education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

MATHEMATICS P1
NOVEMBER 2024

MARKS: 150

TIME: 3 hours

This question paper consists of 9 pages and 1 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.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, etc. that 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. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

1.1.1 $x^2 + x = 12$ (3)

1.1.2 $3x^2 - 2x - 6 = 0$ (3)

1.1.3 $\sqrt{x+7} - 1 = x$ (6)

1.1.4 $2 - x > x^2$ (4)

1.1.5 $x^{-\frac{3}{4}} = 8$ (3)

1.1.6 $3^{x+2} + 3^{-x} = 10$ (6)

1.2 Solve for x and y simultaneously if:

$y + 7 = 2x$ ..... ①

and

$x^2 + xy + y^2 = 21$ .....②

(6)

1.3 The following equation is given: $(y-3)(x^2-8)(5x+2) = 0$

Solve for x if:

1.3.1 $y = 3$ (1)

1.3.2 $y \neq 3$; $x \in \mathbb{Z}$ (1)

1.3.3 $y \neq 3$; $x \in \mathbb{Q}$ (1)

1.3.4 $y \neq 3$; $x \in \mathbb{R}$ (2)

[36]

QUESTION 2

2.1 Simplify: $\frac{25^{x-1}}{5^{2x}}$ (3)

2.2 If $x = \sqrt{3} + 2$, calculate the value of $\frac{x^2+2}{x-2}$. Give the answer with a rational denominator **without the use of a calculator**. (5)

2.3 If $\sqrt{10} = 3{,}162$, calculate the value of $\sqrt[5]{316{,}2}$ **without the use of a calculator.** (4)

[12]

QUESTION 3

The following linear pattern is given: 8 ; 6 ; 4 ; ….

3.1 Which term will be the first negative term in this pattern? (2)

3.2 Determine T_n , the formula for the n^{th} term of the sequence. (2)

3.3 Determine n if $T_n = -2008$. (2)

3.4 This linear pattern forms the row of first differences of a quadratic number pattern. T_4 of the quadratic pattern is 58. Determine the first three terms of the quadratic number pattern. (3)

[9]

QUESTION 4

Given the following quadratic sequence : 75 ; 53 ; 35 ; 21 ; ...

4.1 Write down the FIFTH term of the number pattern. (1)

4.2 Determine T_n , the n^{th} term of the quadratic sequence. (4)

4.3 Which term in the sequence has a value of 131? (4)

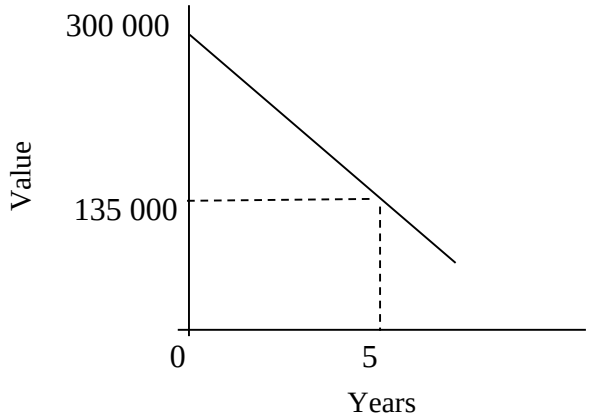
4.4 Determine the maximum value of the following number pattern:

$$-15 \; ; \; -\frac{53}{5} \; ; \; -7 \; ; \; -\frac{21}{5} \; ; \; \ldots$$ (4)

[13]

QUESTION 5

5.1 Computers are purchased for R 300 000. It depreciates as shown in the diagram below. Determine the rate at which the depreciation was calculated.



(3)

5.2 Peter is a farmer and he made a profit of R3,5 million. He decides to buy a new tractor for R2 250 000 and he invests the rest of the money. With this investment, the tractor has to be replaced 6 years later.

5.2.1 How much money does Peter have available to invest? (1)

5.2.2 If the average inflation rate is 4% per year over the next 6 years, what is the estimated cost of a new tractor after 6 years? (2)

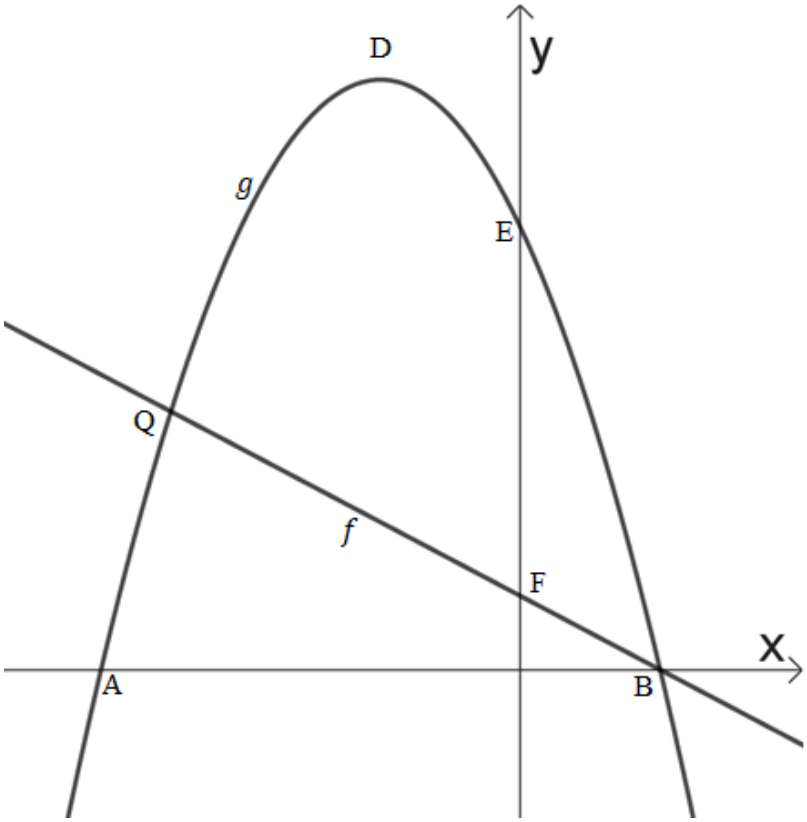
5.2.3 The old tractor depreciates on a reducing balance at a rate of 14% p.a. Calculate the value of the old tractor after 6 years. (3)

5.2.4 Peter invests the amount calculated in 5.2.1 for 6 years. For the first 4 years the interest on his investment is 9% p.a. compounded monthly and thereafter, it is reduced to 8,5% p.a. compounded quarterly. One year before the end of the 6 year period, Peter has to withdraw R100 000 for unexpected expenses. Assume that the old tractor will be traded in at its reduced value after 6 years to partially finance the new tractor. Determine with the necessary calculations if Peter will have enough money from his investment after 6 years to replace the tractor. (6)

[15]

QUESTION 6

The graphs of $f(x) = -x + 2$ and $g(x) = -x^2 - 4x + 12$ are drawn below. The graphs intersect at B and Q. A and B are the x-intercepts of g. D is the turning point of g. F and E are the y-intercepts of f and g respectively.



6.1 Determine the length of AB. (4)

6.2 Determine the length of FE. (2)

6.3 Calculate the coordinates of the turning point, D. (3)

6.4 Determine the range of g. (1)

6.5 Determine the average gradient of g between D and B. (2)

6.6 Calculate the co-ordinates of Q. (4)

6.7 For which values of x is $f(x) > g(x)$? (2)

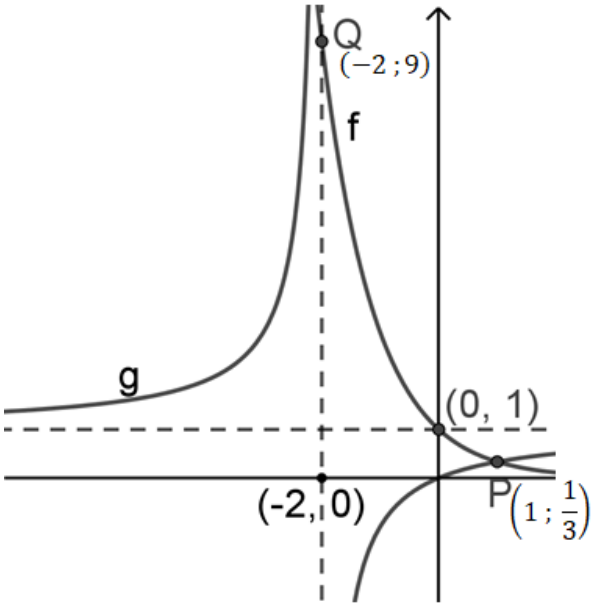
6.8 For which value of k will $-x^2 - 4x + k = 0$ have two equal roots? (2)

6.9 Use the graph to solve the following inequality: $f(x).g(x) \leq 0$. (2)
[22]

QUESTION 7

The graphs of: $f(x) = a^x$ and $g(x) = \frac{k}{x+p} + q$ are drawn below.

P $\left(1 ; \frac{1}{3}\right)$ is the point of intersection between f and g. Q $(-2 ; 9)$ lies on f as well as on the vertical asymptote of *g*.



7.1 Determine:

7.1.1 the value of a. (2)

7.1.2 the equation of g (4)

7.1.3 the domain of g (1)

7.2 Write down the equation of $k(x)$ if k is the function obtained by reflecting f in the *y*-axis and translating it 2 units down. (2)

7.3 Determine the range of k. (1)

7.4 Determine the equation of the axis of symmetry of g in the form $y = mx + c$, if $m < 0$. (3)

7.5 For $x \geq -2$, determine the x-value(s) for which $f(x) \geq g(x)$. (2)

7.6 Use the graph to solve the following inequality:

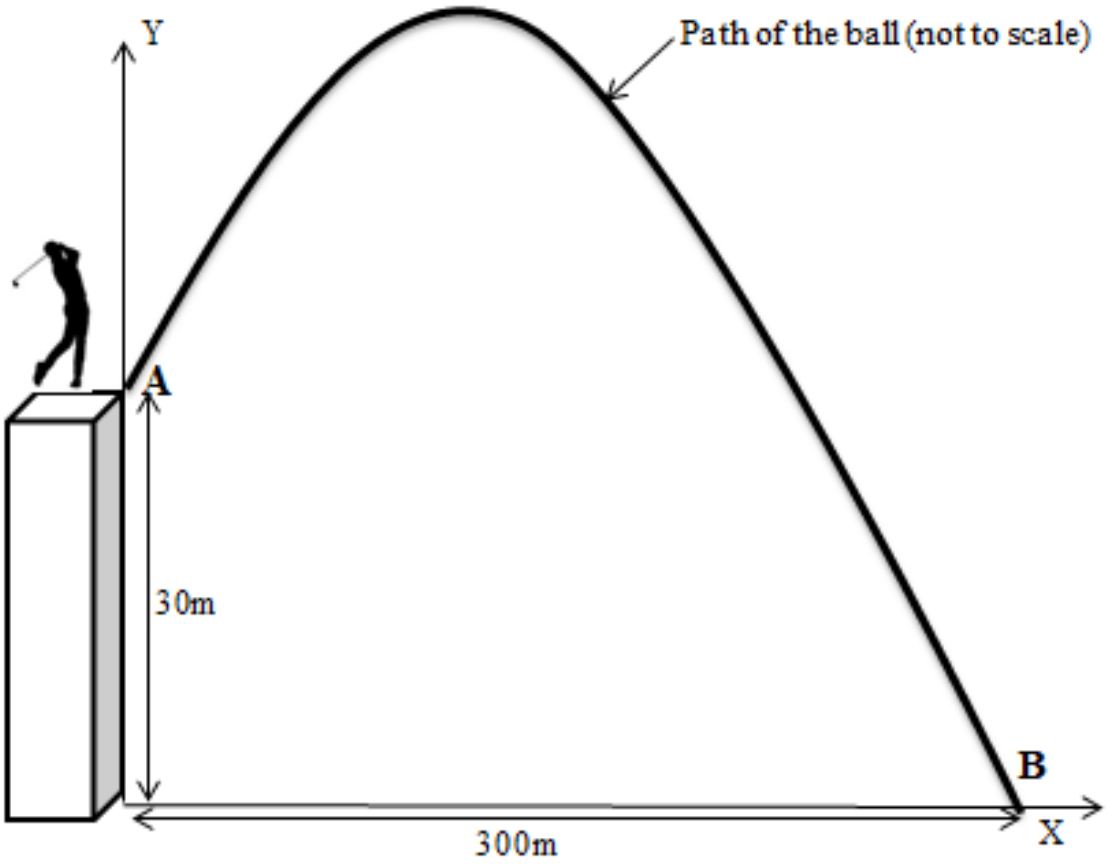
$$1 \geq \frac{2}{x+2}$$ (3)

[18]

QUESTION 8

A golf ball is hit from point A to point B. The path of the golf ball is placed in the Cartesian plane so that A is on the y-axis and B on the x-axis.

- Point A is 30 m vertical above the ground
- Point B is horizontal 300 m away from A on ground level
- The path of the golf ball is modelled by $y = ax^2 + bx + c$
- The ball passes through the point $(200; 30)$



Determine the maximum height the ball reaches above the ground. (5)
[5]

QUESTION 9

Given: A and B are 2 different events.

P(A) = 0,5 ; P(B) = 0,3 ; P(A or B) = 0,7

9.1 Are the events mutually exclusive? Motivate with appropriate calculations. (3)

9.2 Draw a Venn-diagram representing the situation with different probabilities. (3)

9.3 Calculate P ((not A) or B) (2)

9.4 Are events A and B independent? Motivate with appropriate calculations. (4)
[12]

QUESTION 10

A parking area has 14 Volkswagen and 18 BMW cars parked. There are no other cars. During the afternoon, two cars are stolen – one early afternoon and the other later.

10.1 Represent the situation using a tree diagram, indicating probabilities on all branches . Also indicate possible outcomes. (4)

10.2 Determine, using the tree diagram, the probability that:

10.2.1 both stolen cars are BMWs (2)

10.2.2 at least ONE Volkswagen will be stolen (2)
[8]

GRAND TOTAL : 150

INFORMATION SHEET: MATHEMATICS GR11

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

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

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

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

In ΔABC: $\dfrac{a}{\sin \text{A}} = \dfrac{b}{\sin \text{B}} = \dfrac{c}{\sin \text{C}}$ $\qquad a^2 = b^2 + c^2 - 2bc.\cos A$

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

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

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