Western Cape Government

FOR YOU

Education

EDUCATION DISTRICT

MATHEMATICS
GRADE 12

PAPER 1
MAY/JUNE 2026

MARKS: 150

TIME: 3 hours

This paper consists of 8 pages and an information sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of **8** questions.
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. An information sheet, with formulae, is included at the end of the question paper.
9. Number the answers correctly according to the numbering system used in this question paper.
10. Write legibly and present your work neatly.

QUESTION 1

1.1 Solve for x:

1.1.1 $3x^2 - 2x = 0$ (3)

1.1.2 $x^2 - 7x = -3$ (Correct to TWO decimal places) (4)

1.1.3 $(x-1)(x-4) \geq 10$ (4)

1.1.4 $x = 1 + \sqrt{x+5}$ (4)

1.2 Imizamo Yethu Secondary School sells two types of tickets for a talent show:

- Adult tickets (x) cost R30
- Children's tickets (y) cost R10

The total amount collected from ticket sales is R220 on the first day. The number of children's tickets sold is four more than the square of the number of adult tickets. Calculate the number of adult and children's tickets sold on day one? (6)

1.3 If it is given that $P^{\frac{2}{k}} = 3$; $P^{\frac{4}{y}} = 2$ and $P^{\frac{2}{x}} = 12$.

Prove that $x = \frac{ky}{4k+y}$. (4)

[25]

QUESTION 2

2.1 The first four terms of a quadratic pattern are: $-1\,;4\,;13\,;26$.

2.1.1 Determine the next term of the quadratic pattern. (1)

2.1.2 Determine the general term of the quadratic pattern in the form $T_n = an^2 + bn + c$. (4)

2.1.3 Which term in the pattern has a value of 2413? (3)

2.2 The given sequence below has four terms, such that the first three terms, T_1 ; T_2 and T_3 form an arithmetic sequence and the last three terms T_2 ; T_3 and T_4 form a geometric sequence:

$$6\ ;\ a\ ;\ b\ ;\ 16$$

Calculate the values of a and b. (5)

[13]

QUESTION 3

3.1 Given the geometric sequence: $-\frac{1}{9} : p\ ;\ -1\ ; ...$

3.1.1 Calculate the possible values of p. (3)

3.1.2 If $p = \frac{1}{3}$, calculate the 11^{th} term of the sequence. (3)

3.1.3 Write the sum of the first 16 positive terms of the sequence in sigma notation. (3)

3.1.4 Is the geometric series formed in QUESTION 3.1.3 convergent? Give reasons for your answer. (2)

3.2 In a certain geometric series, the constant ratio is 3, the first term is 1 and $T_n = t$.

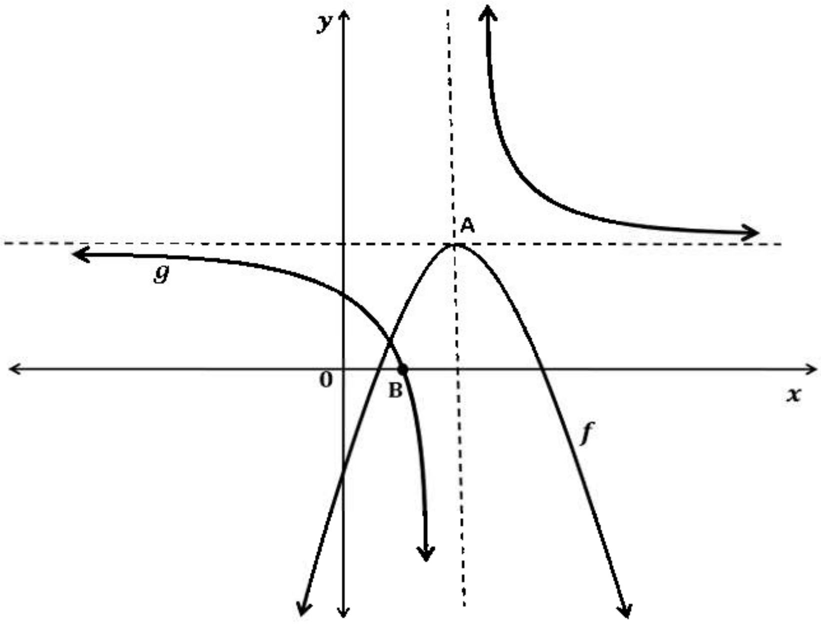
Express S_n in terms of t. (4)

[15]

QUESTION 4

4.1 Sketched below is the parabola f, with equation $f(x) = -x^2 + 6x - 5$ and a hyperbola g, with equation $(y - k)(x - m) = 4$.

- A, the turning point of f, lies at the point of intersection of the asymptotes of g.
- $B(2\,;0)$ is the x- intercept of g.



4.1.1 Show that the coordinates of A are $(3\,;4)$. (2)

4.1.2 Write down the range of f. (1)

4.1.3 Determine the values of k and m. (3)

4.1.4 Determine the equation of the vertical asymptote of the graph of h if $h(x) = g(x + 3)$. (1)

4.1.5 Determine the equation of the tangent to f at $x = 1$, in the form $y = mx + c$. (4)

4.1.6 For which value(s) of p will $f(x) = p$ have roots of opposite signs? (2)

4.1.7 Write down the values of x for which $f(x).g'(x) \leq 0$. (3)

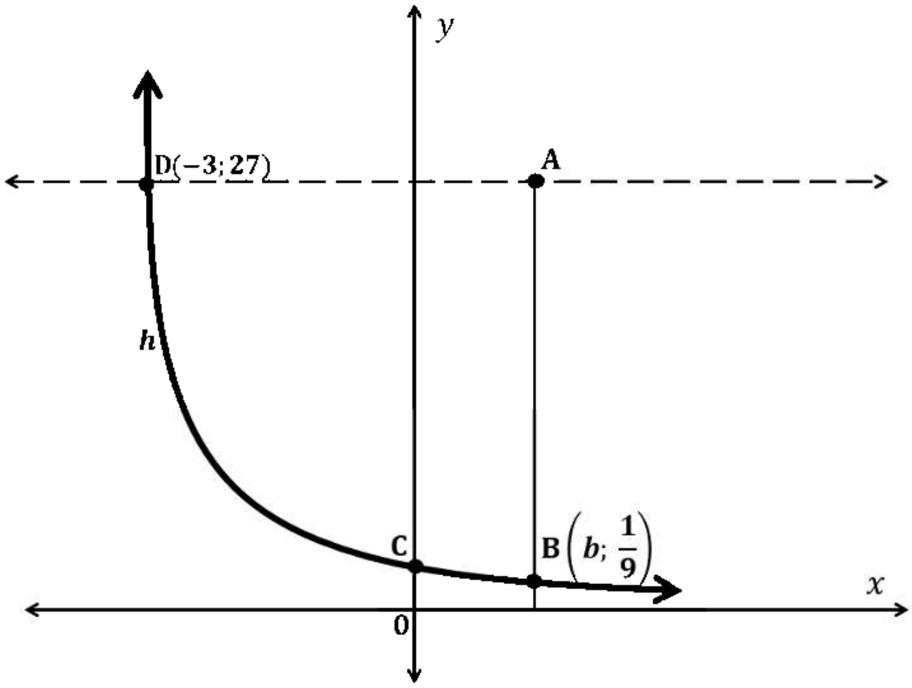
4.1.8 Determine the minimum value of $t(x) = 3^{-f(x)+3}$. (2)

4.2 Draw a sketch graph of $y = ax^2 + bx + c$, where $a < 0$, $b < 0$, $c < 0$ and $ax^2 + bx + c = 0$ has two solutions that are equal. (4)

[22]

QUESTION 5

Sketched below is the graph of $h(x) = a^x$, $a > 0$. The point C is the y-intercept of h. The points D$(-3; 27)$ and B $\left(b; \frac{1}{9}\right)$ lie on h.



5.1 Write down the equation of the asymptote of h. (1)

5.2 Calculate the value of a. (2)

5.3 Write down the coordinates of C. (1)

5.4 Determine the equation of h^{-1} in the form $y = \cdots$ (2)

5.5 Write down the domain of h^{-1}. (1)

5.6 Determine the range of $p(x)$ if $p(x) = -h(x) + 3$. (2)

5.7 A is a point such that AB ∥ y-axis and AD ∥ x-axis. Calculate the size of $\text{A}\hat{\text{D}}\text{B}$. (5)

[14]

QUESTION 6

6.1 Mahle's VW Polo costs R269 000 in 2020. Calculate the book value of the VW Polo after 4 years if it depreciates at 11% p.a. according to the straight-line method. (2)

6.2 At what annual percentage interest rate, compounded monthly, should a lump sum be invested in order for it to double in 6 years? (4)

6.3 Kabelo invests R30 000 in a Bitcoin savings account offering an interest rate of 14.5% p.a, compounded quarterly. The platform charges a 3% withdrawal fee on the final amount when he withdraws after 18 months.

6.3.1 Calculate the investment amount Kabelo received after 18 months. (4)

6.3.2 Calculate the effective annual interest rate of the nominal rate offered. (2)

6.4 Mandy made an initial deposit of R25 000 into an investment account with an interest rate of 6,3% p.a compounded quarterly. After 2 years the interest rate changes to 6,9% p.a, compounded monthly. Four years after her initial deposit, Mandy withdrew R4 000 from her investment. How much will her investment be worth after 7 years? (4)

[16]

QUESTION 7

7.1 Determine $f'(x)$ from first principles if $f(x) = -2x^2 + 6$ (5)

7.2 Determine:

7.2.1 $D_x[x^3 + 3x^2 - 6x + 5]$ (3)

7.2.2 $m'(x)$ if $m(x) = \frac{1}{x} + \frac{3x}{4}$ (3)

7.2.3 $f'(x)$ if $f(x) = \frac{x^3-27}{x^2-3x}$ (4)

7.2.4 $\frac{dx}{dy}$ if: $\sqrt[3]{y}.x = 2y^2 + 3$ (5)

7.3 Given: $g(x) = bx^2, x > 0$
Determine the value of b if it is given that $g'(3) = g^{-1}\left(\frac{9}{2}\right)$. (5)

[25]

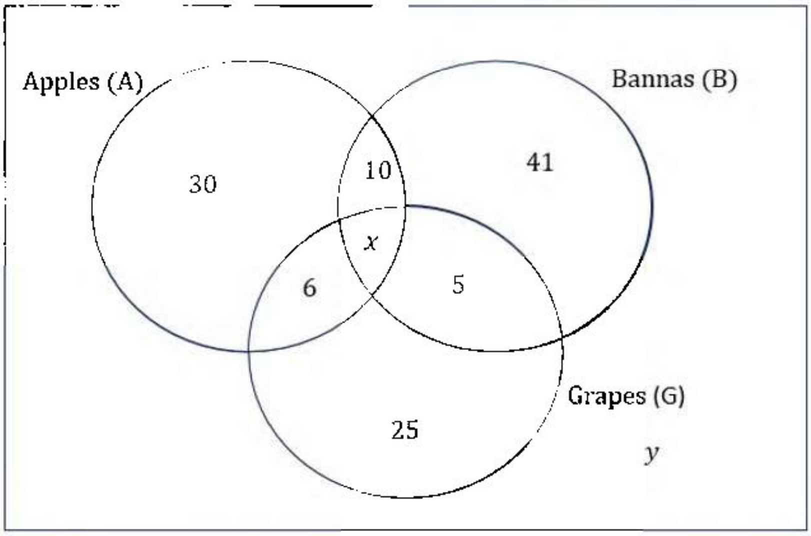
QUESTION 8

8.1 Two events A and B are such that:

- P(A) = 0,35
- P(A or B) = 0,75

Determine P(B) if A and B are mutually exclusive. (3)

8.2 A survey was conducted among 130 Grade 12 learners to establish which fruit they prefer to eat while they are studying for Mathematics examination. The results were summarised in the Venn diagram below. However, some information is missing.



8.2.1 If 29 learners prefer at least two types of fruits, calculate the value of x and y. (4)

8.2.2 Determine the probability that a learner who does not eat grapes will either have another fruit or no fruit while studying for their Mathematics examination. (3)

8.3 Events D and C are independent such that $P(D) = P(C) = x$ and $P(D \text{ or } C) = 0{,}84$. Determine the numerical value of x. (5)

8.4 A bag contains only two colours of tennis balls, blue and yellow, in the ratio 1: 3. Two balls are picked at random, one after the other, without replacement. Calculate the number of balls in the bag given that the probability of picking first a blue ball and second a yellow ball is equal to $\frac{1}{5}$. (5)

[20]

TOTAL: 150

INFORMATION SHEET

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

$A = P(1 + ni)$ $\quad A = P(1 - ni)$ $\quad A = P(1 - i)^n$ $\quad A = P(1 + i)^n$

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

$T_n = ar^{n-1}$ $\quad S_n = \frac{a\left(r^n - 1\right)}{r - 1}\ ;\ r \neq 1$ $\quad S_\infty = \frac{a}{1-r};\ -1 < r < 1$

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

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

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $\quad M\left(\frac{x_1 + x_2}{2}; \frac{y_1 + y_2}{2}\right)$

$y = mx + c$ $\quad y - y_1 = m(x - x_1)$ $\quad m = \frac{y_2 - y_1}{x_2 - x_1}$ $\quad m = \tan\theta$

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

In ΔABC: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

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

$\textit{oppervlakte}\ \Delta ABC = \frac{1}{2}ab.\sin C$

$\sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$ $\quad \sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta$

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

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

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

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

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

$P(A) = \frac{n(A)}{n(S)}$ $\quad P(A \text{ of } B) = P(A) + P(B) - P(A \text{ en } B)$