



**GAUTENG PROVINCE**

EDUCATION  
REPUBLIC OF SOUTH AFRICA

# **PROVINCIAL EXAMINATION**

**JUNE 2022**

**GRADE 11**

**MATHEMATICS**

**PAPER 1**

**TIME: 2 hours**

**MARKS: 100**

**7 pages**

**INSTRUCTIONS AND INFORMATION**

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. This question paper consists of 7 questions.
3. Present your answers according to the instructions of each question.
4. Clearly show ALL calculations, diagrams, graphs et cetera which were used in determining the answers.
5. Answers only will NOT necessarily be awarded full marks.
6. Use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, answers should be rounded-off to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Number the questions correctly according to the numbering system used in the question paper.
10. Write neatly and legibly.

## QUESTION 1

- 1.1 For which values of  $x$  is  $\sqrt{\frac{x+3}{(x+1)^2}}$  real? (2)
- 1.2 Solve for  $x$ :
- 1.2.1  $(x+4)(x-1)=0$  (1)
- 1.2.2  $3x^2-2x=14$  (correct to TWO decimal places) (4)
- 1.2.3  $x^2-2x=18-\frac{45}{x^2-2x}$  (4)
- 1.2.4  $\sqrt{5-x}+1=-x$  (5)
- 1.2.5  $3^{2x+1}-4\cdot 3^x=-1$  (4)
- 1.2.6 (a)  $x^2-3x\leq 0$  (2)
- (b) If  $f(x)=x^2-3x$ , write down the values of  $x$  for which  $f(x-3)\leq 0$ . (2)
- 1.3 The sum of TWO numbers is -10 and the product of the same numbers is -600. Determine the value of the two numbers. (5)
- [29]

**QUESTION 2**

2.1 Simplify completely WITHOUT the use of a calculator.

2.1.1  $2\sqrt{8} - 4\sqrt{32} + 3\sqrt{50}$  (3)

2.1.2  $3^{-\frac{1}{2}}[\sqrt{12} + \sqrt[3]{(3\sqrt{3})}]$  (4)

2.1.3  $\frac{5^{2006} - 5^{2004} + 24}{5^{2004} + 1}$  (4)

2.2 Given:  $x = \sqrt{6 + \sqrt{6 + \sqrt{6 + \sqrt{6 + \dots}}}}$

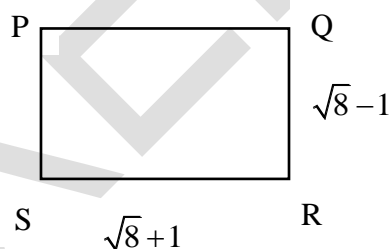
2.2.1 Write  $x^2$  in terms of  $x$ . (2)

2.2.2 Hence determine the value of  $x$ . (4)

2.3 Given rectangle PQRS with:

- $QR = \sqrt{8} - 1$
- $RS = \sqrt{8} + 1$

Determine the length of ANY diagonal of rectangle PQRS.  
(Leave the answer in the simplest surd form.)



(3)

[20]

**QUESTION 3**

- 3.1 The first four terms of a quadratic number pattern are  $-7; 0; 9; 20$ .
- 3.1.1 Determine a formula to represent the general term of the pattern. (4)
- 3.1.2 Which term of the pattern has a value of 128? (3)
- 3.1.3 Determine between which successive terms in the quadratic number pattern will the FIRST difference be 599. (3)
- 3.2 Given the quadratic pattern:  
 $5; 12; 29; 56; \dots$
- 3.2.1 Write down the next term of the pattern. (1)
- 3.2.2 Show that the first differences of this pattern will always be odd values. (4)
- [15]

**QUESTION 4**

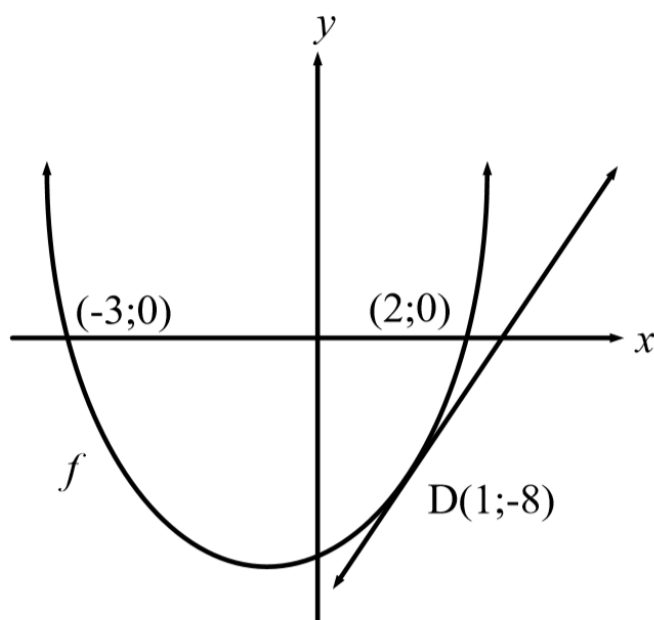
Given the linear pattern:  $1 - p; 2p - 3; p + 5; \dots$

- 4.1 Calculate the value of  $p$ . (3)
- 4.2 Write down the value of:
- 4.2.1 The first term of the pattern. (1)
- 4.2.2 The common difference. (1)
- 4.3 Explain why none of the numbers in this linear pattern are perfect squares. (2)
- [7]

**QUESTION 5**

The graphs of  $f(x) = ax^2 + bx + c$  ;  $a \neq 0$  and  $g(x) = 6x + k$  are drawn below.

- Point D(1 ; -8) is a common point on  $f$  and  $g$ .
- $f$  intersects the  $x$ -axis at (-3 ; 0) and (2 ; 0).
- $g$  intercepts the graph of  $f$  at point D only.



- 5.1 For which value(s) of  $x$  is  $f(x) \leq 0$ ? (1)
- 5.2 Determine the values of  $a$ ,  $b$ , and  $c$ . (4)
- 5.3 Determine the coordinates of the turning point of  $f$ . (3)
- 5.4 Write down the equation of the axis of symmetry of  $h$  if  $h(x) = f(x-7) + 2$ . (1)
- 5.5 Determine the equation of a line  $q$  which is perpendicular to  $g$  passing through the point (-3 ; 0) in the form  $y = mx + c$ . (3)

**[12]**

### QUESTION 6

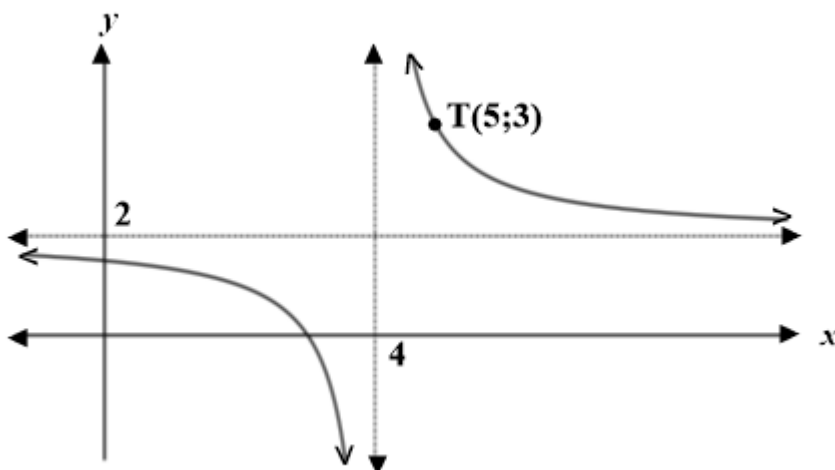
Given:  $p(x) = 4^x$  and  $h(x) = 2(x-1)^2 - 8$ .

- 6.1 Sketch the graphs of  $p$  and  $h$  on the same set of axes in your ANSWER BOOK. Indicate ALL intercepts with the axes and any turning points. (4)
- 6.2 Sketch the graph of  $f(x)$  if  $f(x) = p(-x)$  using the same axes as in QUESTION 6.1. (1)
- 6.3 The graph of  $h$  is shifted 2 units to the LEFT. Write down the equation of the new graph. (1)
- 6.4 Show, algebraically, that  $p(x + \frac{1}{2}) = 2p(x)$  (3)

[9]

### QUESTION 7

The sketch below represents the graph of  $f(x) = \frac{a}{x-p} + q$ . T (5 ; 3) is a point on  $f$ .



- 7.1 Determine the values of  $a$ ,  $p$ , and  $q$ . (4)
- 7.2 Write down an equation for  $h(x)$  if  $h$  is the graph of  $f$  where  $a < 0$ . (1)
- 7.3 Write down the range of  $f$ . (1)
- 7.4 If the graph of  $f$  is reflected in the line  $y = -x + c$ , the new graph coincides with the graph of  $y = f(x)$ . Determine the value of  $c$ . (2)

[8]

**TOTAL: 100**