Province of the
EASTERN CAPE
EDUCATION

NATIONAL SENIOR CERTIFICATE

GRADE 12

JUNE 2026

MATHEMATICS P1

MARKS: **150**

TIME: **3 hours**

* J M A T H E 1 *

This question paper consists of 11 pages, including 1 information sheet and an answer book of 26 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 in the SPECIAL ANSWER BOOK provided
3. Clearly show ALL calculations, diagrams, graphs, et cetera which you have used in determining the 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. 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 neatly and legibly.

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QUESTION 1

1.1 Solve for x:

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

1.1.2 $3x^2-5x-4=0$ (correct to TWO decimal places) (3)

1.1.3 $3x^2-8x\geq 0$ (4)

1.1.4 $\frac{3}{2x}=\sqrt{\frac{6}{x}}-1$ (5)

1.2 Solve simultaneously for x and y, if:

y is one less than, 3 times x
$x^2+2xy=3y^2-7$ (6)

1.3 Given that: $x+y=4$ and $xy=1$. Without solving for x and y, determine a value for P, if $P=x^3+y^3$. (4)
[24]

QUESTION 2

2.1 $p+3$; p ; $p-2$ are the first three terms of a geometric sequence.

2.1.1 Determine the value(s) of p. (3)

2.1.2 Show that the sequence converges. (2)

2.1.3 Calculate S_∞ (2)

2.2 Given the following series: 2 + 6 + 18 + . . . + 13 122

2.2.1 Write the series in sigma notation. (3)

2.2.2 Calculate the sum. (2)
[12]

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QUESTION 3

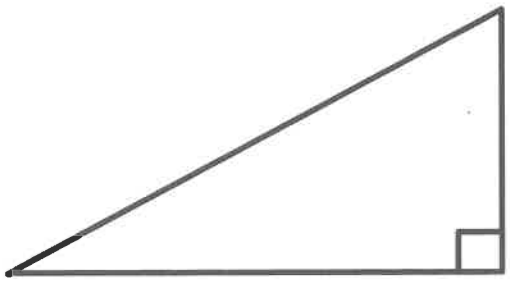
3.1 The following information of a quadratic pattern is given:

- General term of first differences, $d_n = 6n - 3$.
- $T_1 = 1$ (the first term of the quadratic number pattern)

3.1.1 Determine the values of the second and third terms of the quadratic number pattern. (2)

3.1.2 Determine the general term, T_n of the quadratic number pattern. (3)

3.2 The lengths of the sides of a right-angled triangle form an arithmetic sequence. If the second longest side has a length of 12 cm, determine the lengths of the other side and the hypotenuse.



(4)

3.3 Evaluate: $\sum_{p=5}^{20}(p+1)^2 - \sum_{p=5}^{20} p^2$ (4)

[13]

QUESTION 4

Given the function $f(x) = \frac{6}{x-4} + 3$, where $x \in \mathbb{R}$

4.1 Write down the domain of f. (1)

4.2 Write down the equation of the horizontal asymptote of f. (1)

4.3 Determine the x- and y-intercepts of f. (3)

4.4 Sketch the graph of $f(x)$, showing the asymptotes and the intercepts with the axes. (3)

4.5 For which values of x is $f(x) \leq 0$? (2)

[10]

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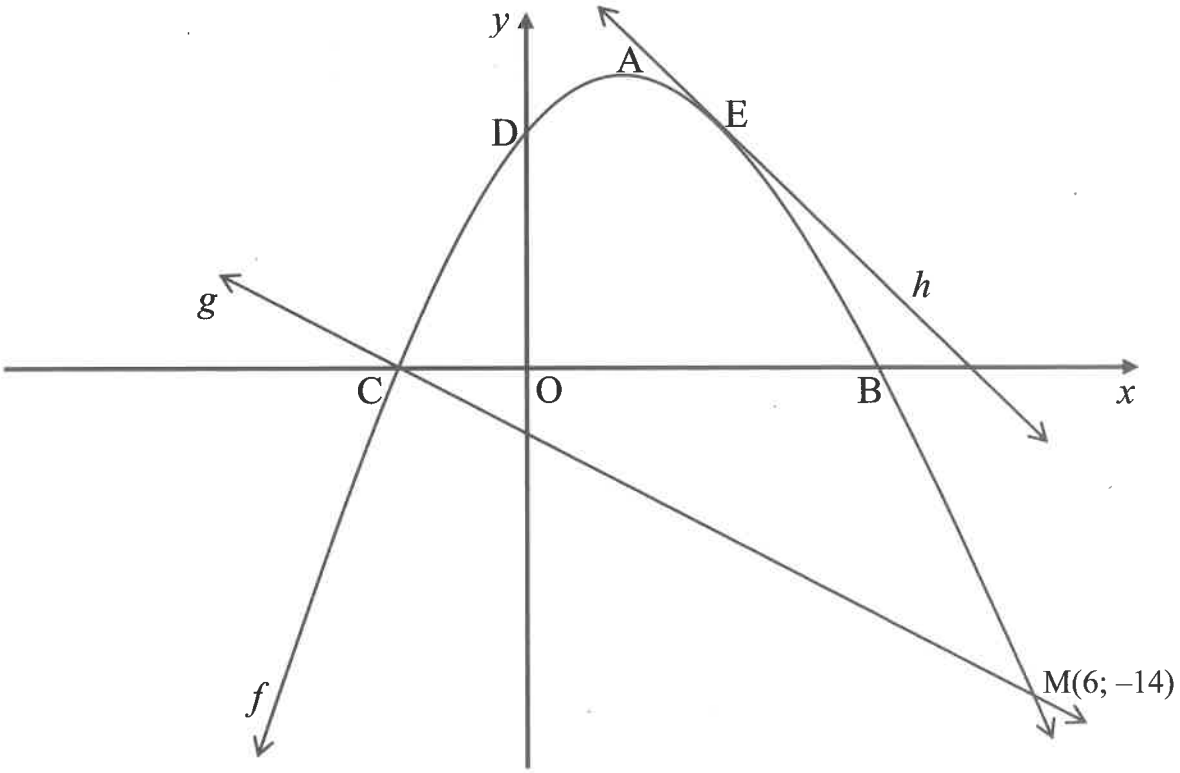
QUESTION 5

The sketch below represents the graphs of $f(x) = -2x^2 + 8x + 10$ and $g(x) = mx + c$. A is the turning point of $f(x)$. B, C and D are the intercepts with the axes. E is the point where the tangent, h touches the graph of $f(x)$. M(6 ; –14) is the point of intersection of f and g.



5.1 Determine:

5.1.1 The coordinates of A, the turning point of f (2)

5.1.2 The length of BC (3)

5.2 Determine the equation of g, in the form $y = \ldots$ (2)

5.3 h, the graph of $y = -8x + k$, is a tangent to f at E. Determine the value of k. (4)

5.4 Determine the new equation of f, if the graph of f is moved 1 unit to the left. (2)

5.5 For which values of p will the equation $-2x^2 + 8x + 3 = p$, have non-real roots? (2)

[15]

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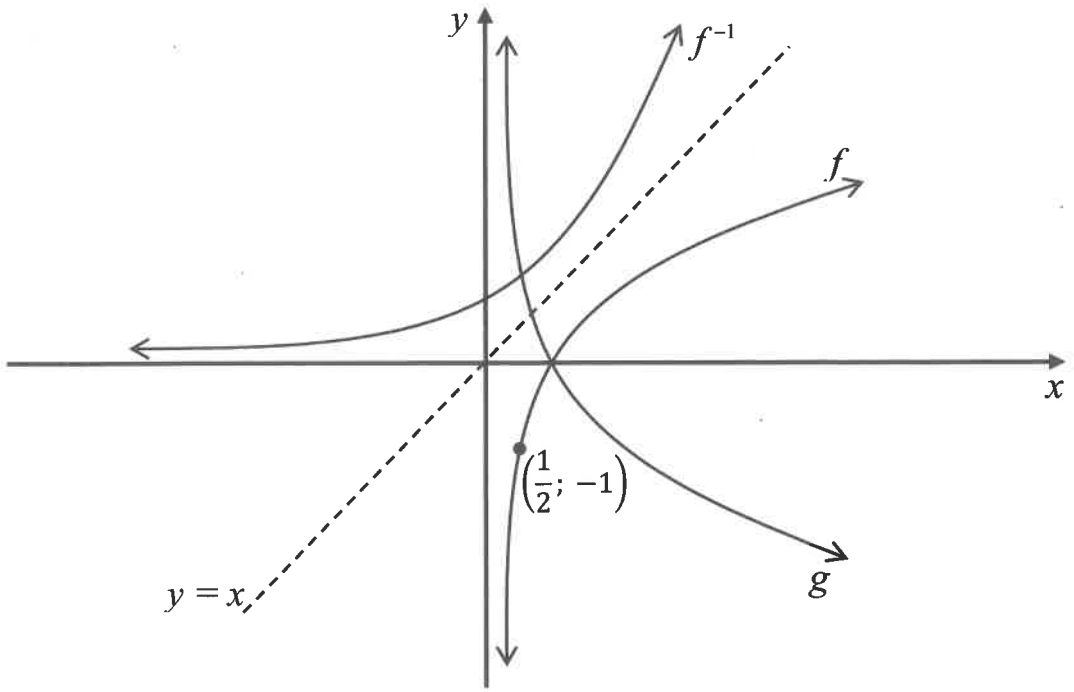
QUESTION 6

The graphs of $y = f(x) = \log_a x$, f^{-1} and g are drawn below. f passes through the point $\left(\frac{1}{2}; -1\right)$.



6.1 Determine the value of a. (2)

6.2 Write down the equation of f^{-1}, in the form $y = ...$ (2)

6.3 g is the reflection of f in the x-axis.

6.3.1 Write down the equation of g. (1)

6.3.2 Is g an increasing or decreasing function? (1)

6.4 For which values of x, is $f(x) < -1$? (2)
[8]

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QUESTION 7

7.1 Tom deposits R5 000 into a savings account. The interest rate is 9% p.a. compounded monthly. How long, in years, will it take for the savings to double? (4)

7.2 Calculate the monthly nominal interest rate if an investment earns interest at 12,13% p.a., compounded annually. (3)

7.3 Kim made an initial deposit of R20 000 into an investment account that paid interest at the rate of 7,2% p.a., compounded quarterly. After 2 years the interest rate changed to 7,8% p.a., compounded monthly. Four years after her initial deposit, Kim withdrew Rx from her investment. After 7 years the investment is worth R30 871,61.

7.3.1 Calculate how much Kim had in her investment account 2 years after the initial deposit was made. (2)

7.3.2 How much money did she withdraw? , i.e. determine the value of x (to the nearest rand). (5)

[14]

QUESTION 8

8.1 Determine $f'(x)$, from first principles, if $f(x) = 5x^2 + 1$. (4)

8.2 Determine:

8.2.1 $\frac{dy}{dx}$, *if* $y = 2x^3 - \frac{x}{5}$ (2)

8.2.2 $D_x\left[\frac{\sqrt{x^5}+5}{x^2}\right]$ (4)

8.3 Given that $h(x) = 3x^2 + 4x$, determine the equation of the tangent to h at point $T(-1; y)$. (5)

[15]

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QUESTION 9

Given: $f(x) = x^3 - 3x^2 - 9x - 5$.
Answer the questions that follow.

9.1 Show that $(x+1)$ is a factor of $f(x)$. (1)

9.2 Determine the x- and y-intercepts of f. (3)

9.3 Determine the coordinates of the turning points of f. (3)

9.4 Sketch the graph of f. Clearly indicate the coordinates of the turning points and the intercepts with the axes. (3)

9.5 For which values of x, is:

9.5.1 f increasing? (2)

9.5.2 f concaved up? (2)

9.5.3 $f(x).f'(x) > 0$? (2)
[16]

QUESTION 10

Given: $h(x) = -x^3 + bx^2 + cx$, with $\text{P}\left(-1\,;-\frac{7}{2}\right)$ a turning point of h. The graph of h passes through the origin. Determine the values of b and c. (Show ALL your working) **[7]**

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QUESTION 11

11.1 Given that:

- P(A) = 0,63
- P(B) = 0,25
- P(A or B)′ = 0,2775

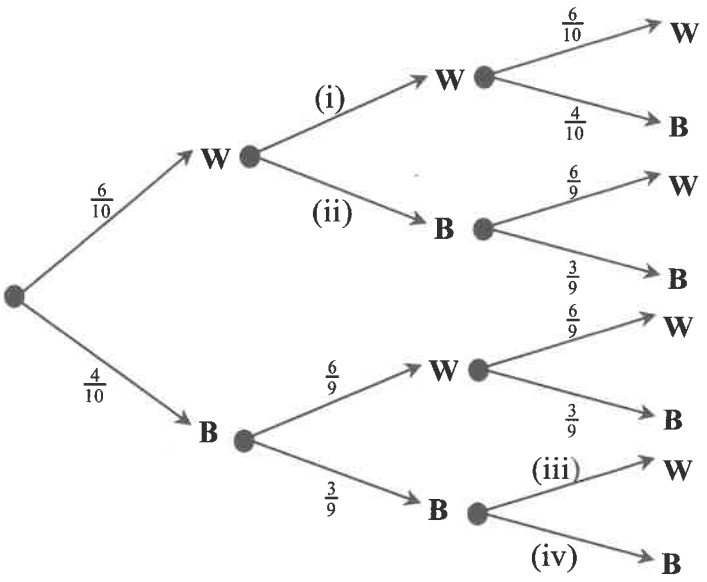
Give answers correct to FOUR decimal places, where necessary.

11.1.1 Determine the probability that at least one of the events will take place. (1)

11.1.2 Are the events A and B mutually exclusive? Support your answer. (2)

11.1.3 Are the events A and B independent? Show your working to justify your conclusion. (2)

11.2 A bag contains 6 white balls and 4 blue balls. Three balls are taken consecutively out of the bag. Each time a white ball is found, it is put back in the bag. When a blue ball is found, it is placed aside. The tree diagram represents the process.



11.2.1 Fill in the missing probabilities on the branches, (i), (ii), (iii) and (iv) above. (2)

11.2.2 Determine the following probabilities:

(a) Two blue balls are selected (2)

(b) At least one of the balls selected is blue (2)

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11.3 P(A and B); P(B); P(only A), in that order, forms a arithmetic sequence, with P(A or B)′ = d, the common difference.

11.3.1 Represent the above information in a Venn diagram. (3)

11.3.2 Hence, or otherwise, determine P(only A). (2)
[16]

TOTAL: 150

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INFORMATION SHEET: MATHEMATICS

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

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

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

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

$-1 < r < 1$

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

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

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

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

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

In Δ ABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc.\cos A \qquad area\,\Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

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

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

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