KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PROVINCIAL STANDARDISED ASSESSMENT

GRADE 12

MATHEMATICS P1

JUNE 2026

MARKS: 150

TIME: 3 hours

This question paper consists of 10 pages and an information sheet.

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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 in the ANSWER BOOK provided.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. If necessary, round off answers correct to **TWO decimal places, un**less stated otherwise.
9. Write neatly and legibly.

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QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 - 5x - 24 = 0$ (3)

1.1.2 $4x(x+3) = 13$ (correct to TWO decimal places). (4)

1.1.3 $22x - 121 < x^2$ (4)

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

1.2 Solve simultaneously for x and y:

$$2^{x-y} = 8$$
$$x^2 - xy = 2y^2 + 7$$ (6)

1.3 It is given that $P^{\frac{1}{x}} = 2$, $P^{\frac{1}{y}} = 3$ and $P^{\frac{1}{z}} = 6$.

Prove that $z = \dfrac{xy}{x+y}$. (3)

[24]

QUESTION 2

2.1 Given the sequence: $1\ ;\ -3\ ;\ x\ ;\ \ldots$

Write down the value of x if the sequence is.....

2.1.1 arithmetic. (1)

2.1.2 geometric. (1)

2.2 Given a geometric sequence: $\frac{1}{64}\ ;\ \frac{1}{128}\ ;\ \frac{1}{256}\ ;\ \ldots$

2.2.1 Determine the general term, T_n, of the sequence. (2)

2.2.2 Which term of the sequence is equal to $\frac{1}{8192}$? (3)

2.2.3 Explain why the series $\frac{1}{64} + \frac{1}{128} + \frac{1}{256} + \ldots.$ is convergent. (1)

[8]

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QUESTION 3

3.1 Consider the quadratic number pattern: $-233\ ;\ -191\ ;\ -153\ ;\ -119\ ;\ \ldots$

3.1.1 Determine the values of the 5^{th} and the 6^{th} terms of the sequence. (2)

3.1.2 Determine the general term, T_n, of the sequence. (4)

3.1.3 Calculate the maximum value for a term of this sequence. (4)

3.2 Given $\sum_{k=p}^{18}(7k+5)=1230$

3.2.1 Write down the first and the last terms of the series. (2)

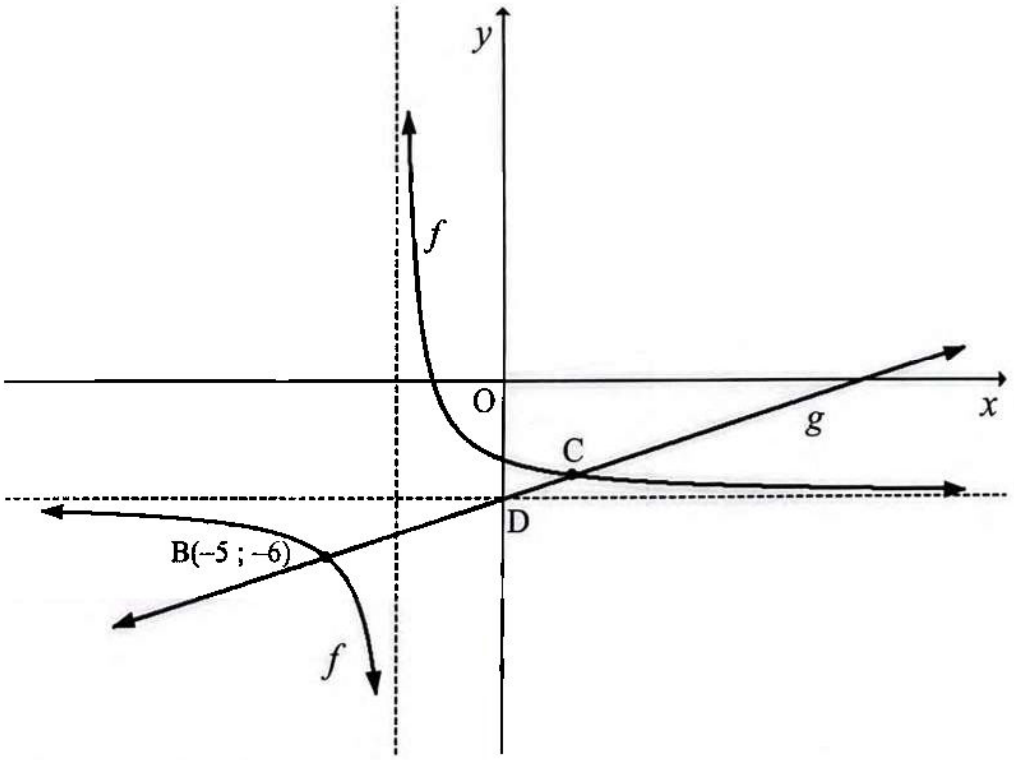
3.2.2 Hence, or otherwise, determine the value of p. (5)

[17]

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QUESTION 4

The graphs of $f(x)=\frac{a}{x+3}+q$ and $g(x)=mx-4$ are drawn below. The graphs of f and g intersect at $B(-5\,;-6)$ and C. The horizontal asymptote of f goes through the y-intercept of g.



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

4.2 Determine the values of a and m. (4)

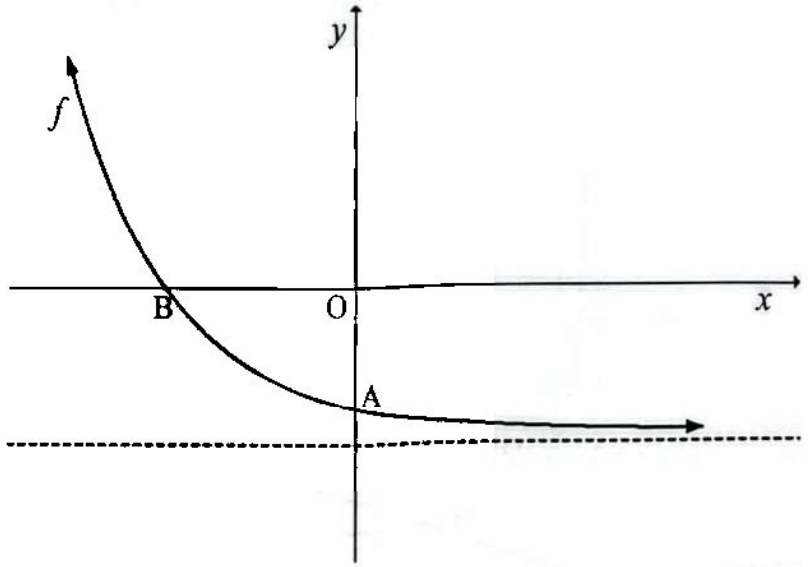
4.3 Determine the x-coordinate of C. (3)

4.4 For which values of x will $f(x-3)-g(x-3)\geq 0$? (3)

[12]

QUESTION 5

The graph of $f(x)=\left(\frac{1}{9}\right).3^{-x}-9$ is drawn below. A is the y-intercept and B the x-intercept.



5.1 Write down the range of f. (1)

5.2 Determine the coordinates of A and B. (4)

5.3 f is translated to become $g(x)=\left(\frac{1}{3}\right)^{x}$. **Describe** the translation. (3)

5.4 Determine the equation of g^{-1}, the inverse of g, in the form of $y=....$ (2)

5.5 Draw a sketch graph of g^{-1}, indicating any intercepts with the axes. (2)

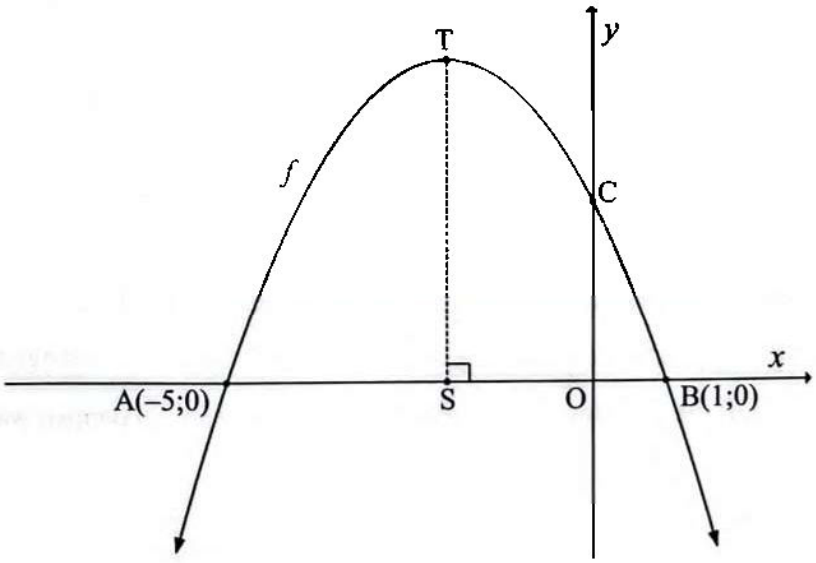
5.6 Determine the values of x for which $-2\leq g^{-1}(x)\leq 0$. (3)

[15]

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QUESTION 6

The graph of $f(x) = -2x^2 - 8x + 10$ is drawn below. $A(-5;0)$ and $B(1;0)$ are the x-intercepts and C the y-intercept. T is the turning point of f and TS is drawn perpendicular to the x-axis, with S on the x-axis.



6.1 Calculate the length of:

6.1.1 AB (1)

6.1.2 OC (1)

6.1.3 TS (3)

6.2 Solve for k if $f(x) + k = 0$ has 2 real roots with the same sign. (3)

6.3 For which value(s) of x will $f(x+t) = f(x-t)$ for all values of t? (1)

[9]

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QUESTION 7

7.1 Convert an interest rate of 8,5% p.a., compounded quarterly, to an effective interest rate. (3)

7.2 Jaden bought a car for R380 000. Depreciating at an interest rate of k % p.a. on a reducing balance, the book value of the car was R124 518,50 after 5 years.

7.2.1 Calculate the value of k. (3)

7.2.2 Use the grid provided in the ANSWER BOOK to draw a sketch graph representing the depreciation of the car. (1)

7.2.3 After how many years will the book value of the car be R0? (1)

7.3 Mrs Zwane deposited R5000 into a bank account at an interest rate of 7,25% p.a., compounded monthly. After $2\frac{1}{2}$ years of investment, the interest rate changed to 8% p.a. How much will the investment be worth 7 years after the initial deposit was made? (4)

[12]

QUESTION 8

8.1 Determine $f'(x)$ from first principles if $f(x)=\frac{4}{x}$. (5)

8.2 Determine the following:

8.2.1 $\frac{dy}{dx}$ if $y=x^2\left(6x^3-7\right)$ (3)

8.2.2 $\mathrm{D}_x\left(\frac{3}{2x^4}+5\sqrt{x^3}\right)$ (4)

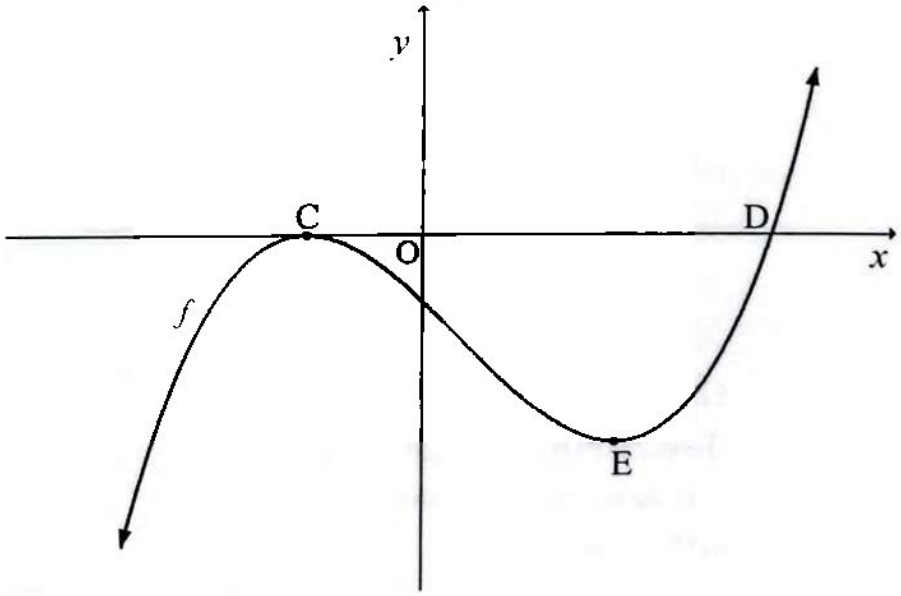
8.3 Determine the value of t if the line $y=-2x+t$ is a tangent to the curve $f(x)=6+4x-x^2$. (5)

[17]

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QUESTION 9

9.1 The graph of $f(x)=x^3-x^2-5x-3$ is sketched below. The x-intercepts of f are at C and D. C and E are the turning points of f.



9.1.1 Calculate $f(-1)$. (1)

9.1.2 Determine the x-coordinate **of D.** (3)

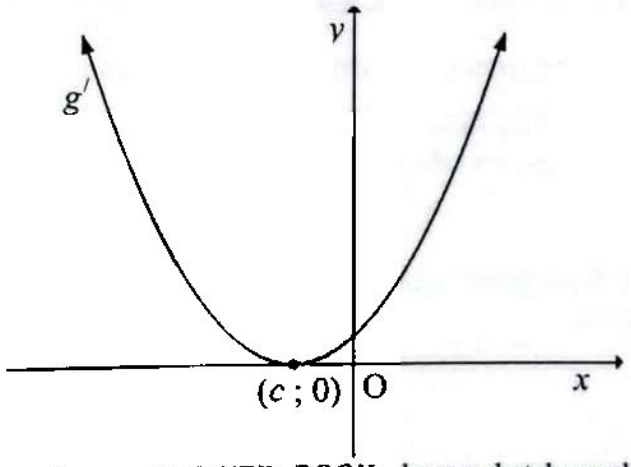
9.1.3 Determine the x-coordinate of E. (4)

9.1.4 For which values of x will:

(a) f be concave up? (3)

(b) $f'(x).f(x)<0$? (3)

9.2 The graph of g' is sketched below. g' is a parabola that touches the x-axis at $(c\,;0)$.



On the system of axes in your ANSWER BOOK, draw a sketch graph of g.
No coordinates of points on the graph or intercepts with the axes need to be shown. (2)
[16]

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QUESTION 10

A ball is thrown into the air and its height, h, above the ground after t seconds is given by $h(t) = -5t^2 + 22t + 4$ metres.

10.1 Write down the initial height of the ball. (1)

10.2 Determine the maximum height of the of the ball above the ground. (4)

10.3 Determine the rate of change in velocity of the ball at any given time. (2)

[7]

QUESTION 11

11.1 For events A, B and C it is given that:

- $P(A) = 0,2$, $P(B) = 0,6$ and $P(C) = 0,7$
- A and B are mutually exclusive
- A and C are independent

11.1.1 What is the probability that A and B will occur simultaneously? (1)

11.1.2 Calculate $P(A \text{ or } C)$. (3)

11.2 A survey was done among 45 grade 12 learners in Success High School on their favourite games. The results are given below:

- 22 learners like Chess
- 24 learners like Morabaraba
- 18 learners like Drie stokkies
- 5 learners like all the games
- 3 learners like only Chess
- 38 leaners like at least one of the games
- 11 learners like Drie stokkies and Chess

11.2.1 Determine the number of learners who do not like any of these games. (1)

11.2.2 If x learners like Morabaraba and Drie stokkies, but not Chess, draw a Venn diagram to represent the information given above. (4)

11.2.3 Solve for x. (2)

11.2.4 What is the probability that a learner chosen at random likes exactly two of these games? (2)

[13]

TOTAL: 150

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INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

In ΔABC:

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

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

$$\text{area } \Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$

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