



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2016

MATHEMATICS P1

MARKS: 150

TIME: 3 hours



This question paper consists of 6 pages.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of NINE questions. Answer ALL the questions.
2. Clearly show ALL calculations, diagrams, graphs, et cetera that you have used in determining your answer.
3. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
4. Answers only will not necessarily be awarded full marks.
5. If necessary, round off answers to TWO decimal places, unless stated otherwise.
6. Diagrams are NOT necessarily drawn to scale.
7. Number the answers correctly according to the numbering system used in this question paper.
8. Write neatly and legibly.
9. An information sheet with formulae is included at the end of the question paper.

QUESTION 1

1.1 Solve for x .

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

1.1.2 $2x^2 - 11x - 4 = 0$ (4)

1.1.3 $x^2 > \frac{1}{4}$ and $x < 0$ (4)

1.1.4 $x + 5 = \sqrt{(3 - 3x)}$ (4)

1.2 1.2.1 Factorise: $y^2 - 9x^2$ (1)

1.2.2 Hence or otherwise solve the following equations simultaneously:

$y + 3x = 2$ and $y^2 - 9x^2 = 16$ (5)

[21]

QUESTION 2

2.1 Simplify:

2.1.1 $\left(\frac{a^3}{2}\right)^2$ (1)

2.1.2 $\frac{2^{x-3} - 3 \cdot 2^{x-1}}{2^{x-2}}$ (4)

2.2 Find the value of: 10^{x+3} if $10^x = 1,5$ (2)

2.3 Solve for x :

2.3.1 $2^x = 0,125$ (2)

2.3.2 $0,5^x \cdot \sqrt{1 + \frac{9}{16}} = 10$ (5)

[14]

QUESTION 3

3.1 For which value(s) of m will the equation $2x(x + 1) + m = x$ have non-real roots? (5)

3.2 If: $f(x) = \frac{\sqrt{x+2}}{5-x^2}$

For which value(s) of x is $f(x)$ not defined? (5)

[10]

QUESTION 4

- 4.1 Given the sequence: $7 ; 12 ; 17 ; \dots \dots \dots$
- 4.1.1 Write down the next two terms of the sequence. (2)
- 4.1.2 Determine the general term of the sequence in the form of $T_n = an + b$. (2)
- 4.1.3 Determine if 12^5 will be a term in above sequence. (3)
- 4.1.4 Explain why any positive number ending with a **2** will form part of the sequence. (2)
- 4.2 Given the sequence: $3 ; 9 ; 17 ; 27 ; \dots \dots \dots$
- 4.2.1 Write down the value of the next term of the sequence. (1)
- 4.2.2 Determine an expression for the n^{th} term of the sequence. (5)
- 4.2.3 Calculate the value of the first term that is greater than 269. (4)
- 4.3 A quadratic pattern has a second term equal to **6**, a third term equal to **2** and a fifth term equal to **-18**.
- 4.3.1 Calculate the second difference of the pattern. (4)
- 4.3.2 Calculate the first term. (3)
- [26]**

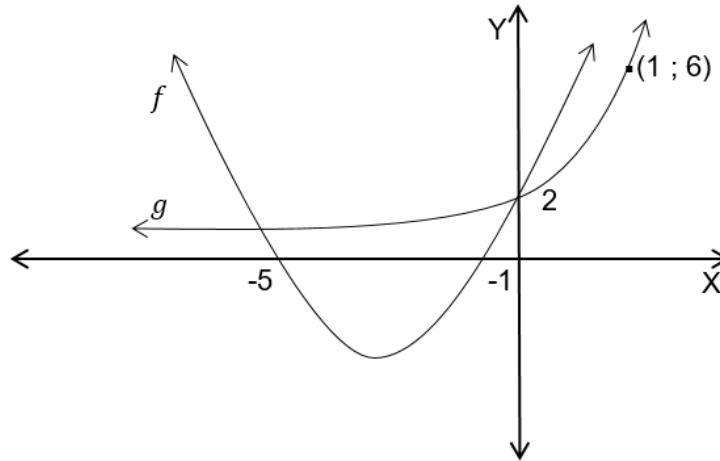
QUESTION 5

Given: $f(x) = \frac{8}{x-8} + 4$

- 5.1 Write down the equations of the asymptotes of f . (2)
- 5.2 Write down the domain and range of f . (2)
- 5.3 Draw the graph of f showing all intercepts and asymptotes. (4)
- 5.4 Use your graph to solve for x , if : (2)
- 5.4.1 $\frac{8}{x-8} \geq -4$ (3)
- 5.4.2 $f(x) \leq 3$ (3)
- 5.5 Determine the equation of the positive axis of symmetry of f . (2)
- 5.6 Determine the equation of g if $g(x) = f(x-2) - 2$. (2)
- [18]**

QUESTION 6

Sketched below are the graphs of $f(x) = ax^2 + bx + c$ and $g(x) = k \cdot m^x$.
 The parabola has intercepts $(-5; 0)$; $(-1; 0)$ and $(0; 2)$.
 The exponential graph passes through the points $(0; 2)$ and $(1; 6)$.



- 6.1 Determine the equation of the parabola in the form of $y = ax^2 + bx + c$. (4)
 - 6.2 Determine the values of m and k . (3)
 - 6.3 Write down the equation of the asymptote of the exponential curve. (1)
 - 6.4 Determine the value(s) of x for which:
 - 6.4.1 $f(x)$ is decreasing (2)
 - 6.4.2 $2 \leq g(x) \leq 6$ (2)
 - 6.4.3 $g(x) \leq 2$ (2)
 - 6.4.4 $f(x) \cdot g(x) < 0$ (2)
 - 6.5 Determine the average gradient between the points $(-5; 0)$ and the y-intercept of g . (3)
- [19]**

QUESTION 7

The graph of $y = b^x$ is shifted 2 units to the right and 4 units upwards. The shifted graph passes through the point $(4; 8)$.

- 7.1 Calculate the value of b . (4)
- 7.2 Hence, write down the equation of shifted graph. (1)

[5]

QUESTION 8

- 8.1 A new cell phone was purchased for R 7 200. Determine the depreciation value after 3 years if the cell phone depreciates at 25% per annum on reducing balance method. (3)
- 8.2 An amount of R 500 is invested at x % per annum compounded half yearly. After 6 years it has grown to R 1 126,10. Calculate the value of x , correct to two decimal places. (4)
- 8.3 John invest R 120 000. He is quoted a nominal interest rate of 7,2 % per annum compounded monthly.
- 8.3.1 Calculate the effective interest rate p.a. correct to three decimal places. (3)
- 8.3.2 Use the effective interest rate to calculate the value of John's investment if he invested the money for 3 years. (3)
- 8.3.3 Suppose John invest his money for a total of 4 years, but after 18 months he makes a withdrawal of R 20 000. How much will he receive at the end of 4 years? (4)
- [17]**

QUESTION 9

A packet of sweets contains 3 pink, 2 green and 5 blue sweets. Two sweets are removed in succession from the packet without replacing them.

- 9.1 Draw a tree diagram to determine all possible outcomes. (6)
- 9.2 Determine the probability that: (Round of your answer to three decimal places)
- 9.2.1 Both sweets are blue (2)
- 9.2.2 A green and a pink sweet are selected (5)
- 9.3 A survey was conducted amongst 60 boys and 60 girls in grade 8 relating to their participation in sport. 20 girls did not participate in any sport and 50 boys did participate in a sport.
- 9.3.1 Complete a two way contingency table for the above survey. (5)
- 9.3.2 What is the probability that if a grade 8 pupil is chosen at random that:
- (a) It is a girl and participates in sport? (1)
- (b) The pupil does not participate in sport and is not female? (1)
- [20]**

TOTAL: 150

