education

Department:
Education
REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 10

MATHEMATICS P1

NOVEMBER 2006

MARKS: 100

TIME: 2 hours

This question paper consists of 7 pages.

INSTRUCTIONS AND INFORMATION

1. Answer ALL the questions.

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

3. Write neatly and legibly.

QUESTION 1

1.1 Simplify:

1.1.1 $(3x-2)(x^2+1)-2$ (3)

1.1.2 $\dfrac{(2^2\times 3)^{x+1}}{2^{2x}\times 3^x}$ (4)

1.1.3 $\dfrac{x^2-1}{3}\times\dfrac{1}{x-1}-\dfrac{1}{2}$ (4)

1.2 What must be added to x^2-x+4 to make it equal to $(x+2)^2$? (3)

1.3 It is given that $2\,000 = 2\times M^3\times N^3$, where M and N are whole numbers.
Determine the value of $M\times N$. (3)

1.4 Factorise:

1.4.1 $3x^2-5x-2$ (2)

1.4.2 $n^2+3n-5n-15$ (3)

1.5 Write down at least THREE rational numbers between $\sqrt{2}$ and $\sqrt{10}$. (3)
[25]

QUESTION 2

2.1 Solve the following equations:

2.1.1 $2x(x-1)=4$ (4)

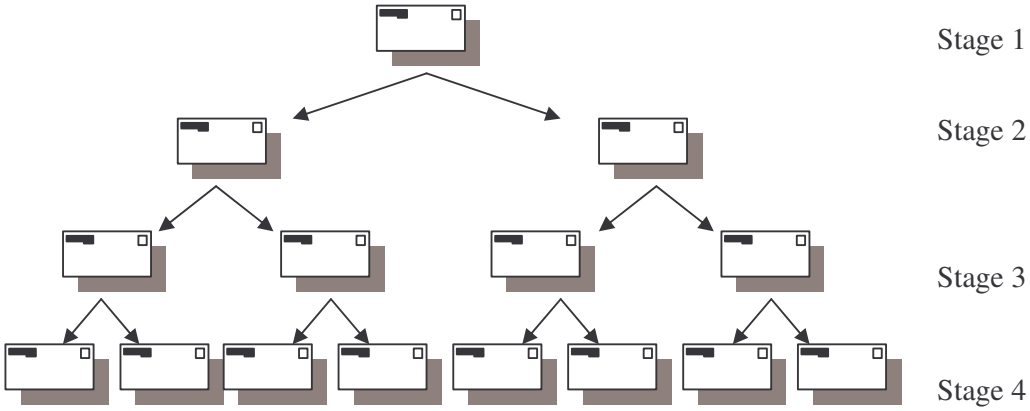
2.1.2 $3^x = 75$ (Answer rounded off correctly to ONE decimal place.) (3)

2.2 Solve the following inequality. Illustrate your answer on a number line if x is a real number.

$-2\le x-1<3$ (4)
[11]

QUESTION 3

3.1 Morwesi started a chain letter with a message of peace and goodwill. She sent it to Rosanne and Nathi and asked them to each send it to two other friends. These friends in turn have to each ask two friends to send it to two other friends. This process must continue and is illustrated below:



3.1.1 How many letters will be sent at stage 5? (1)

3.1.2 How many letters will be sent at stage 6? (1)

3.1.3 Write a conjecture about the number of letters that will be sent at any stage in the process. (2)

3.1.4 Use a variable to express your conjecture algebraically. (2)

3.2 Two chocolates and four packets of chips cost R32 and three of the same chocolates and eight of the same packets of chips cost R58.

Calculate the cost of a single chocolate and a single packet of chips.

(HINT: Let the cost of a chocolate be x and the cost of a packet of chips be y.) (6)
[12]

QUESTION 4

4.1

Consider the advertisement above and answer the following question:

Zaida invested R2 750 at Community Savings Club for 4 years. How much money will she receive at the end of the investment period? (4)

4.2 There are 12 500 people in a small town. The population of the town increases every year by 5,5%. What will the population of the town be after 5 years? (5)

4.3 The Eteana family of three members from Nigeria, wishes to attend the Soccer World Cup in South Africa in 2010. A travel agency has advised them to save R17 000 per person to attend all games in 2010. This cost will include accommodation, airline tickets, et cetera.

How much money, in Nigerian currency, will the family require if the predicted exchange rate in 2010 is:

One Naira (Nigerian currency) = R18,85. (3)

[12]

QUESTION 5

5.1 Given the functions: $f(x) = -x^2 + 4$ and $g(x) = 2x + 4$

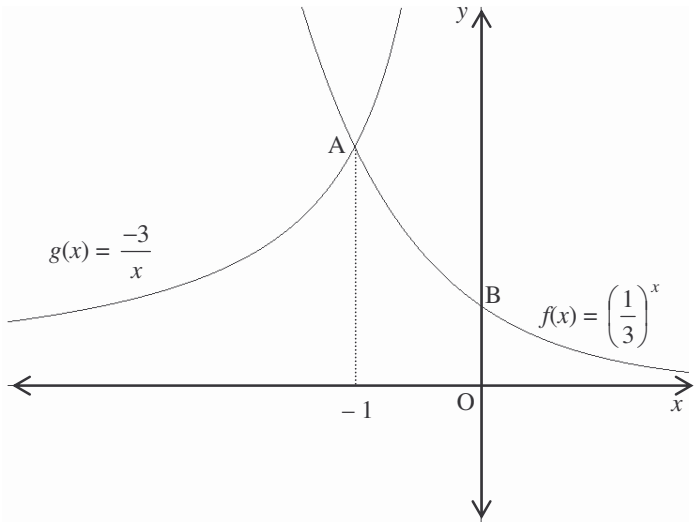
5.1.1 Draw f and g on the same system of axes. (6)

5.1.2 Use your graphs to solve for x if:

$f(x) \leq g(x)$ (3)

5.1.3 Give the equation of p, the reflection of f in the x-axis. (2)

5.2 The graphs of $f(x) = \left(\frac{1}{3}\right)^x$ and $g(x) = \frac{-3}{x}$ where $x < 0$ are represented below:



Answer the following questions by using the graphs:

5.2.1 Write down the co-ordinates of A and B. (2)

5.2.2 Write down the domain of $f(x)$. (1)

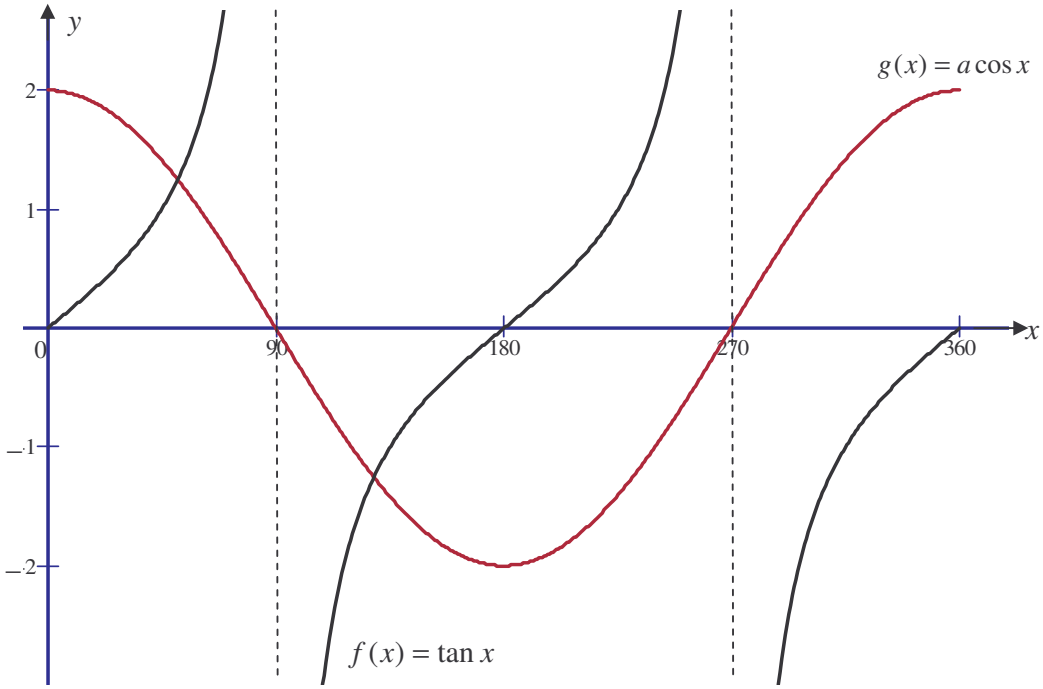
5.2.3 Write down the equation of the reflection of f in the y-axis. (2)

5.2.4 Give the equation of the asymptote of the graph of $y = g(x) + 2$. (2)

[18]

QUESTION 6

The following graphs have been drawn below: $f(x) = \tan x$ and $g(x) = a\cos x$



6.1 Determine the value of a. (2)

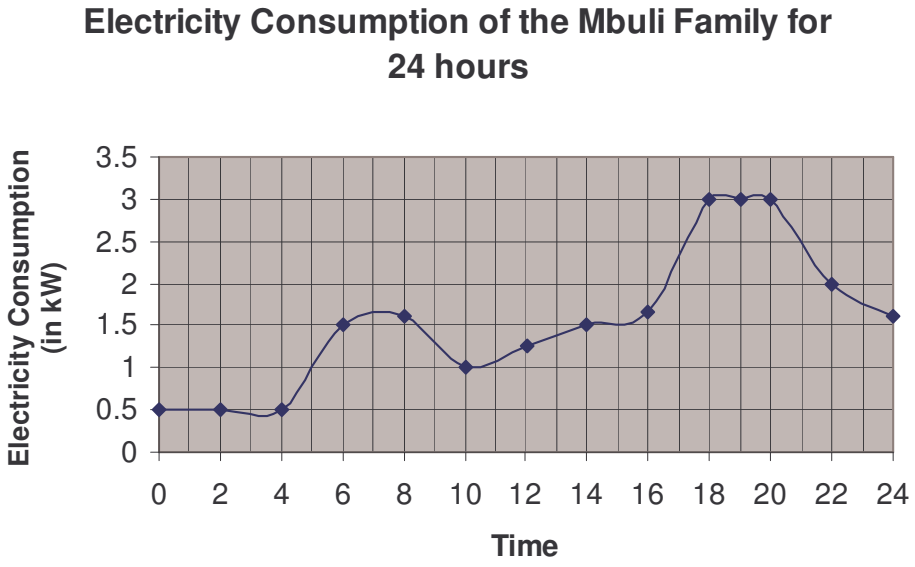
6.2 If $f(x)$ is shifted 2 units upwards, it represents the function h.
State the defining equation of h. (2)

6.3 Write down the values of x for which $g(x) - f(x) = 2$. (2)

6.4 Write down the range of g. (1)

6.5 Write down the period of f. (1)
[8]

QUESTION 7



7.1 What is the maximum and minimum amount of electricity used by the Mbuli's in any hour? (2)

7.2 When is the electricity consumption increasing and when is it decreasing? (4)

7.3 At what stage during the day does the electricity consumption increase most rapidly? (2)

7.4 Determine the average rate of kilowatts per hour used by the Mbuli's for the 24-hour period. (3)

7.5 Does your answer to QUESTION 7.4 fairly reflect the electricity consumption of the Mbuli's for the 24-hour period? Substantiate your answer. (3)
[14]

TOTAL: 100