GAUTENG PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

PREPARATORY EXAMINATION
2026

NAME OF SCHOOL:	
CANDIDATE'S NAME:	

DATE:	D	D	M	M	2	0	2	6	BOOK NUMBER		OF	BOOKS
TEACHER:									PAPER NUMBER	1		
SUBJECT:	MATHEMATICS (10611)											

ANSWER ALL THE QUESTIONS IN THE QUESTION PAPER.

	MARKER				MODERATOR(S)					
QUESTION	MARKS			MARKER'S INITIALS	MARKS			MODERATORS' INITIALS		
1	0				0					
2	0				0					
3	0				0					
4	0				0					
5	0				0					
6	0				0					
7	0				0					
8	0				0					
9	0				0					
10	0				0					
11	0				0					
				TOTAL						

TIME: 3 hours

MARKS: 150

26 pages + 1 information sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions. Answer ALL the questions in the spaces provided for answers.

2 Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answers.

3. Answers only will NOT necessarily be awarded full marks.

4. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.

5. If necessary, round-off answers to TWO decimal places, unless stated otherwise.

6. Diagrams are NOT necessarily drawn to scale.

7. An INFORMATION SHEET with formulae is included at the end of the question paper.

8. No pages may be torn from the question paper.

9. Candidates may not retain a question paper or remove it from the examination room. Question papers must be returned to the invigilator at the end of the examination session.

10. Answers must be written in black/blue ink as distinctly as possible. DO NOT write in the margins.

11. Indicate the questions you have answered by drawing a circle around the relevant numbers on the front cover of the question paper where marks are to be recorded.

12. Draw a neat line through any work/rough work that must NOT be marked.

13. In the event that you use the additional space provided:

    13.1 Write down the number of the question.

    13.2 Leave a line open and rule off after your answer.

14. Write neatly and legibly.

QUESTION 1

1.1	Solve for x:	
1.1.1	$3x^2 - x + 2 = x + 2$	(3)
1.1.2	$7x^2 - x - 2 = 0$ (Correct to TWO decimal places)	(3)
1.1.3	$\left(\frac{x}{2}\right)^2 - 5x + 24 \leq 0$	(5)

1.1.4 $2^{-x+2} - 2^{-x} = 48$ (3)

1.2 Solve for x and y simultaneously:

$\sqrt{2x+1} - 2 = y$ and $x = 4y$ (6)

1.3	Given the quadratic equation $ax^2 + bx + c = 0$ with solutions: $x = 7$ and $x = \frac{5 - \sqrt{25 + 56a}}{2a}$	
1.3.1	Determine the values of a, b and c.	
		(5)
1.3.2	Hence determine the other solution to the quadratic equation.	
		(1)

[26]

QUESTION 2

Given the number pattern: $7\sin30°$; 7 ; $23\sin30°$; 17 ; …

2.1 Show that the pattern is quadratic.

(3)

2.2 The n^{th} term of the number pattern can be written as $T_n = \frac{1}{2}n^2 + pn + q$.

Show that $p = 2$ and $q = 1$.

(2)

2.3 Determine which term of the sequence will have a value of 49.

(4)

2.4	A Grade 12 learner claims that the minimum value of this pattern can be obtained by determining the turning point of the relevant quadratic function. By using a valid calculation, explain why this learner is incorrect.	
		(3)

[12]

	ADDITIONAL SPACE	

QUESTION 3

3.1	The first three terms of an infinite series are given by: $3+2x+\frac{4}{3}x^2+...$	
3.1.1	Determine the value(s) of x for which the series is convergent.	
		(2)
3.1.2	If $x=\frac{1}{2}$, determine S_∞.	
		(3)
3.2	Two different series, A and B are given as follows: $A_m=\sum_{p=1}^{m}(7p-22)$ and $B_n=\sum_{k=1}^{n}24\left(\frac{3}{2}\right)^k$	
3.2.1	Show that $B_n=72\left[\left(\frac{3}{2}\right)^n-1\right]$.	
		(2)

3.2.2 Given: $A_{18} - B_n = \frac{423}{8}$.

Hence or otherwise, calculate the value of n.

(6)

[13

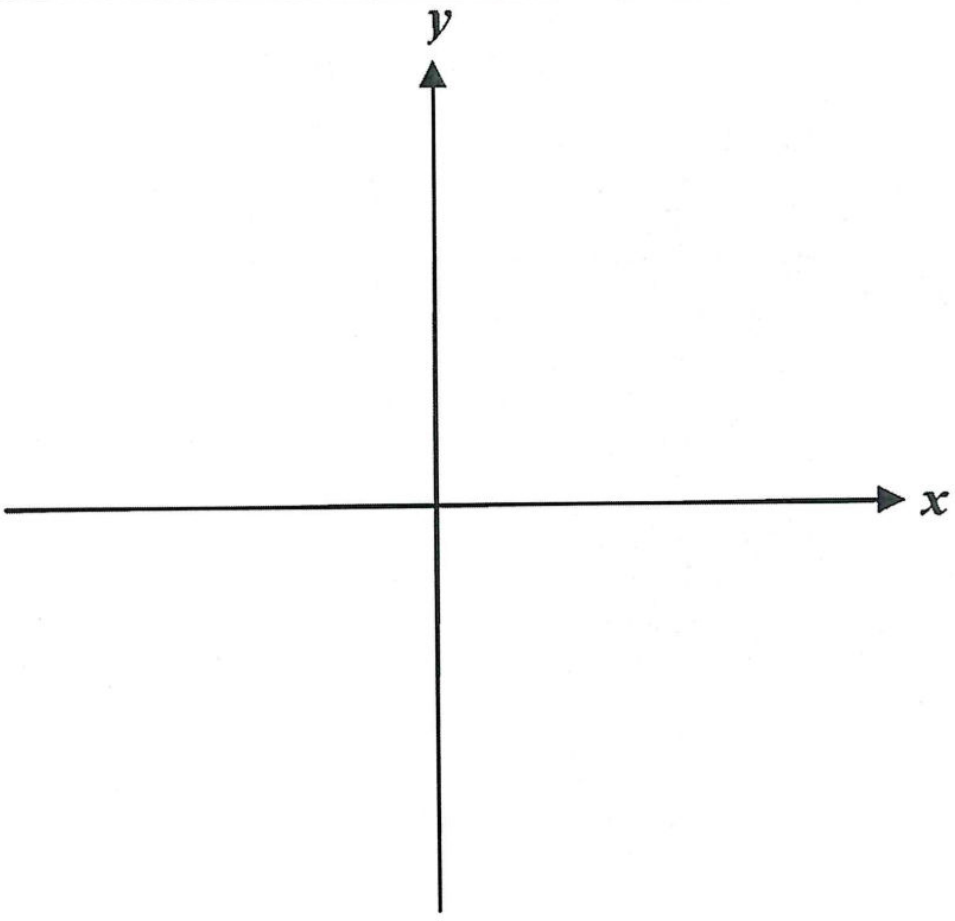
ADDITIONAL SPACE

QUESTION 4

Given $f(x) = q - \dfrac{2}{x+p}$ with the following essential properties:

- $x \in R;\ x \neq 2$
- $y \in R;\ y \neq 3$
- $y = x + t$ is the equation for ONE of the axes of symmetry of f.

4.1	Write down the values of p and q.	
		(2)
4.2	Calculate the value of t.	
		(2)
4.3	f is translated 2 units to the left and 3 units upward to obtain h. Determine the equation of h^{-1}. Write your answer in the form $y = ...$	
		(3)

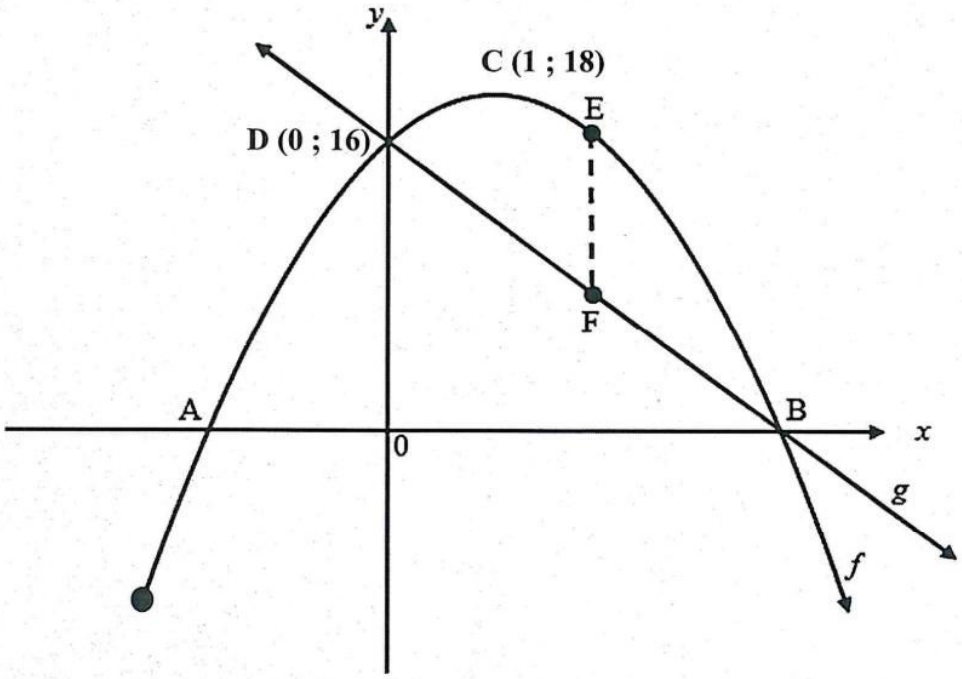
4.4	Given: $g(x) = \log_2 x$	
4.4.1	Write down the equation of g^{-1} in the form $y = ...$	
		(2)
4.4.2	Sketch the graphs of g and g^{-1} on the same set of axes. Clearly indicate the intercepts with the axes, and ONE additional point on each graph.	
		(4)
4.4.3	Write down the value(s) of x for which $x.g(x) \leq 0$.	
		(2)

[15]

QUESTION 5

The graphs of $f(x) = a(x+p)^2 + q$ for $x \geq -4$ and $g(x) = mx + c$ are sketched below.

- Points A and B are the x-intercepts of f.
- C(1 ; 18) is the turning point of f.
- D(0 ; 16) is a point of intersection of f and g.



5.1	Show that the equation of f can be written as $f(x) = -2x^2 + 4x + 16$.	
		(4)
5.2	Calculate the length of AB.	
		(2)

5.3	Determine the equation of g in the form $g(x) = \ldots$	
		(2)
5.4	For which value(s) of x is:	
5.4.1	f increasing?	
		(2)
5.4.2	$f(x).f'(x) < 0$?	
		(2)
5.5	E is a point on f and F is a point on g such that EF is a line drawn parallel to the y-axis. Determine the maximum length of EF.	
		(5)

[17]

	ADDITIONAL SPACE	

QUESTION 6

6.1	The International Union for Conservation of Nature (ICUN) estimates that approximately 39 000 African lions remain in the wild in 2026. If the rate of population growth is estimated to average 18% p.a, in which year can the ICUN expect the African lion population to double?	
		(4)
6.2	Mrs Molefe, a Mathematics teacher, decides to invest in a retirement fund. She plans to retire in 20 years. She makes equal, monthly contributions of R3 200 into the fund which earns interest at 9,75% p.a. compounded monthly.	
6.2.1	Determine how much Mrs Molefe will have in her retirement fund when she retires.	
		(3)

6.2.2 If Mrs Molefe has R2 352 649,68 in her retirement fund when she retires, what percentage of the total investment is interest?

(3)

6.2.3 After settling all her debt, Mrs Molefe plans to purchase a property valued at R1 200 000. She obtains a 20-year home loan (mortgage bond) from a bank at an interest rate of 11,37% p.a., compounded monthly. The loan is to be repaid in equal monthly instalments commencing one month after the loan is granted.

Mrs Molefe can afford monthly repayments of R13 000 from the income generated by her investments. Determine whether she will be able to afford the new property.

(4)

[14]

ADDITIONAL SPACE

QUESTION 7

7.1	Determine $f'(x)$ from first principles if $f(x) = -x + 2x^2$.	(5)
7.2	Determine: $\frac{dy}{dx}$ if $y = 2x^3 - 6x^2 + 1$	(2)

7.3 Given: $f(x)=\frac{\sqrt{x}}{x}-9x$ and $g(x)=-16x$

Determine: $D_x\left[f(x)+\frac{1}{2}g(x)\right]$

(5)

[12]

ADDITIONAL SPACE

QUESTION 8

Consider the function $f(x) = x^3 - ax^2 + bx - 6$ where:

- The graph of f has a point of inflection at $x = 2$ and;
- The gradient of f at $x = -1$ is 26.

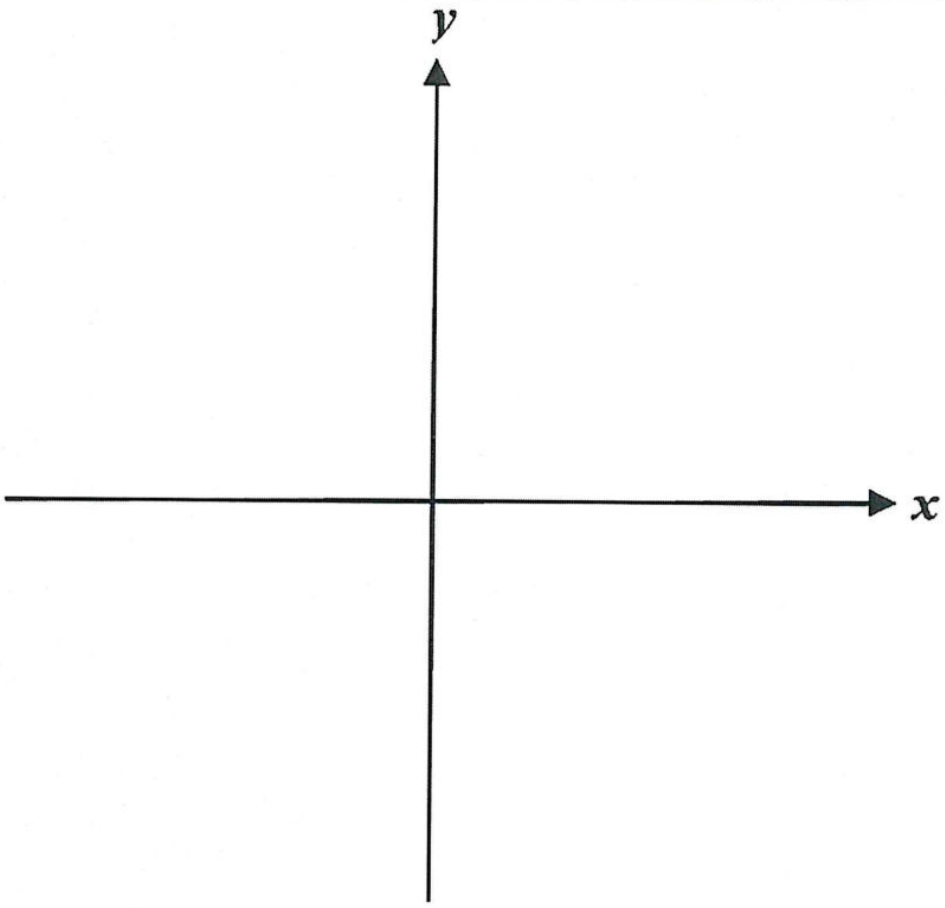
8.1 Show that $a = 6$ and $b = 11$.

(4)

8.2 The graph of f passes through the x-axis at $x = 1$. Determine, showing ALL relevant calculations, the other x-intercepts of f.

(3)

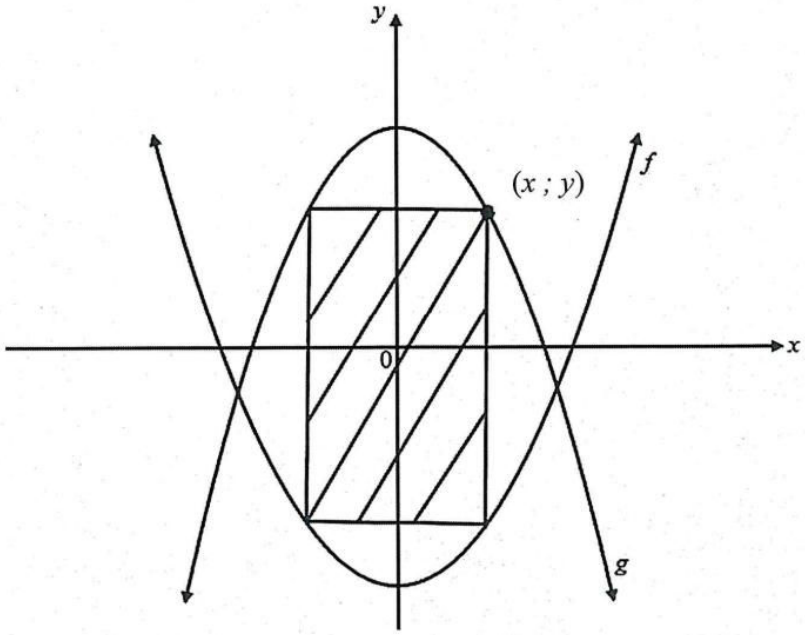
8.3	Determine the x-coordinate of the local maximum of f.	
		(3)
8.4	Describe the concavity of the function at $x = 4$. Support your answer with a valid calculation.	
		(3)

8.5	Sketch the graph of f, clearly indicating ALL intercepts and turning points. (It is NOT necessary to determine the y-coordinates of the turning points).	
		(3)
8.6	A tangent to f is drawn at the y-intercept of the function. Determine the equation of the tangent.	
		(2)

[18]

QUESTION 9

$f(x)=\frac{1}{2}x^2-6$ and $g(x)=-x^2+12$ enclose a rectangle, as shown in the diagram below. The vertical sides of the rectangle lie perpendicular to the x-axis. A point $(x\,;y)$ is given on g.



9.1	Determine the dimensions of the rectangle in terms of x.	(3)
9.2	Hence or otherwise, determine the maximum area of the rectangle.	(5)

[8]

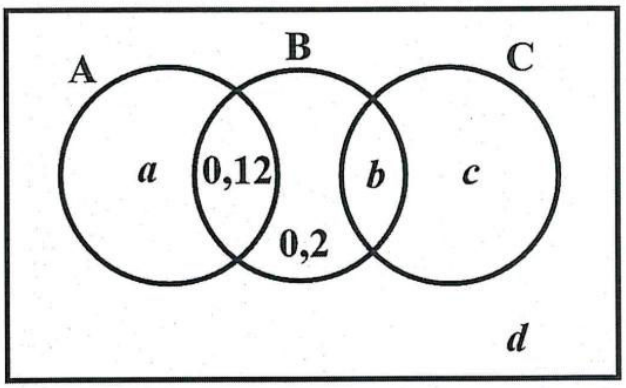
QUESTION 10

Three events A, B and C are given such that:

- B and C are independent.
- A and C are mutually exclusive.
- P(A) = 0,3
- P(B) = 0,4
- P(C) = 0,2
- P(A and B) = 0,12

10.1	Calculate the probability of the following:	
10.1.1	Both A and C occur simultaneously.	
		(1
10.1.2	Both B and C occur simultaneously.	
		(2)

10.2 Using the Venn Diagram given below, determine values for *a*, *b*, *c* and *d*.



(4)

ADDITIONAL SPACE

QUESTION 11

9 members of a school's Representative Council of Learners (RCL) are seated in the front row for the school's photographs.

11.1 Determine the number of ways in which the 9 RCL members can be arranged?

(2)

11.2 The following office bearers/portfolio managers are present at the school's photo session:

- President (P)
- Deputy President (DP)
- Secretary (S) and
- Public Relations Officer (PRO)

11.2.1 Calculate the probability that the President, Deputy President and Secretary will be seated next to each other.

(3)

11.2.2 If the Secretary and Public Relations Officer may NOT sit together, in how many different ways can the RCL members be seated?

(3)

[8]

TOTAL: 150

	ADDITIONAL SPACE	

	ADDITIONAL SPACE	

END

INFORMATION SHEET

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

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

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

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

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

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

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

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

$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\bar{x} = \frac{\sum x}{n}$

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

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

P(A or B) = P(A) + P(B) – P(A and B)

$\hat{y} = a + bx$

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