

Hillcrest High School

Grade 10

MATHEMATICS P1 NOVEMBER 2024

MARKS : 100
DURATION : 2 HOURS

EXAMINER : MR LS MBUYAZI

MODERATOR : MRS D KNIGHT

This question paper consists of 6 pages

INFORMATION AND INSTRUCTIONS:

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions.
3. Number the questions 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 correct to TWO decimal places, unless stated otherwise.
8. Diagrams are not necessarily drawn to scale.
9. Write neatly and legibly.

QUESTION 1

1.1 Factorise the following expressions fully:

1.1.1 $x^3 - 64$ (2)

1.1.2 $y^2(a - b) + b - a$ (3)

1.2 Simplify the following completely:

1.2.1 $-(2x - 3)^2$ (2)

1.2.2 $\frac{5x^2 + 14x - 3}{x^2 - 9}$ (3)

1.2.3 $\frac{5^{x+1} \cdot (4^x)^3}{2^{5x-2} \cdot 10^{x-1}}$ (5)

1.3 Determine the value of d if $(3x + 2)$ is a factor of: $6x^2 + dx - 10$ (3)

[18]

QUESTION 22.1 Solve for x :

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

2.1.2 $3^x - 2 \cdot 3^{x-1} = 3$ (3)

2.2 Given: $0 < 3 + \frac{x}{2} < 2$

2.2.1 Solve the inequality. (3)

2.2.2 Write down an integer that will make the equation invalid. (1)

2.3 Solve for x and y simultaneously:

$6x + 7y = 3$ and $2x + y = 5$ (5)

[14]**QUESTION 3**

3.1 Your friends Zain and Letti have been trying to solve an exercise based on the following sequence: 2; 6; 10; 14; ...

3.1.1 Letti says that $T_n = 4n - 2$ and Zain says that $T_n = 4(n - 1) + 2$. Who is right?

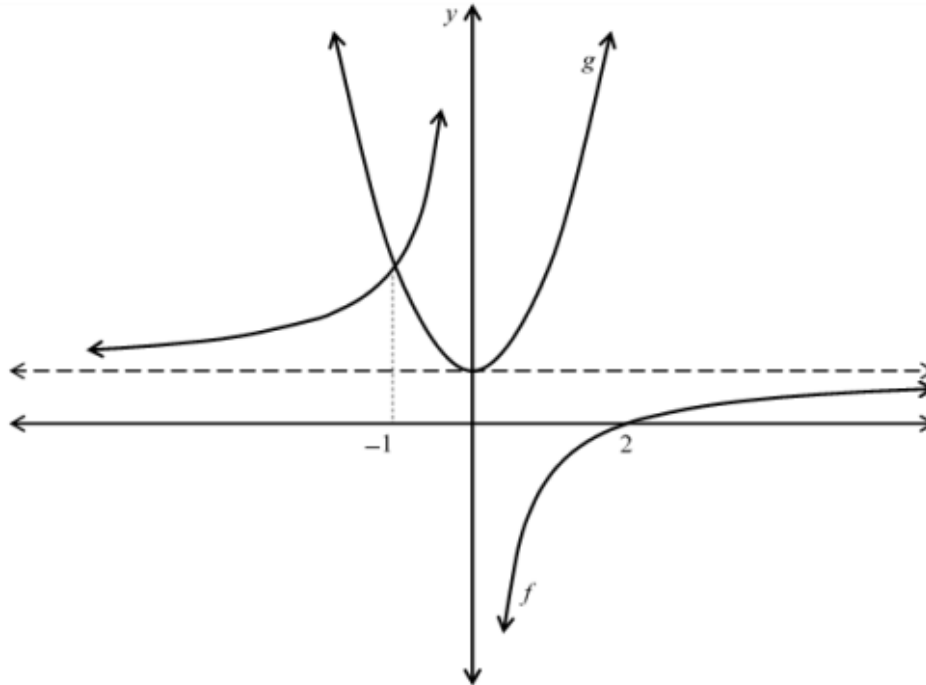
Use algebra to justify your answer. (3)

3.1.2 Determine the value of the 27th term of the sequence. (2)3.2 Given that: $3x + 1$; $2x$; $3x - 7$; ... are the first three terms of a linear number pattern3.2.1 If the value of x is three, write down the FIRST THREE terms. (3)3.2.2 Determine the formula for T_n , the general term of the sequence. (2)3.2.3 Which term in the sequence is the first to be less than -31 ? (3)**[13]**

QUESTION 4

The sketch below shows the graphs of $f(x) = \frac{b}{x} + 1$ and $g(x) = ax^2 + q$,

$(2; 0)$ is the x -intercept of f .



4.1 Write down the:

4.1.1 Domain of f . (1)

4.1.2 Range of g . (1)

4.2 Determine the value of b . (2)

4.3 Determine the equation of g if the x -value at the point of intersection of the two graphs is -1 . (4)

4.4 Write down the equation of the line of symmetry of f , which has a negative gradient. (2)

4.5 Write down the values of x for which:

4.5.1 $g(x)$ is decreasing. (2)

4.5.2 $f(x) > g(x)$ (2)

4.6 Write down the equation of $k(x)$, if $k(x) = -g(x) + 3$ (2)

[16]

QUESTION 5

The exponential graph of $h(x) = \frac{1}{2} \cdot 2^x - 1$ is given.

5.1 Write down the equation of the asymptote of h . (1)

5.2 Calculate the:

5.2.1 The y -intercept of h . (2)

5.2.2 The x -intercept of h . (2)

5.3 Sketch the graph of h on a system of axes. Clearly show all intercepts with the axes and asymptotes. (3)

5.4 Write down the equation of the graph formed if h is reflected over the asymptote. (2)

[10]

QUESTION 6

6.1 Peter wants to buy a computer costing R7 950, on a hire purchase agreement.

The conditions for the agreement are:

- Peter must pay a deposit of 25% of the purchase price.
- Interest is charged at 15% p.a simple interest on the balance.
- He must pay a compulsory monthly insurance premium of R70,75.
- The balance is to be settled in equal monthly installments.

6.1.1 Calculate the balance after Peter pays the deposit. (2)

6.1.2 If the balance is to be paid off in 24 months, calculate Peter's total monthly instalments. (4)

6.2 On his 29th birthday, John invested R5 000 on the Johannesburg Stock Exchange.

His shares increased in value by 20% compounded annually. How much would his investment be worth on his 60th birthday? (5)

6.3 If it is found after 10 years that the population has actually increased by 10 million to 67 million, what was the growth rate? (3)

[14]

QUESTION 7

7.1 For any two events, A and B, it is given that $P(A) = 0,25$, $P(B) = 0,89$ and

$$P(A \text{ or } B)' = 0,05$$

7.1.1 Calculate $P(A \text{ or } B)$. (2)

7.1.2 Are the two events mutually exclusive? Justify your answer. (2)

7.1.3 Calculate $P(A \text{ and } B)$. (2)

7.1.4 What is the probability of event B only? (2)

7.2 In a small town of 1 500 people, there are two main banks, Add Savings and Multiplier Bank. Most of the people in the town bank with one or both of these banks. 600 people bank with Add Savings and 950 bank with Multiplier Bank. 235 people in the town do not use either Add Savings or Multiplier Bank.

7.2.1 Draw a Venn diagram to illustrate the information given above. (4)

7.2.2 What is the probability that a person from the town uses both banks? (1)

7.2.3 What is the probability that a person from the town does not use Multiplier Bank? (2)

[15]

TOTAL: 100