



KWAZULU-NATAL PROVINCE
EDUCATION
REPUBLIC OF SOUTH AFRICA

**PROVINCIAL STANDARDISED
ASSESSMENT**

GRADE 12

MATHEMATICS P1
PREPARATORY EXAMINATION
SEPTEMBER 2026

MARKS: 150

TIME: 3 hours

**This question paper consists of 11 pages and
an information sheet.**

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 10 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, unless stated otherwise.
9. Write neatly and legibly.

QUESTION 1

1.1 Solve for x :

$$1.1.1 \quad 2x - 4x^2 = 0 \quad (3)$$

$$1.1.2 \quad x^2 - 5 = -8x \text{ (correct to TWO decimal places).} \quad (4)$$

$$1.1.3 \quad 3x^2 - 16x \leq -5 \quad (4)$$

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

1.2 Solve simultaneously for x and y :

$$x - 2y = 3$$

$$3x^2 - 5xy = 24 + 16y \quad (5)$$

1.3 Given: $(\sqrt{7})^x + (\sqrt[3]{5})^y = 54$; where x and $y \in \mathbb{N}$. Determine the value of P , where $P = x \times y$. (4)

[25]

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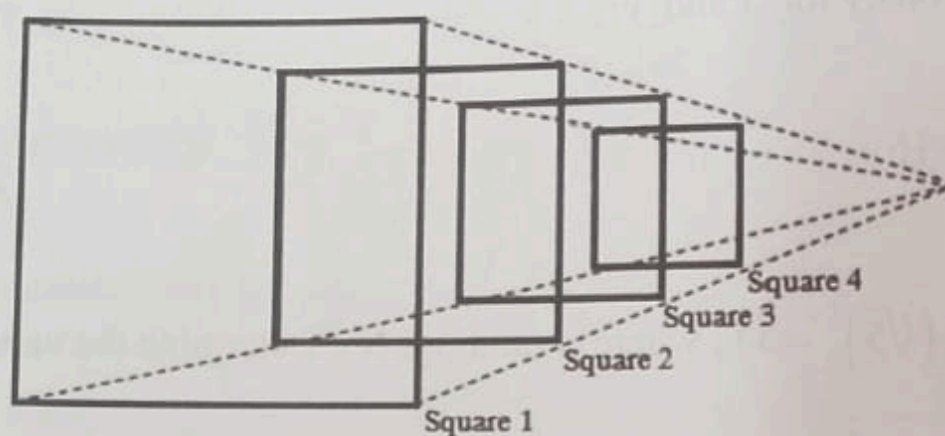
QUESTION 2

- 2.1 The fourth term of an arithmetic sequence is 15 and the twelfth term is 47. Determine the first two terms of the sequence. (4)

- 2.2 The areas of the first three squares in the sketch below are as follows:

- Area of Square 1: 18 cm^2
- Area of Square 2: 9 cm^2
- Area of Square 3: $\frac{9}{2} \text{ cm}^2$

The pattern continues indefinitely.



- 2.2.1 Write down the area of Square 4. (1)
- 2.2.2 Calculate the total area of all the squares that are smaller than Square 6. (6)
- 2.2.3 Which square will have a side length of $\frac{3}{8} \text{ cm}$? (5)

[16]

QUESTION 3

3.1 Calculate: $\sum_{k=10}^{25} (7-5k)$. (4)

3.2 The following information of a quadratic pattern is given:

- $T_n = an^2 + bn + 6$
- $T_4 = 26$
- $T_3 - T_2 = 7$

Determine the values of a and b .

(4)

[8]

QUESTION 4

Given: $f(x) = \frac{-9}{x-3} + 2$

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

4.2 Calculate the

4.2.1 x -intercept of f . (2)

4.2.2 y -intercept of f . (1)

4.3 Sketch the graph of f , showing all the intercepts with the axes and the asymptotes. (3)

4.4 Describe in words the single transformation of f to g , where $g(x) = \frac{9}{x+3} + 2$. (2)

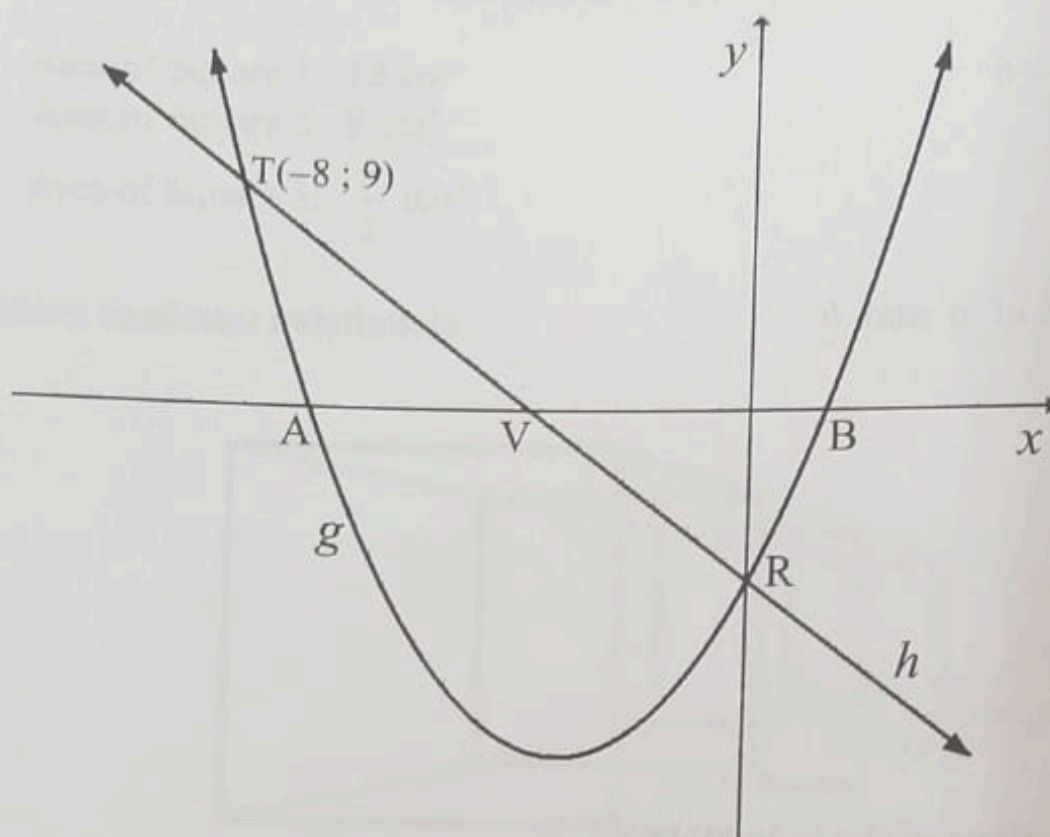
4.5 For which values of p will $f(x) + p = 0$ have one negative root? (2)

[12]

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QUESTION 5

The diagram below shows the graphs of $g(x) = x^2 + 5x - 6$ and $h(x) = mx + c$. A and B are the x -intercepts of g , and V is the x -intercept of h . g and h intersect on the y -axis at R and also at $T(-8; 9)$.

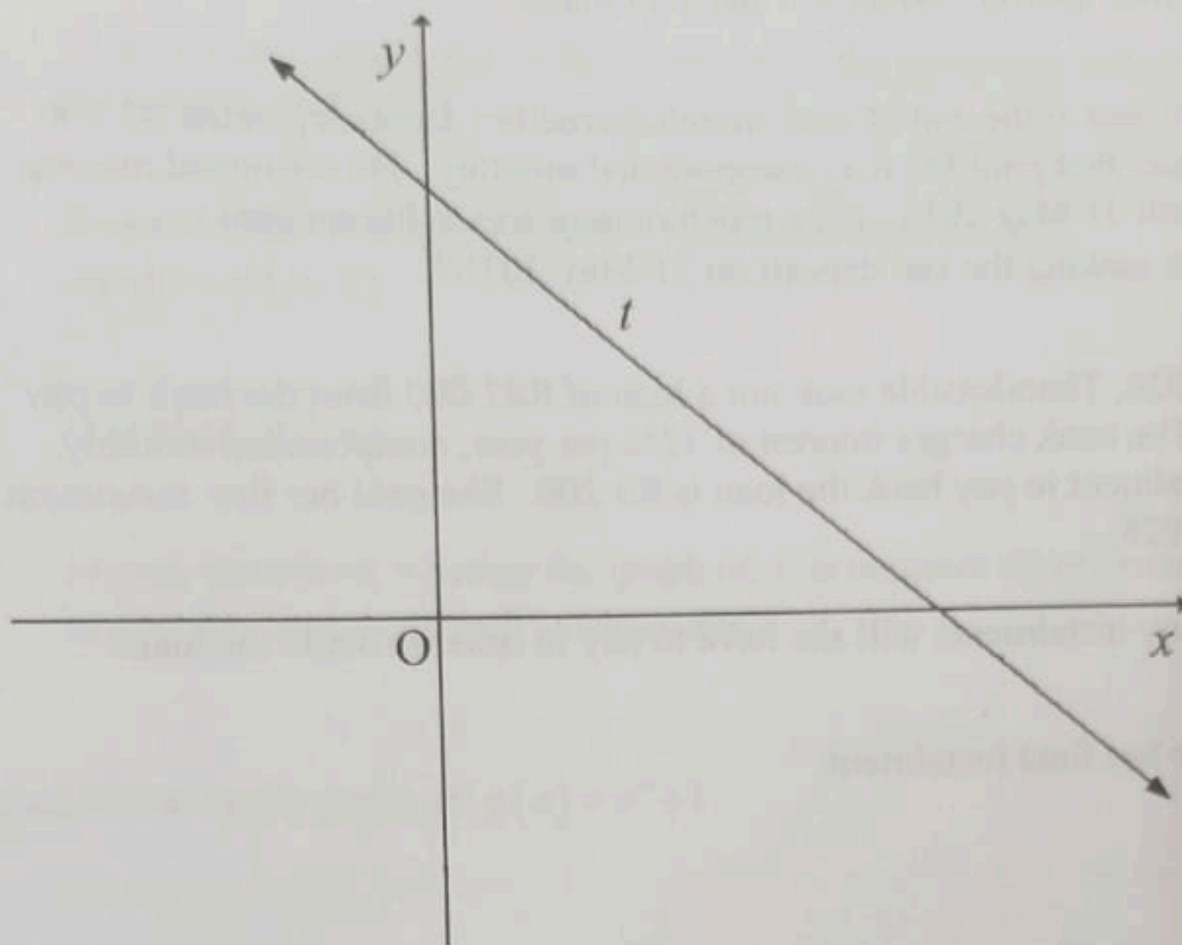


- 5.1 Write down the coordinates of R. (1)
- 5.2 Determine the equation of h . (3)
- 5.3 Write the equation of g in the form $y = a(x + p)^2 + q$. (2)
- 5.4 Determine the coordinates of point W on g , such that the average gradient between T and W will be -1 . (5)
- 5.5 It is given that the coordinates of A and B are $(-6; 0)$ and $(1; 0)$ respectively. Determine the values of x for which $\frac{g(x)}{h(x)} \leq 0$. (4)

[15]

QUESTION 6

The graph of $t(x) = -x + 4$ is drawn below.



- 6.1 Draw on the same set of axes the graph of $s(x) = \log_3 x$, showing any intersections with the axes. (2)
- 6.2 Write down the equation of $s^{-1}(x)$, in the form $y = \dots\dots\dots$ (2)
- 6.3 Explain how you will use question 6.1 and/or question 6.2 to solve $\log_3(4-x) = x$. (3)
- 6.4 Write down the solution to $\log_3(4-x) = x$. (1)

[8]

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QUESTION 7

- 7.1 Rajesh inherited a sum of money from his father. He invested the money at 7,3% p.a., compounded quarterly. After how many years will his inheritance have doubled? Give your answer correct to 1 decimal place. (4)
- 7.2 On 30 June 2013, and at the end of each month thereafter, Jacob deposited R2 500 into a bank account that paid 8% p.a., compounded monthly. He continued making these deposits until 31 May 2018. How much money was in his account immediately after making the last deposit on 31 May 2018? (4)
- 7.3 On 31 January 2026, Thandokuhle took out a loan of R82 000 from the bank to pay for her studies. The bank charges interest of 12% per year, compounded monthly. Her monthly instalment to pay back the loan is R3 200. She paid her first instalment on 28 February 2026.
- 7.3.1 How many instalments will she have to pay in order to settle the loan? (4)
- 7.3.2 Calculate her final instalment. (3)
- [15]

QUESTION 8

- 8.1 Determine $f'(x)$ from first principles if $f(x) = x - 3x^2$. (5)
- 8.2 Determine the following:
- $$D_x \left(\frac{4x^2 + x + 2\sqrt{x}}{2x^2} \right) \quad (4)$$
- 8.3 Given: $p(x) = 5x^3 + x$.
Explain, using relevant calculations, why it is not possible for a tangent drawn to the graph of p to have a negative gradient. (3)
- [12]

QUESTION 9

9.1 Given: $f(x) = -x(x-3)^2$ with $f'(1) = f'(3) = 0$ and $f(1) = -4$

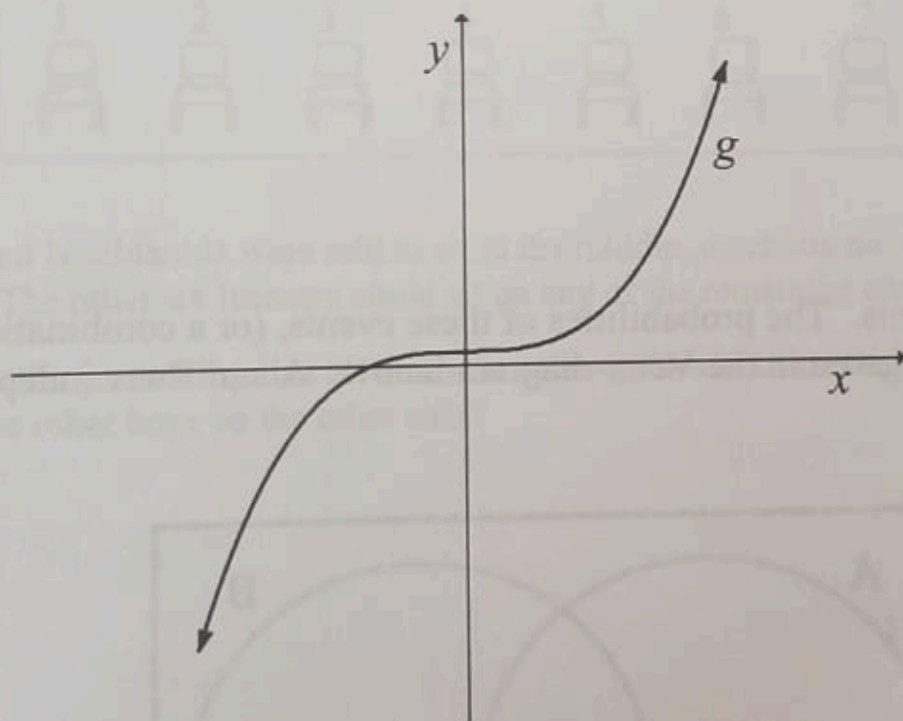
9.1.1 Draw a sketch graph of f , clearly indicating the intercepts with the axes and the turning points. (4)

9.1.2 Determine the coordinates for the local maximum of h if $h(x) = -f(x-2)$. (2)

9.1.3 Calculate $f''(x)$. (3)

9.1.4 Hence, determine whether the graph of f is concave up or concave down at $(0; 0)$. Show all your calculations. (3)

9.2 Sketched below is the graph of $g(x) = x^3 + 1$.

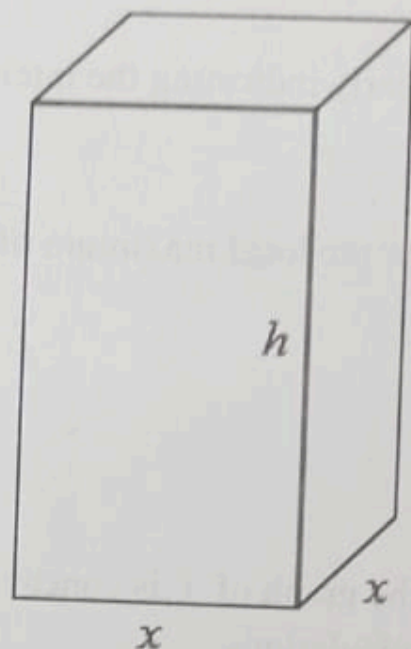


For which values of k will $y = 12x + k$ intersect g at 3 distinct points? (5)

[17]

QUESTION 10

A piece of cardboard with area $1\,350\text{ cm}^2$ is folded to form a closed rectangular box with a square base. The side length of the square base is $x\text{ cm}$ and the height of the box is $h\text{ cm}$.



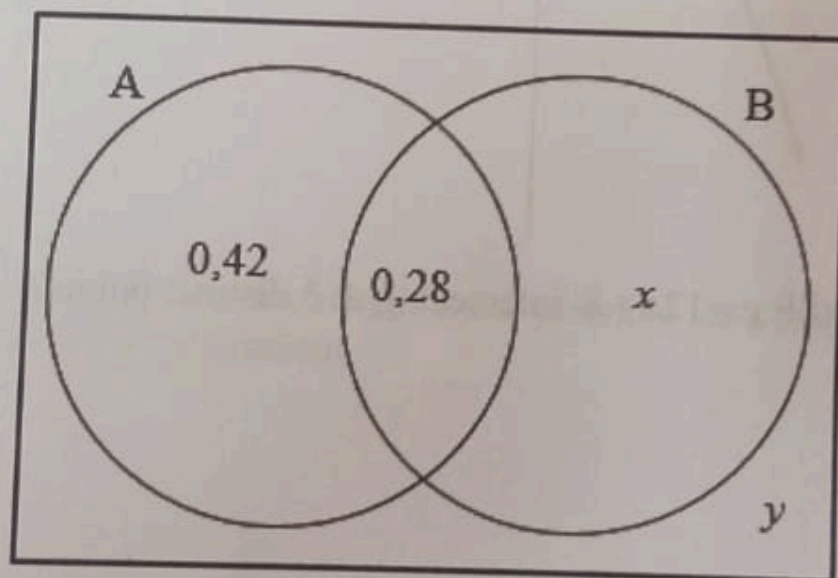
10.1 Show that the volume of the box is given by: $V(x) = \frac{675x}{2} - \frac{x^3}{2}$ (4)

10.2 Determine the value of x for which the volume of the box will be a maximum. (3)

[7]

QUESTION 11

11.1 A and B are two events. The probabilities of these events, (or a combination of them) occurring, are given in the Venn-diagram below. A and B are independent events.



Calculate:

11.1.1 the value of x . (3)

11.1.2 the value of y . (1)

11.1.3 $P(A \text{ or } B)$ (1)

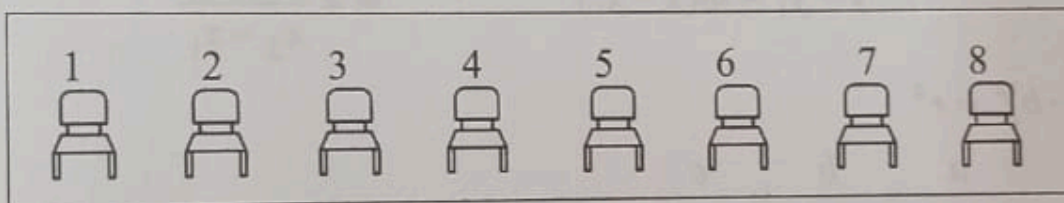
- 11.2 The probability that it will rain tomorrow is 70%.
If it rains, the probability that Nomsa will arrive late at the office is 25%.
If it does not rain, the probability that Nomsa will arrive late at the office is 10%.
Calculate the probability that Nomsa will be on time for work tomorrow. (4)

- 11.3 A modelling agency invited eight grade 12 learners for a photo shoot. There were 4 girls and 4 boys. The names of the girls were Zanele, Sandra, Anashya and Nonhlanhla. The names of the boys were Thulani, Ruan, Reggie and Peter.

- 11.3.1 For the first photo, the learners had to stand in a line in any order they preferred. In how many ways could they arrange themselves for this photo? (1)

- 11.3.2 For the second photo, four chairs were placed in a row, and the learners were told that any four of them could pose for this photo. How many arrangements were possible for this photo? (1)

- 11.3.3 For the third photo, eight chairs were placed in a row, as shown in the sketch below:



Peter and Nonhlanhla were told to sit in the middle, on chairs no. 4 and 5, in any order. The other six learners could sit on any of the remaining chairs.

What is the probability that all three the other girls will sit on the one side, and all three the other boys on the other side? (4)

[15]

TOTAL MARKS: 150

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INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

In ΔABC :

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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