HILLCREST HIGH SCHOOL

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INTERNAL EXAM

GRADE 10

MATHEMATICS P1

TERM 4

November Examination

MARKS : 100 **TIME :** 2 HOURS

NAME : _____

EXAMINER: ALBOROUGH

MODERATOR: STOW

This question paper consists of 6 pages.

QUESTION	1	2	3	4	5	6	TOTAL
MARK	29	18	14	17	10	12	100
MARKS							
SIGN							

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This examination consists of 6 questions.
2. Answer ALL the questions in the space 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. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Leave all exponents in positive exponential form.

Question 1 **[29]**

1.1 Without the use of a calculator, if $a = -2, b = 3$ *and* $c = -1$:

1.1.1 Calculate p if $p = \sqrt{a^2 - 2bc}$, leaving your answer in surd form. (2)
1.1.2 State between which two integers p will lie. (2)

1.2 Prove that $0,\dot{1}\dot{3}$ is a rational number. (3)

1.3 Factorize the following expressions:

1.3.1 $27x^3 - 125$ (2)
1.3.2 $2x^2(y-3) - 3x(3-y) + 2(3-y)$ (5)

1.4 Simplify the following expressions:

1.4.1 $(3x - 2y + 1)(6x + 4y - 2)$ (4)

1.4.2 $\frac{3x-6}{x^2-4} \div \frac{x^2-4x+4}{x^3+8}$ (4)

1.4.3 $\frac{3}{x+2} - \frac{2}{x+1}$ (3)

1.4.4 $\frac{16^x \cdot 12^{x+1}}{3^x \cdot 4^x}$ (4)

Question 2 **[18]**

2.1 Solve for x in the following equations:

2.1.1 $9x^2 = 16$ (3)

2.1.2 $96 = 3x^{\frac{5}{4}}$ (3)

2.1.3 $v^2 = \frac{3a}{\sqrt{x}}$ (3)

2.2 Given the following inequality: $5 - 3x \geq 14$

2.2.1 Solve for x (2)
2.2.2 Express your answer in interval notation (2)

2.3 Solve for x and y simultaneously in the following pair of equations:

$3x + 2y = -9$
$x + 4y = 7$ (5)

Question 3 [14]

3.1 Consider the following number pattern:

Term Number (n)	1	2	3	4	5
Pattern A	4	0	-4	-8	-12
Pattern B	16	0	16	64	144

3.1.1 Give a formula for the n^{th} term of Pattern A. (2)
3.1.2 What will be the value of the 100^{th} term of Pattern A? (2)
3.1.3 Which term in Pattern A will be the first to go below -100? (3)
3.1.4 Give a formula for the n^{th} term of Pattern B. (2)
3.1.5 Hence, determine a general formula for the following sequence:
20; 0; 12; 56; 132 (3)

3.2 State the next term in the following sequences

3.2.1 15; 12; 10; 9; … (1)
3.2.2 -1; -8; -27; -64; … (1)

Question 4 [17]

4.1 Matthew buys some furniture on Hire Purchase which has a cash price of R5400.
He pays a 20% deposit first and the remainder will be paid over 36 months on HP.
He signs an HP agreement with interest charged at 15% pa for the next 3 years.
Calculate his monthly instalments. (4)

4.2 Brenda opens a new investment account at BestBigBank (BBB) by putting in R3000.
After 3 years, she withdraws R1200. Two years later, she invests another R3000.
If interest is 14% pa compound, how much will she have 8 years after the first deposit?
(4)

4.3 Jerome is studying the endangered mountain gorilla and discovers the following:
In 2010 there were just 480 in existence but thanks to conservation efforts there are 1000 mountain gorillas alive in 2020. Determine the average annual population growth rate.
(4)

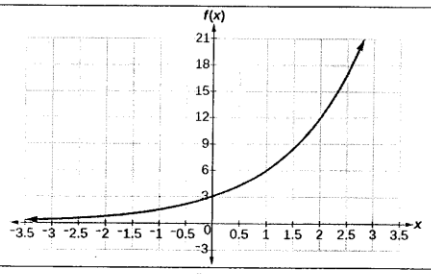
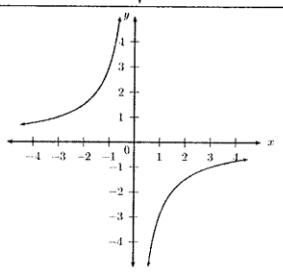
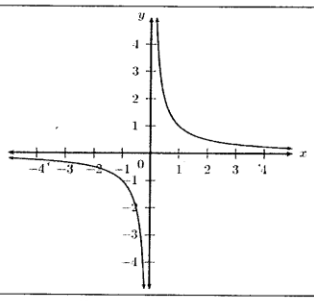
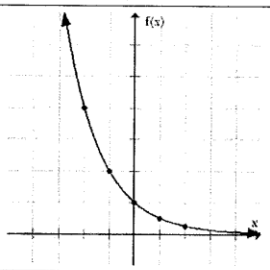
4.4 Mandy is planning an overseas trip once COVID-19 has passed. She wants to go to the UK.
The exchange rate now is £1: R21,56.

4.4.1 How much will she receive in pounds (£) if she takes R5 000 spending money? (2)

4.4.2 If the exchange rate changes to £1: R18 before she leaves, will she receive more?
Use calculations to justify your answer (3)

Question 5 **[10]**

5.1 Match the functions in **Column A** to their general equations in **Column B**. Give only the letter of the answer from **Column B**. (4)

5.1.1		$A)\ f(x) = \frac{1}{x}$
5.1.2		$B)\ f(x) = -\frac{1}{x}$
5.1.3		$C)\ f(x) = 2^x$
5.1.4		$D)\ f(x) = \left(\frac{1}{2}\right)^x$

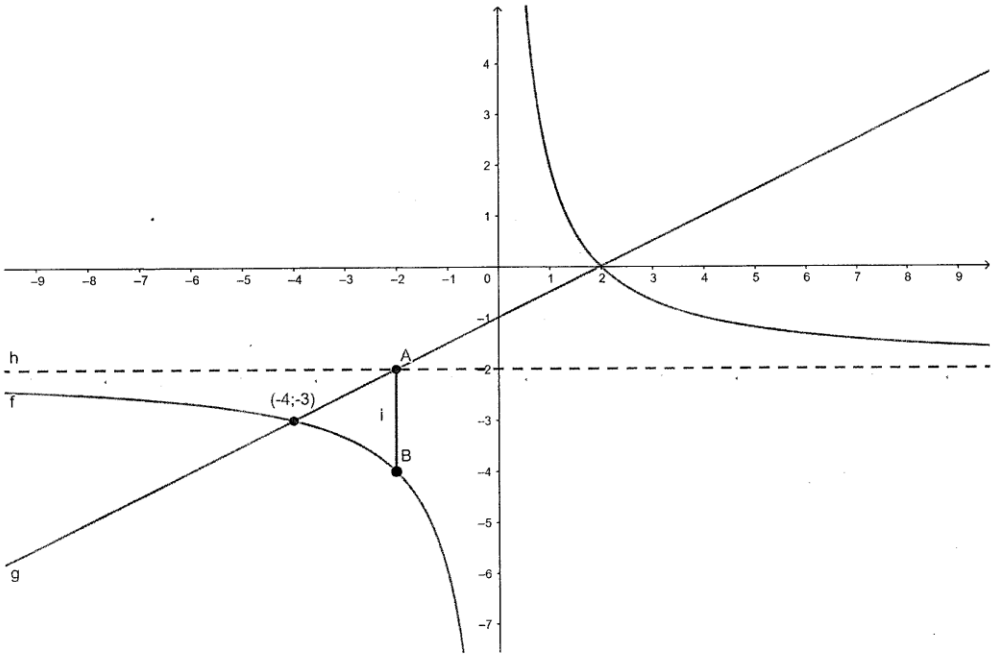
5.2 Sketch the following graphs, showing all asymptotes and intercepts with axes.
A cartesian plane has been provided for you on the cover of your answer booklet.

$f(x) = \frac{1}{2}x^2 - 8$ and $g(x) = -\frac{3}{x} - 1$ (6)

Question 6 **[12]**

6. The graphs shown below are $f(x) = \frac{a}{x} + b$ and $g(x) = cx + d$

6.1 Find the values of *a, b, c* and *d* (6)
6.2 State the domain of f (2)
6.3 Calculate $g(-2) - f(-2)$, the length of AB (2)
6.3 For which values of x is $f(x) \geq g(x)$ (2)



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