the equation of the inverse of f in the form $y = \dots$ (2)

4.4 Write down the range of $y = f^{-1}(x)$. (2)

4.5 The function $h(x) = \left(\frac{3}{4}\right)^x$ is obtained after applying two reflections on f .

Write down the coordinates of B'' , the image of B on h . (2)

[11]

QUESTION 5

Consider the function $f(x) = \frac{3}{x-1} - 2$

5.1 Write down the equations of the asymptotes of f . (2)

5.2 Calculate the intercepts of the graph of f with the axes. (3)

5.3 Sketch the graph of f on DIAGRAM SHEET . (3)

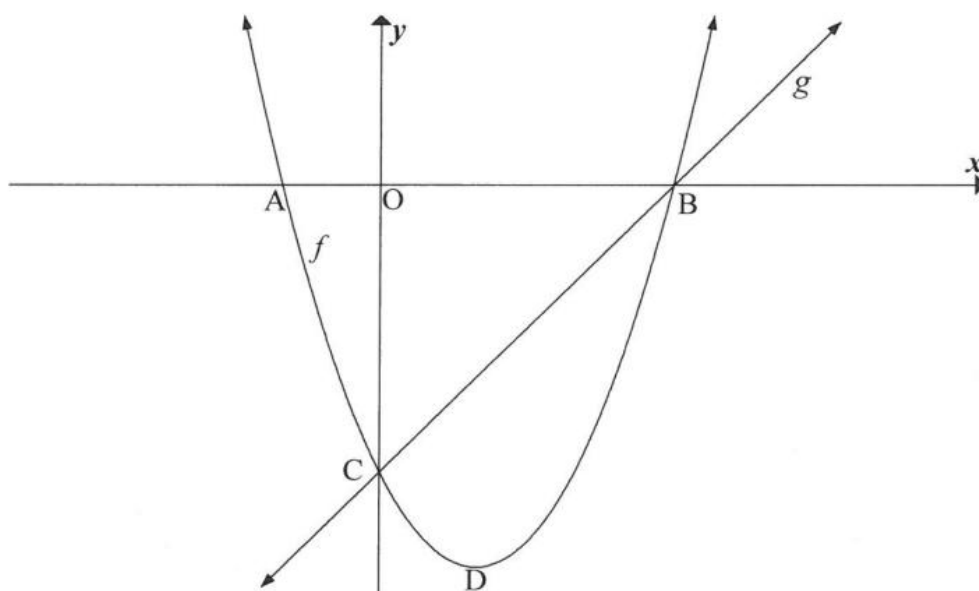
5.4 Write down the equation of a line symmetry of f which has a negative gradient. (2)

[10]

QUESTION 6

6.1 The sketch shows the graphs of $f(x) = x^2 - 2x - 3$ and $g(x) = x - 3$.

- A and B are the x - intercepts of f .
- The graphs of f and g intersect at C and B.



- 6.1.1 Determine the coordinates of C. (1)
- 6.1.2 Calculate the length of AB. (4)
- 6.1.3 Determine the coordinates of D. (2)
- 6.1.4 Calculate the average gradient of f between C and D. (2)
- 6.1.5 Determine the values of k for which $f(x) = k$ will have two unequal positive real roots. (3)
- 6.1.6 For which values of x will $f(x) \geq g(x)$. (2)

[14]

QUESTION 7

- 7.1 Six years ago, Eric bought a phone for R12 500. The value of the phone depreciated annually according to the reducing-balance method. The value of the phone is now R8 535, 35. Calculate the annual rate of depreciation. (4)
- 7.2 Mary started working on 1 January 1970. At the end of January 1970 and at the end of each month thereafter, she deposited R550 into an annuity fund. She continued doing this until she retired on 31 December 2013.
- 7.2.1 Determine the total amount of money that she paid into the fund (2)
- 7.2.2 The interest rate on this fund was 7.5% p.a. compounded quarterly. Calculate the value of the fund at the time that she retired. (5)
- 7.2.3 On 1 January 2014 Mary is invested R 500 800,00 in an account paying interest at 9,5% p.a. compounded monthly. Mary withdraws a fixed amount from this account at the end of each month, starting on 31 January 2014. If Mary wishes to make monthly withdrawals from this account for 20 years, calculate the maximum amount she could withdraws at the end of each month. (4)

[15]

QUESTION 8

8.1 Given $f(x) = 3x - x^2$

Determine $f'(x)$ from first principles (5)

8.2.1 $f'(x)$ where $f(x) = \frac{x^4 - x + 5}{x}$, giving your answer with positive exponents. (3)

8.2.2 $\frac{dy}{dx}$ if $y = 4\sqrt{x} - \frac{8}{\sqrt{x}} + \pi x^3$ (4)

8.3 Determine the gradient of the tangent of the graph of $f(x) = -x^3 - 4x + 5$ at

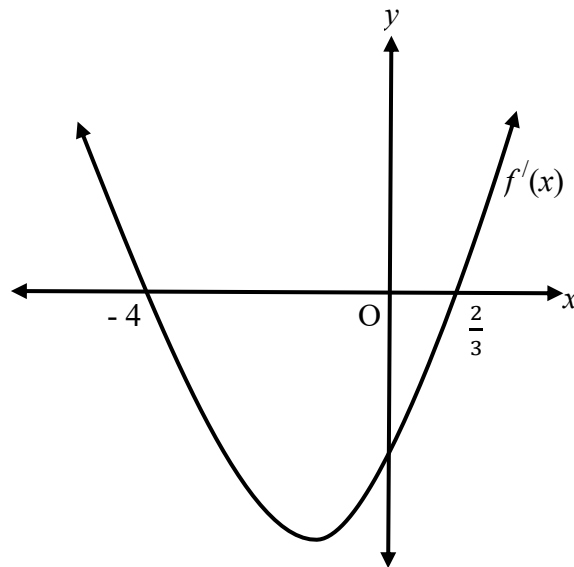
$x = -1$ (3)

[15]

QUESTION 9

f is a cubic function. Consider the sketch of the first derivative of f , given by

$$f'(x) = 3x^2 + 10x - 8$$



- 9.1 Write down the x –coordinates of the stationary points of f . (2)
- 9.2 For which value(s) of x will $f''(x) = 0$? (2)
- 9.3 If $f(x) = ax^3 + bx^2 + cx + d$ and $f(0) = -12$, determine the values of a, b, c and d (5)
- 9.4 Determine the equation of the tangent of f at $x = -2$ (4)

[13]

QUESTION 10

A pump is connected to a dam. The volume of the Water is given by:

$V(t) = 50 + 5t - 2t^2$ Where $V(t)$ is the volume in thousands of litres.

10.1 Determine the rate of change of the volume with respect to the days at $t = 4$. (3)

10.2 When the maximum volume reached? Determine the maximum volume of water in the dam. (2)

10.3 When will the dam be empty? (2)

[7]

QUESTION 11

11.1 A survey concerning their holiday preferences was done with 200 staff members. The options they could choose from were to:

- Go to the Coast
- Visit a Game park
- Stay at Home

The results were recorded in the table below:

	Coast	Game Park	Home	Total
Male	53	38	15	106
Female	62	24	8	94
Total	115	62	23	200

11.1.1 Determine the probability that a randomly selected staff member:

- (a) Is male (1)
- (b) Does not prefer visiting a game park (2)

11.1.2 Are the events 'being a male' and 'staying at home' independent events?

Motivate your answer with relevant calculations. (4)

11.2 A password consists of five different letters of the English alphabet. Each letter may be used only once. How many passwords can be formed if:

- 11.2.1 All the letters of the alphabet can be used. (2)
- 11.2.2 The password must start with a 'D' and end with an 'L'. (2)

11.3 Ten cars of different manufactures, of which 3 are silver, are to be parked in a straight line.

- 11.3.1 In how many different ways can ALL the cars be parked? (1)
- 11.3.2 If the three silver cars must be parked next to each other, determine in how many different ways the cars can be parked. (3)

[15]

TOTAL : 150

INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

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

$$S_\infty = \frac{a}{1 - r}; -1 < r < 1$$

$$F = \frac{x[(1 + i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1 + i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x + h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cdot \cos A$$

$$\text{area } \triangle ABC = \frac{1}{2}ab \cdot \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cdot \cos \beta + \cos \alpha \cdot \sin \beta$$

$$\sin(\alpha - \beta) = \sin \alpha \cdot \cos \beta - \cos \alpha \cdot \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cdot \cos \beta - \sin \alpha \cdot \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cdot \cos \beta + \sin \alpha \cdot \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin 2\alpha = 2 \sin \alpha \cdot \cos \alpha$$

$$\bar{x} = \frac{\sum_{i=1}^n x_i}{n}$$

$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$