HILLCREST HIGH SCHOOL

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INTERNAL EXAM

GRADE 11

MATHEMATICS P1

TERM 4

November Examination

MARKS : 100 **TIME :** 2 HOURS

NAME : _____

WOODROW	REUBEN	KNIGHT	MACTAVISH	ALBOROUGH
EXAMINER			MODERATOR	

This question paper consists of 5 pages and 6 questions.

QUESTION	1	2	3	4	5	6	TOTAL
MARK	26	18	19	9	8	20	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 your answer book.
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.

INFORMATION SHEET: MATHEMATICS

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

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

1. **QUESTION 1**

1.1 Solve for x :

1.1.1 $(5x-2)(x+4)=0$ (2)

1.1.2 $\sqrt{x-1}+3=x$ (5)

1.1.3 $2x^2-3x=7$ (Give your answer correct to TWO decimal places) (4)

1.1.4 $x(2x-1)\geq 15$ (4)

1.1.5 $x+t=t(x+2)$ (Solve for x in terms of t and show any restrictions) (4)

1.2 Solve for x and y simultaneously :

$$2x-y=3$$
$$y^2=x^2+y+x$$ (5)

1.3 The roots of a quadratic equation is given by $x=\frac{-2\pm\sqrt{4-12k}}{2}$

Determine the value of k for which the equation will have non-real roots? (2)

[26]

2. **QUESTION 2**

2.1 Simplify WITHOUT the use of a calculator.

2.1.1 $\frac{9^{x+3}.12^{x-3}}{2^{2x-6}.27^{x+1}}$ (4)

2.1.2 If $\sqrt{3}=p$ and $\sqrt{5}=q$, express the following in terms of p and q : $\sqrt{80}+\sqrt{48}$ (2)

2.1.3 $\frac{2.3^x+3^{x-2}}{5.3^{x+1}-7.3^{x-1}}$ (3)

2.2 Solve for x, WITHOUT the use of a calculator :

2.2.1 $3^{4x}-27=0$ (2)

2.2.2 $7.25^{x+3}=7$ (3)

2.2.3 $x^{\frac{1}{2}}-7x^{\frac{1}{4}}+12=0$ (4)

[18]

QUESTION 3

3.1 Consider the finite linear pattern : $21; 17; 13; \ldots \ldots; -143$

3.1.1 Write down the 4th term in the pattern. (1)

3.1.2 Determine the expression for the nth term (2)

3.1.3 Calculate the number of terms in the sequence. (2)

3.1.4 Which term is the first to have a negative value? (2)

3.2 $5; -4; x; -40; \ldots \ldots \ldots$ is a quadratic number pattern.

3.2.1 Determine the value of x (3)

3.2.2 Show that the nth term in the sequence is $T_n = -3n^2 + 8$ (4)

3.2.3 Which term in the sequence will be equal to -3064 (2)

3.2.4 Between which TWO consecutive terms of the quadratic pattern will the first difference be -171. (3)

[19]

QUESTION 4

4.1 A company bought machinery costing R90 000. Using the reducing balance method, the machinery had a book value of R30 000 after 5 years.

4.1.1 Calculate the rate of depreciation (2)

4.1.2 Calculate the effective interest rate if interest is compounded at 8% p.a., compounded monthly (2)

4.2 Mr Farreira invested R35 000 for 6 years. The investment earned interest at 12% p.a., compounded monthly for the first two years. Thereafter the interest rate changed to 10,8% p.a., compounded semi-annually for the rest of the period.

4.2.1 Calculate the value of the investment at the end of 6 years if Mr Farreira deposited a further R5 000 after 3 years of the start of the investment. (5)

[9]

QUESTION 5

5.2.1 Sketch the graph of $f(x) = -x^2 + 4x - 3$ indicating ALL intercepts with axes and any asymptotes (3)

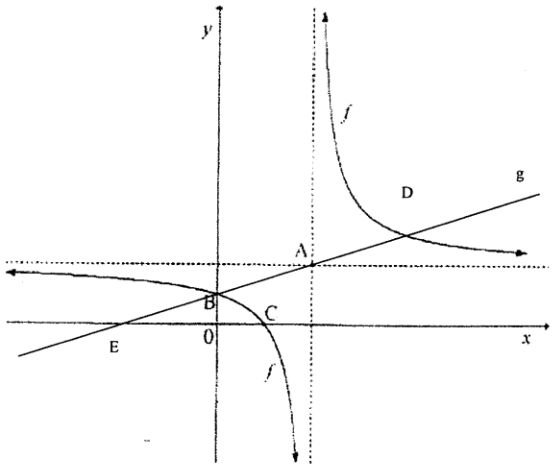
5.2.2 Give the Range of $f(x)$. (2)

5.3 On the same set of axes as Q4.1.1 sketch the graph of $g(x) = -\frac{1}{2}(2)^{x+1} + 5$ (3)

[8]

QUESTION 6

6.1 The sketch below shows the graph of $f(x) = \frac{6}{x-4} + 3$ and $g(x) = mx + c$. The asymptotes of f interest at A. The graph f intersects the x-axis and y-axis at C and B respectively. Graph g intersects the x-axis at E. Graph f and g intersect at B and D.



6.1.1 Write down the co-ordinates of A. (2)

6.1.2 Calculate the co-ordinates of B and C. (4)

6.1.3 Determine the equation of $g(x)$. (3)

6.1.4 Calculate the average gradient of $f(x)$ between B and C. (2)

6.1.5 Determine the equation of a line of symmetry of $f(x)$ which has a positive y-intercept (2)

6.1.6 For which values of x will $g(x) = f(x)$ (3)

6.1.7 Determine the values of x for which $g(x) > f(x)$ (2)

6.1.8 Determine the equation of $p(x)$ if $p(x)$ is the reflection of $f(x)$ about the x-axis (2)

[20]

Total: 100

