Hillcrest High School

MATHEMATICS P1

NOVEMBER 2025

Grade 10

MARKS: 100

TIME: 2 Hours

EXAMINER: Mrs Woodrow

MODERATOR: Mr Reuben

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions

1. This test consists of 8 pages.
2. This test consists of 7 questions.
3. Read all questions carefully before answering.
4. Answer ALL the questions in the space provided.
5. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
6. Answers only will NOT necessarily be awarded full marks.
7. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
9. Diagrams are not necessarily drawn to scale.
10. Write neatly and legibly.

QUESTION 1

1. ALGEBRA

1.1. Between which two consecutive integers does $\sqrt[3]{-195}$ lie? (2)

1.2. Factorise the following expressions completely.

1.2.1. $y - xy + x - 1$ (3)

1.2.2. $x^3 + 27$ (2)

1.3. Simplify the following fully :-

1.3.1. $(-12p + 3)(2p^2 + 11p - 3)$ (3)

1.3.2. $\frac{x+3}{x-3} \times \frac{x^3-27}{x^2-9} \div \frac{x^2+3x+9}{x-3}$ (4)

1.3.3. $\frac{3^{x+1} - 3^{x+2}}{3^{x+2} + 3^x}$ (3)

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QUESTION 2

2. Solve for x:

2.1. $2.3^{2x} = 18$ (4)

2.2. $\frac{2x-1}{3} \geq 2x + 1$ (4)

2.3. $2x^2 - x - 10 = 0$ (3)

2.4. Solve for x and y simultaneously:
$y - 3x = -2$ and $7x - 2y = 8$ (4)

[15]

QUESTION 3

3. SEQUENCE AND SERIES

3.1. Given the sequence $-2\ ;\ -6\ ;\ -10$ ...

3.1.1. Determine the general term for the sequence. (2)

3.1.2. Determine T_{126} (2)

3.1.3. Is -818 a number in the sequence. (2)

3.2. Consider the pattern : $\frac{1}{5}\ ;\ \frac{3}{7}\ ;\ \frac{5}{9}\ ;\ \frac{7}{11}\ ;\ \ldots..$

3.2.1. Write down the next two terms. (2)

3.2.2. Determine the general term for the pattern. (4)

3.3. A scientist develops a vaccine for the outbreak which forms an arithmetic sequence. It is up to you to break the linear code given below:

$$k-3;\ -5k+6;\ k-9$$

3.3.1. Determine the value of k. (4)

[16]

QUESTION 4

4. FUNCTIONS

4.1. Given the function $h(x) = -2x^2 + 8$.

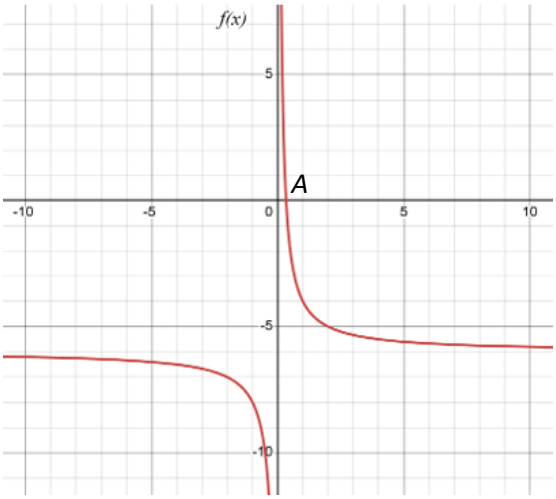
4.1.1. Sketch the function on the Cartesian plane. Clearly show all intercept(s) with the axes. (3)

4.1.2. State the range of h. (2)

4.1.3. State the values of h(x) for which h is increasing. (2)

4.1.4. g is reflection of h ahout the y-axis and is then translated 4 units down. Determine the equation of $g(x)$. (2)

4.2. The diagram below shows $f(x) = \frac{2}{x} - 6$



4.2.1. Determine the coordinates of A, the x-intercept of f. (2)

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

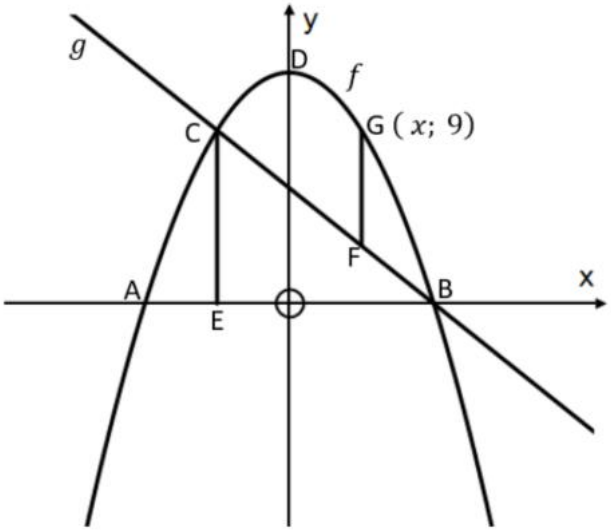
4.2.3. Give the domain of f. (2)

4.2.4. For which value(s) of x is f decreasing? (1)

[16]

QUESTION 5

5. In the diagram, the graphs of the functions $f(x) = -3x^2 + 12$ and $g(x) = -3x + 6$ are drawn. The graph of f cuts the x-axis at A and B. The graphs intersect at B and C. The origin of the Cartesian plane is the letter O.



5.1. Write down the length of OD. (1)

5.2. Determine the length of AB. (3)

5.3. Calculate the x-coordinate of G. (2)

5.4. Hence, calculate the length of FG. (3)

5.5. Determine for which values of x is $f(x) \geq g(x)$ (3)

[12]

QUESTION 6

6. FINANCE

6.1. James is in the market for the iPhone 16 Pro which costs R26 499 in South Africa. James decides to buy it on a hire purchase agreement with the following terms: 12% deposit, 36 monthly payments, 14% interest p.a.

6.1.1. Calculate the value of the deposit James needs to pay. (1)

6.1.2. Calculate James' monthly repayment. (4)

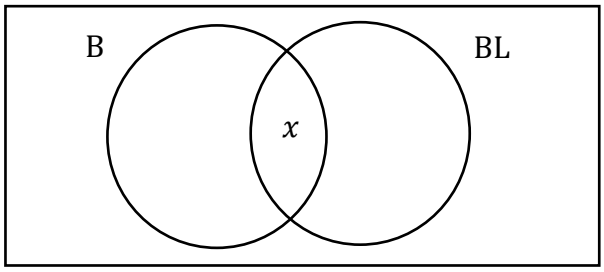
6.1.3. If the iPhone costs $1450 in USA, would it be cheaper in the USA or SA if the exchange rate is R17,21 to the Dollar. (3)

6.2. Oliver received a payout of R134 950,27 from a 10 year fixed investment account, he initially invested R65 000. Calculate the interest rate if the account receives compound interest annually. (3)

[11]

QUESTION 7

7. While invigilating the matric final Geography paper Mr Winkel noticed that boys predominately use either blue or black pen. There were a total of 46 boys that he counted, using the information supplied in the Venn diagram and the information below answer the following questions :-
Blue (B) = 33,
Black (BL) = 25,
Other = 2.



7.1. Complete the Venn diagram to represent the information provided. (3)

7.2. How many boys used both blue and black pen? (2)

7.3. If a boy is chosen at random, determine the probability of the following:

7.3.1. $P(only\ B)$ (1)

7.3.2. $P(B\ or\ not\ BL)$ (2)

7.4. Mr Wagner believes these probabilities will be the same for the rest of the school. If this is the case how many boys will write with only black pens when the cricket center is at full capacity of 393 boys. (2)

7.5. Two events, A and B, are mutually exclusive events. Calculate the P(A) if,
$P(B') = 0{,}4$
$P(A \cup B) = 0{,}7$ (3)

[13]

TOTAL **[100]**