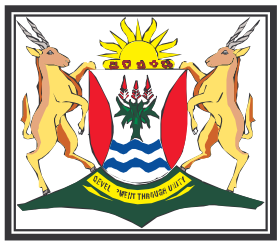

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EASTERN CAPE EDUCATION DEPARTMENT
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IIMVIWO ZEBANGA LESHUMI ELINANYE
GRADE 11 EXAMINATIONS
GRAAD 11-EKSAMEN

NOVEMBER 2008

MATHEMATICS – FIRST PAPER

IXESHA: 3 iiyure **TIME: 3 hours** **TYD: 3 uur**
AMANQAKU: 150 **MARKS: 150** **PUNTE: 150**

Write on the cover of your answer book, after the word "Subject" –
MATHEMATICS – FIRST PAPER

This question paper consists of 8 pages, 2 diagram sheets and a formula sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

1. This question paper consists of TEN questions. Answer ALL the questions.

2. Show clearly ALL calculations, diagrams, graphs, etcetera, which you have used in determining the answers.

3. An approved scientific calculator (non-programmable and non-graphical) may be used, unless stated otherwise.

4. If necessary, answers should be rounded off to TWO decimal places, unless stated otherwise.

5. Number the answers correctly according to the numbering system used in this question paper.

6. Diagrams are NOT necessarily drawn to scale.

7. It is in your own interest to write legibly and to present your work neatly.

8. An information sheet with formulae is attached.

9. A diagram sheet is supplied for QUESTION 8.4 and QUESTION 8.5 as well as for QUESTION 10.2.

QUESTION 1

1.1 Solve for x:

1.1.1 $2x(x-3)=20$ (4)

1.1.2 $x+2=\frac{3x}{x-2}$; $x \neq 2$ (4)

1.1.3 $3x^2-12x+4=0$, round off to TWO decimal places. (4)

1.2 Find the sum of all integers satisfying $x^2-x<20$ (7)

1.3 Solve the following systems of equations simultaneously:
$x-3y=5$ and $x^2+xy+2y^2=4$ (8)
[27]

QUESTION 2

Questions 2.1 and 2.2 to be answered WITHOUT the use of a calculator.

2.1 Determine whether $\sqrt{\sqrt[5]{\frac{-243}{32}}}$ is rational, irrational or non-real.
State reason(s). (3)

2.2 Simplify:

2.2.1 $\frac{2^{3+x}-3.2^x}{3.2^{x-1}+2^x}$ (5)

2.2.2 $\sqrt[3]{\left(\sqrt{13}-\sqrt{5}\right)^6} \cdot \sqrt[3]{\left(\sqrt{13}+\sqrt{5}\right)^6}$ (4)

2.3 Mpho wants to plant a rectangular patch of grass in his garden. The sides of the rectangle measure 26,9 m and 13,1 m. He incorrectly measures it to be 27 m and 13 m and calculates the area of the rectangle to be 351 m^2.
By how much does this area differ from the true area of the rectangle? (3)
[15]

QUESTION 3

3.1 Given: $T_n = 23 - 4(n-1)$

3.1.1 Write down the first 3 terms of the sequence. (3)

3.1.2 Find the tenth term (T_{10}). (1)

3.1.3 Find n if $T_n = -37$. (3)

3.2 Given: $\frac{8}{3}, \frac{4}{3}, \frac{2}{3}, ...$

3.2.1 If the sequence behaves consistently, extend the sequence by 2 terms. (1)

3.2.2 Describe how the sequence is formed. (1)

3.2.3 Determine the general term. (2)
[11]

QUESTION 4

A company builds fences from pieces of wood as shown below.

Diagram 1
3 pieces of wood

Diagram 2
7 pieces of wood

Diagram 3
13 pieces of wood

4.1 Determine the number of pieces of wood in diagram 4. (1)

4.2 Is the general term of the sequence linear or quadratic? (1)

4.3 Hence, determine the number of pieces of wood in diagram n. (6)
[8]

QUESTION 5

5.1 A young student borrows a certain amount of money from a money lender. The money lender charges interest at a rate of 18% p.a. compounded monthly. If the money lender sends a letter of demand of R7 862,27 after 2 years, how much did the student borrow? (5)

5.2 A computer is purchased for R6 500. It depreciates at 15% p.a.

5.2.1 Calculate the book value of the computer after 4 years if depreciation is calculated according to the straight-line method. (3)

5.2.2 Find the rate, according to the reducing-balance method, that would yield the same book value as in QUESTION 5.2.1 after 4 years. (5)

[13]

QUESTION 6

Wanga invested R4 300 at 7,5 % p.a. compound interest for 3 years. She then re-invested the total sum for a further 3 years at 7 % p.a. compounded monthly.

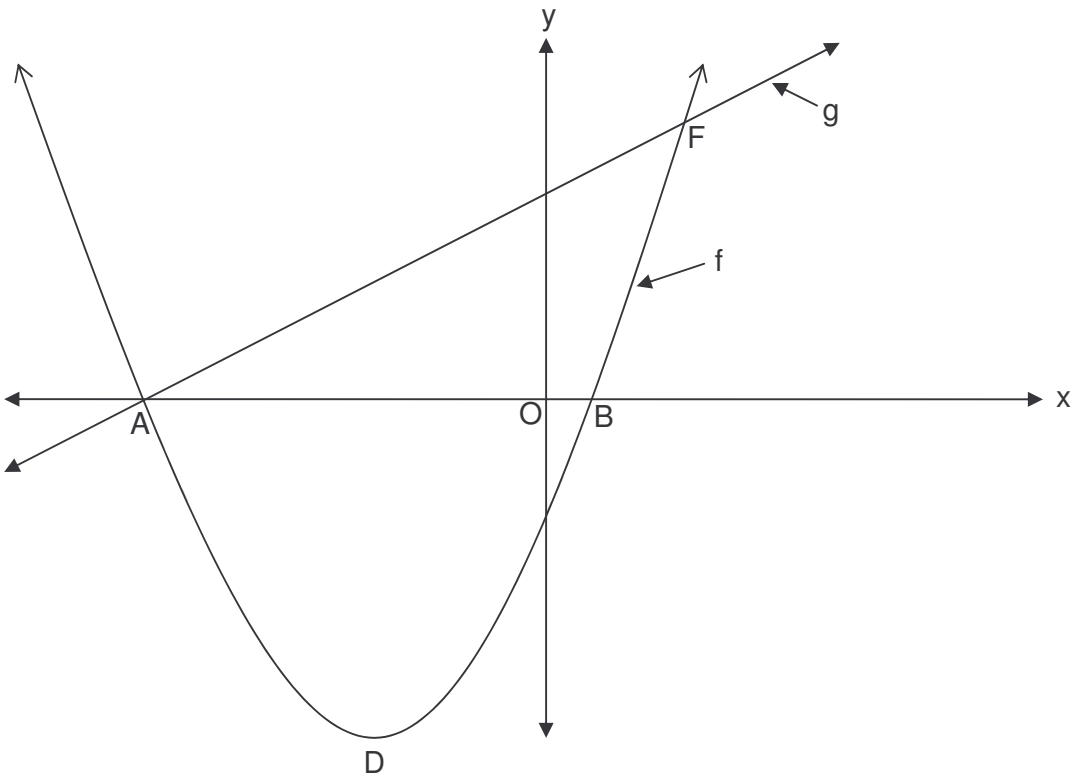
6.1 Calculate the total amount she will receive at the end of the 6-year period. (6)

6.2 Calculate the effective interest rate which is equivalent to the nominal interest rate of 7% p.a. which she will receive for the second part of her investment. (4)

[10]

QUESTION 7

Sketched below are the graphs of $f(x) = x^2 + 4x - 12$ and $g(x) = 2x + 12$



7.1 Determine the co-ordinates of A and B, the x-intercepts of *f.* (4)

7.2 Write the equation of f in the form $y = a(x-p)^2 + q$ by completing the square. (3)

7.2.1 Hence determine the minimum value of *f*(x), (1)

7.2.2 and the coordinates of D (the turning point of *f*). (2)

7.3 Determine the co-ordinates of point F. (5)

7.4 Determine the average gradient between D and F. (3)

7.5 Give the equation of *h* if *h*(x) results from shifting *g*(*x*) 2 units upwards. (1)

7.6 Give the co-ordinates of the turning point of *f*(*x*+1). (2)

[21]

QUESTION 8

Given: $f(x) = \frac{4}{x-1} - 1$ and $g(x) = 2^x - 1$

8.1 Determine the domain of f. (2)

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

8.3 Determine the x and y intercepts of f. (3)

8.4 Draw a neat sketch graph of f, indicating the asymptotes and intercepts with the axes. Use diagram sheet 1. (4)

8.5 On the same system of axes, draw a sketch of graph of g. (3)

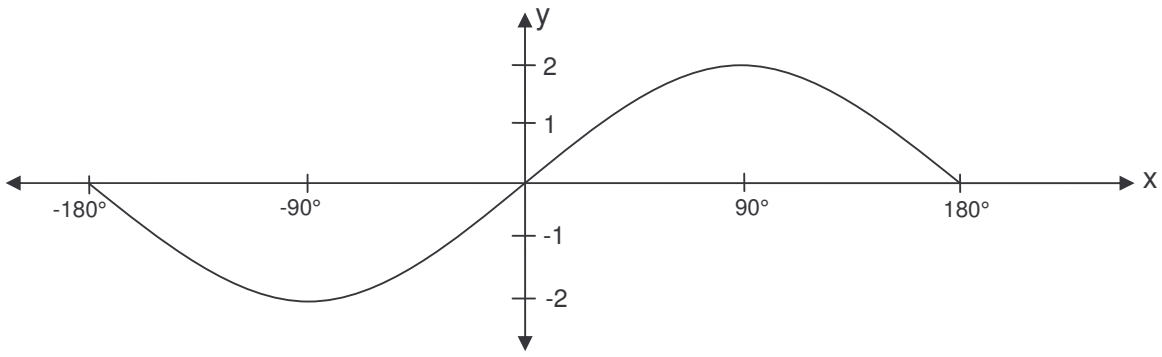
8.6 Describe the transformation for $h(x) = 2^x$ to become $g(x) = 2^x - 1$. (2)

8.7 Determine $g(\frac{3}{4})$ correct to three decimal places. (2)

8.8 Determine the value of x if M(x ; 7) lies on the graph of g. (2)
[20]

QUESTION 9

Given: $f(x) = 2\sin x$ for $x \in [-180°;180°]$



Determine:

9.1 the equation of g if $g(x)$ is the reflection of $f(x)$ in the x-axis. (1)

9.2 the equation of h if $h(x) = f(x - 30°)$. (1)

9.3 the range of k if $k(x) = f(x) + 1$. (2)

9.4 the period of p if $p(x) = f(3x)$. (2)
[6]

QUESTION 10

The City Council subdivided a farm they bought into 100 building plots.

They have R3 600 000 capital available for building houses on this piece of land.

The City Council decided to build two types of houses: simplexes and duplexes. There must be a minimum of 20 simplexes and 30 duplexes.

The simplexes will cost R30 000 each and will yield a profit of R4 000 per house.
The duplexes each will cost R40 000 to build and will yield a profit of R8 000 per house.

Let the number of simplexes to be built be x and the number of duplexes be y.

10.1 Give in terms of x and/or y, the mathematical constraints that will satisfy the above information. (6)

10.2 Illustrate the constraints graphically on the graph paper provided on the answer sheet. Clearly indicate the feasible region. (8)

10.3 Write down an objective function for the profit (P) to be made. (1)

10.4 Use your graph to determine the values of x and y that will ensure the maximum profit. (3)

10.5 What is the profit earned according to the values found in QUESTION 10.4? (1)
[19]

TOTAL: 150