



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2020

**MATHEMATICS P1
EXEMPLAR**

MARKS: 150

TIME: 3 hours



This question paper consists of 8 pages.

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. 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.

QUESTION 11.1 Solve for x :

1.1.1 $(3x+2)(x-5) = 0$ (2)

1.1.2 $3x^2 - 5x - 1 = 0$ (correct to 2 decimal places) (3)

1.1.3 $x = 4 - \sqrt{x-2}$ (5)

1.1.4 $2x^2 + 5x \leq 3$ (4)

1.2 Simplify the following, **without using a calculator**:

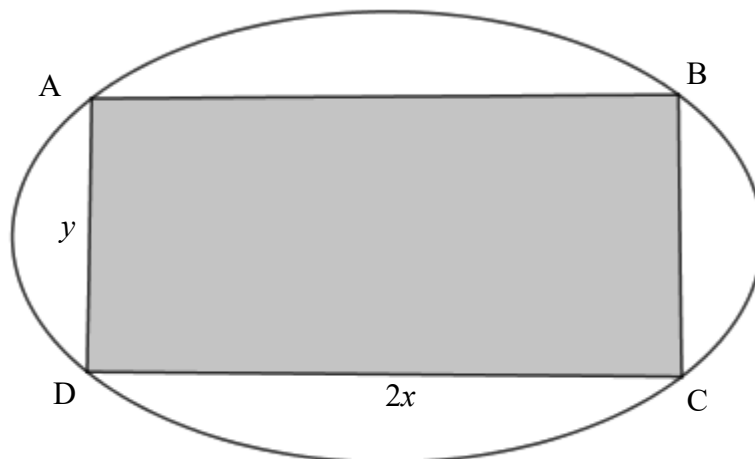
1.2.1 $\left(\frac{8}{27}\right)^{\frac{2}{3}}$ (2)

1.2.2 $(\sqrt{12}+2)(\sqrt{3}-1)$ (3)

1.3 Solve for x and y simultaneously:

$5y - x = 2$ and $x^2 - 3xy + 4y = 4$ (6)

1.4 The diagram below shows an oval piece of land that Eli acquired for his poultry project. He decides to use the biggest possible rectangular piece of land out of the entire piece. The rectangular piece will have a length of $2x$ metres and a breadth of y metres, as shown:



1.4.1 Show that the area A , of the rectangle can be written as: $A = 280x - 4x^2$, given that the perimeter of the rectangle is 280 m. (3)

1.4.2 Determine the maximum possible area that the rectangle can occupy. (3)

[31]

QUESTION 2

2.1 Simplify:

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

2.2 Solve for x :

$$2.2.1 \quad 5x^{\frac{2}{5}} = 20 \quad (3)$$

$$2.2.2 \quad 12^x \cdot 3^{x+1} = 648 \quad (4)$$

2.3 Given: $f(x) = \frac{3x-2}{x^2+10x+25}$,Determine the values of x for which $f(x)$ is defined. (4)**[15]****QUESTION 3**

3.1 Given the linear pattern: 9 ; 5 ; 1 ; ... ; -143.

3.1.1 Determine the formula for the n^{th} term of the pattern. (2)3.1.2 Calculate the value of T_7 . (2)3.1.3 Determine the number of terms in the pattern. (2)3.2 Given that, in a linear number pattern, the 16th term is 38 and the 41st term is 113.
Which term is -1? (4)**[10]****QUESTION 4**

Given the quadratic pattern: -12; -8; 0; 12; ...

4.1 Determine the next two terms of the pattern. (2)4.2 Determine T_n , the general term of the pattern, in the form $T_n = an^2 + bn + c$. (4)4.3 Between which **two** consecutive terms does the **first** difference of 192 lie? (3)4.4 A new pattern, P_n , is formed. It is given that $P_n = T_n - 168$, determine the number of negative terms in the new pattern. (5)4.5 Show that T_n is always an even number. (2)**[16]**

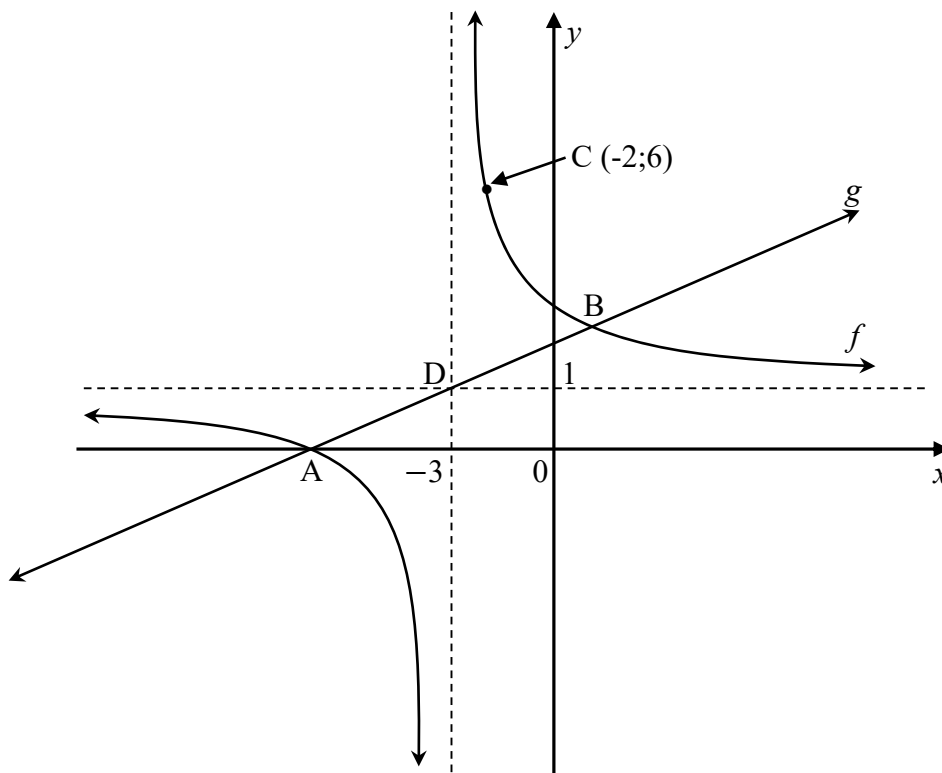
QUESTION 5

Given: $f(x) = -x^2 + 6x + 7$

- 5.1 Determine the coordinates of the turning point of f . (3)
- 5.2 Determine the x -intercepts of f . (2)
- 5.3 Draw a neat sketch of f , clearly indicating all intercepts with the axes and the turning point. (4)
- 5.4 Write down the equation of the axis of symmetry of f . (1)
- 5.5 Determine the average gradient of f between $x = -3$ and $x = 1$. (4)
- 5.6 The graph of f is shifted 4 units to the left and reflected in the x -axis to form h . Write down the equation of h in the form $h(x) = a(x+p)^2 + q$. (2)
- [16]**

QUESTION 6

The diagram below shows the graphs of $f(x) = \frac{a}{x+p} + q$ and $g(x) = bx + c$. The asymptotes of f are at $x = -3$ and at $y = 1$. f and g intersect at A, the x -intercept of f , and B, while $C(-2;6)$ is a point that lies on f . g passes through the point $D(-3;1)$, the point of intersection of the asymptotes of f .



- 6.1 Write down the equation of f in terms of a . (2)
- 6.2 Determine the value of a . (2)
- 6.3 Determine the coordinates of the x -intercept of f . (2)
- 6.4 Determine the values of b and c and write down the equation of g . (4)
- 6.5 Write down the domain of f . (2)
- 6.6 Determine the coordinates of B. (4)
- 6.7 Determine the values of x for which $x.f(x) \geq 0$. (3)
- [19]

QUESTION 7

7.1 Given: $g(x) = \left(\frac{1}{2}\right)^x - 4$

- 7.1.1 Write down the equation of asymptote of g . (1)
- 7.1.2 Write down the range of g . (1)
- 7.1.3 Determine the coordinates of the x and y -intercepts of g . (3)
- 7.1.4 Hence, write down the values of x for which $g(x) < 0$. (1)
- 7.2 Draw a neat sketch of the graph of $h(x) = a.b^x + q$ where
- $a = -1$
 - $0 < b < 1$
 - $q > 1$
- (3)
- [9]

QUESTION8

- 8.1 Calculate the effective interest rate per annum if an investment earns 9,5% interest per annum, compounded monthly. (3)
- 8.2 The value of a house increased to R764 050,60 over a period of 5 years due to inflation. The price of the house increased at a rate of 5% p.a. compounded annually. Calculate the original price of the house. (3)
- 8.3 Kamvelihle invested R28 000 into a savings account that pays interest at 7,5% p.a. compounded monthly for the first 4 years and 11% p.a. compounded quarterly thereafter. At the end of the 4th year, he withdrew R7 300.
- 8.3.1 Calculate his balance at the end of the 7th year of his investment. (5)
- 8.3.2 Assuming that at the end of 7 years, his balance is R42 181, 59, Kamvelihle wants his investment to grow to R80 000 in another 5 years' time. How much must he deposit into the account immediately to achieve this goal if the bank offers 8% p.a. interest compounded monthly?
Write your answer correct to the nearest rand. (5)

[16]

QUESTION 9

9.1 Two events A and B are such that:

- $P(\text{not } A) = 0,45$
- $P(B) = 0,3$
- $P(A \text{ or } B) = 0,685$

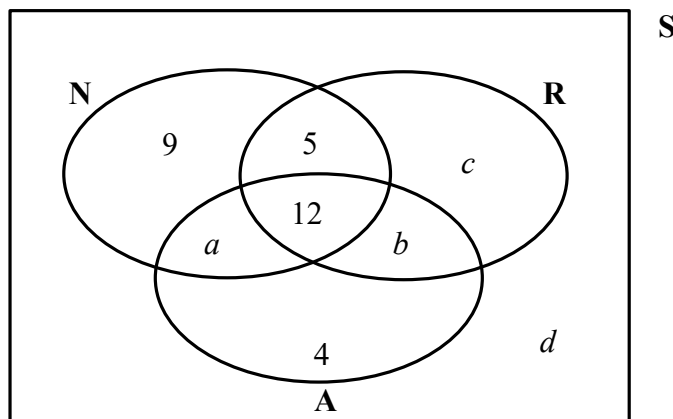
Are events A and B independent? Justify your answer.

(5)

9.2 A survey was done among a group of 75 learners to determine which sports they watch on television. They chose from athletics (A), netball (N) and rugby (R). Some of the information that was collected is as follows:

- 12 learners watch netball, rugby and athletics
- 25 learners watch rugby and athletics
- 22 learners watch netball and athletics
- 38 learners watch rugby
- 5 learners watch only netball and rugby
- 9 learners watch netball only
- 4 learners watch athletics only

The Venn diagram below shows the information:



9.2.1 Determine the values of a , b , c and d .

(4)

9.2.2 Calculate the probability that a learner selected at random watches athletics or both netball and rugby.

(3)
[12]

QUESTION 10

A bag contains a certain number tennis balls that are the same in all respects except colour. There are 5 green balls and the rest are blue.

Ncomi picks a ball, observes the colour and does **not** put it back in the bag.

He picks a second ball and observes the colour. The probability that both balls that Ncomi picks are green, is $\frac{5}{18}$. Determine the total number of balls in the bag.

[6]

TOTAL: 150