



# education

Department of  
Education  
FREE STATE PROVINCE

**GRADE 11**

**MATHEMATICS P1**

**EXAMINATION**

**JUNE 2025**

**MARKS: 100**

**HOURS: 2 HOURS**

**This question paper consists of 7 pages and a formula sheet**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. This question paper consists of 6 questions. Answer all the questions.
2. Answer ALL the questions in the SPECIL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. An approved scientific calculator (non-programmable and non-graphical) may be used unless otherwise stated.
6. If necessary, answers should be rounded 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. Write neatly and legibly.

**QUESTION 1**

1.1 Simplify:

1.1.1  $(\sqrt{x^3})^4$  (2)

1.1.2  $(\sqrt{12} + 2)(\sqrt{3} - 1)$  (3)

1.1.3  $\frac{2^{n+2} \cdot 4^{n+1}}{8^{n-1}}$  (3)

1.1.4  $\frac{3^{2015} + 3^{2013}}{9^{1006}}$  (4)

1.2 Prove that  $\sqrt{2} \cdot \sqrt{32} - \frac{9^{x+1}}{3^{2x}} = -1$  (3)

[15]

**QUESTION 2**

2.1 Solve for  $x$ :

2.1.1  $(3x+1)(x-2) = 0$  (2)

2.1.2  $x(x+1) + 3 = 15$  (3)

2.1.3  $4x^2 + 11x + 4 = 0$  (answer correct to two decimal places) (3)

2.1.4  $-x^2 + 3x \geq -4$  (4)

2.1.5.  $\sqrt{\sqrt{8x+6}} = \sqrt{x}$  (5)

2.2 Solve for  $n$  if  $\sqrt[4]{n^3} = 8$  (3)

2.3 Solve for  $x$  and  $y$ : (6)

$x^2 + 4y^2 = 2xy + 7$  and  $3 + x = 2y$

[26]

**QUESTION 3**

3.1. Determine the nature of the roots of the following equation, without solving the equation:  $x^2 + 5x - 9 = 0$ . (3)

3.2. The solutions of a quadratic equation are given by:  $x = \frac{-2 \pm \sqrt{3k - 4}}{7}$  (2)  
 For which value(s) of  $k$  will the equation have two real and equal solutions?

3.3. Given:  $f(x) = ax^2 + bx + c$ . If  $f(x) = 0$  has equal roots, namely:  $x = \frac{12 \pm \sqrt{192 - 48k}}{2k - 2}$ , (5)  
 and it is further given that  $f(-1) = 27$ . Determine the numerical values of  $a$ ,  $b$  and  $c$ .

**[10]**

**QUESTION 4**

Given;  $g(x) = \frac{1}{x-1} + 2$

4.1 Write down the equation of the asymptotes of  $g$ . (2)

4.2 Calculate the intercepts with the axes of  $g$ . (3)

4.3 Draw a graph of  $g$ , indicating any intercepts with the axes and the asymptotes. (3)

4.4 Determine the value(s) of  $x$  where  $g(x) > 0$ . (2)

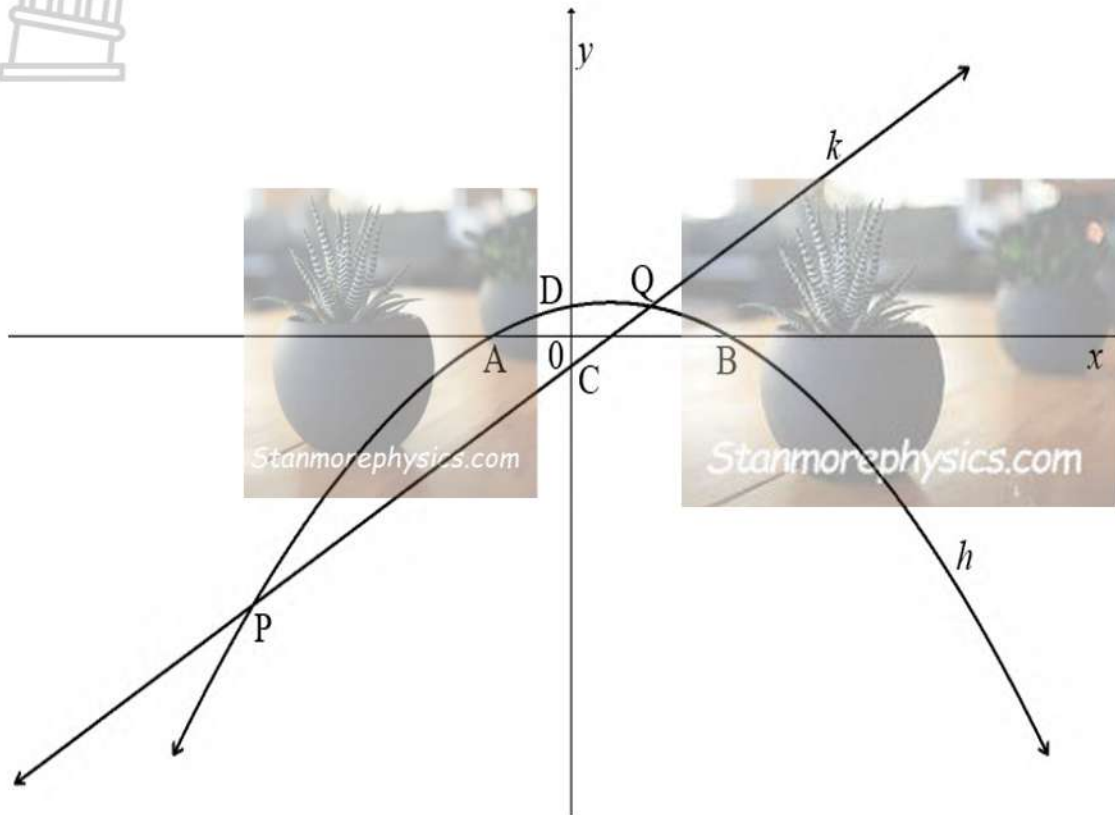
4.5 Determine the equation of the axis of symmetry of  $g$  which has a positive gradient. (2)

4.6 Write down the domain of  $h$  if  $h(x) = g(x+1)$ . (2)

**[14]**

**QUESTION 5**

The graph of  $h(x) = -x^2 + x + 2$  and  $k(x) = 4x - 2$  are drawn below. A and B are the  $x$ -intercepts of  $h$ . D and C are the  $y$ -intercepts of  $h$  and  $k$  respectively. P and Q are the points of intersection of  $h$  and  $k$ .



- 5.1 Calculate the coordinates of A and B. (4)
- 5.2 Determine the length of CD. (3)
- 5.3 Determine the range of  $h(x)$ . (4)
- 5.4 Determine the maximum value of  $4^{h(x) - \frac{7}{4}}$  (2)
- 5.5 Write down the coordinates of the turning point of  $f$ , if  $f$  is the reflection of  $h$  in the  $x$  axis. (2)

5.6 If the coordinates of P and Q are  $(-4; -18)$  and  $(1; 2)$  respectively, determine for which values(s) of  $x$  is:

5.6.1  $h(x) - k(x) \geq 0$ ? (2)

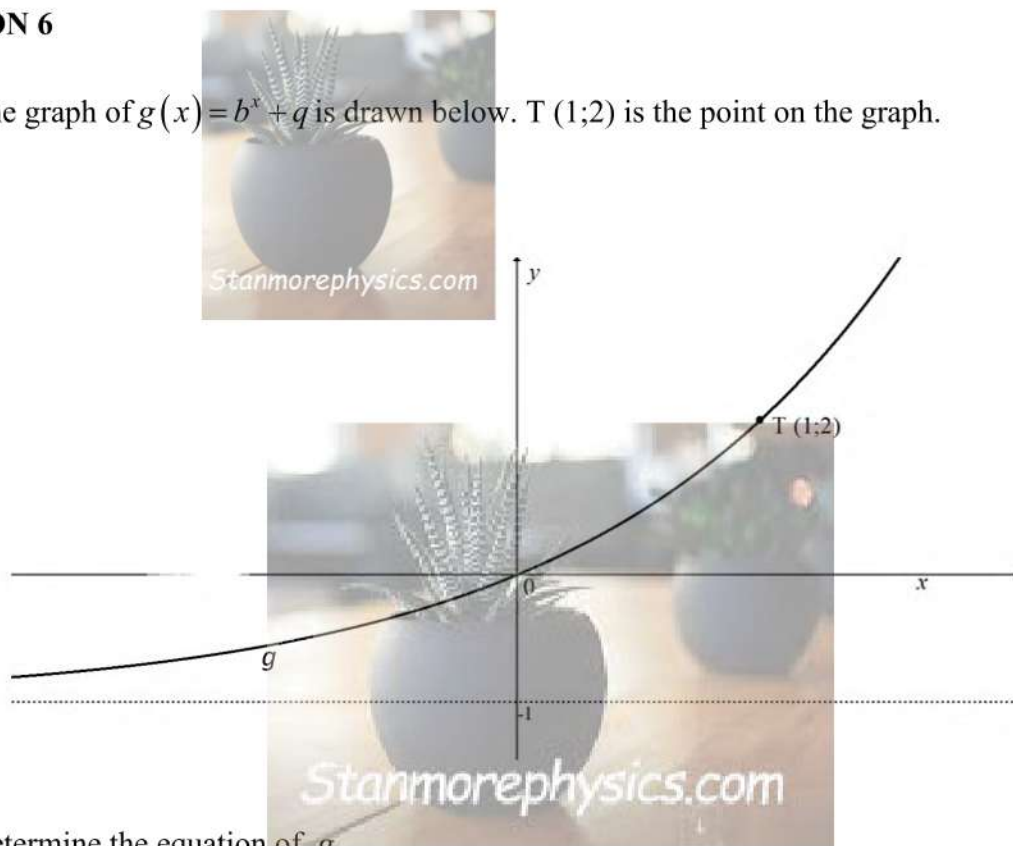
5.6.2  $x \cdot h(x) \leq 0$ . (2)

5.7 Write down the value(s) of  $n$  for which  $h(x) = n$  will have equal roots? (4)

[23]

**QUESTION 6**

The graph of  $g(x) = b^x + q$  is drawn below. T (1;2) is the point on the graph.



6.1 Determine the equation of  $g$ . (3)

6.2 Write down the equation of the asymptote of  $g$ . (1)

6.3 Write down the equation of  $f$  if  $f$  is the graph of  $g$  shifted 2 units to the right. (1)

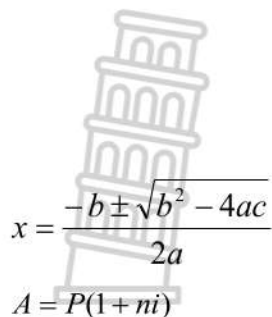
6.4 Calculate the average gradient of  $g$  between point T and the origin. (2)

6.5 If the domain of  $g(x)$  is restricted to be  $x \in [-2; 3]$ , write down the range of  $g$ . (3)

[10]

**TOTAL: 100 MARKS**

INFORMATION SHEET/INLIGTINGSBLAD



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

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

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

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

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

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

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

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

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

$$y = mx + c$$

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

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

$$m = \tan \theta$$

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

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

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

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

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

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

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

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

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

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

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

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