



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 11

NOVEMBER 2019

MATHEMATICS P1 (EXEMPLAR)

MARKS: 150

TIME: 3 hours

This question paper consists of 7 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.

QUESTION 11.1 Solve for x :

1.1.1 $x^2 - 5x - 6 = 0$ (3)

1.1.2 $(2x - 3)(x + 1) = 9$ (4)

1.1.3 $x - \sqrt{x - 1} = 3$ (5)

1.1.4 $x(x + 10) > -25$ (4)

1.2 Solve for x and y simultaneously:

$2x - y = 1$ and $3x^2 - 4xy + y^2 = 0$ (6)

1.3 $x = -3 \pm 2\sqrt{2}$ are the roots of a quadratic function, $f(x)$ of which the y -intercept is 4. Determine $f(x)$.(5)
[27]**QUESTION 2**

2.1 Simplify:

$$\frac{8^{n-3} \cdot 32^{-n+1} \cdot 6^{2n}}{9^n}$$
 (5)

2.2 Solve for x :

2.2.1 $x^{\frac{2}{3}} = 4$ (3)

2.2.2 $2^{2x} - 4^{x-1} = 12$ (4)

2.3 Given: $g(x) = \frac{x^2 - 2x + 2}{3 - x}$ 2.3.1 Determine the values of x for which $g(x)$ is not defined. (2)2.3.2 Explain why $g(x)$ will never be equal to zero. (show your calculations) (3)

[17]

QUESTION 3

3.1 Given the sequence: $10 ; 7 ; 4 ; 1 ; \dots$

3.1.1 Write down the next two terms of the sequence. (2)

3.1.2 Determine the formula for the n^{th} term of the sequence. (2)

3.1.3 Which term of the sequence is equal to -179 ? (3)

3.2 Given the first three terms of a linear sequence: $3x - 2 ; x + 9 ; 2x + 5$

Determine the value of x . (3)

[10]

QUESTION 4

Given the quadratic pattern: $-128 ; -84 ; -48 ; -20 ; \dots$

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 Given that $T_n = -4n^2 + 56n - 180$, determine the biggest numerical value for T_n . (5)

4.4 Given that $h(n) = T_n + k$. For which values of k will T_n **not** have any positive values? (2)

[13]

QUESTION 5

Given: $f(x) = \frac{-3}{x+3} - 1$ and $g(x) = -a^x$. The point $(1 ; -3)$ lies on g .

5.1 Determine the value of a . (2)

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

5.3 Write down the range of g . (1)

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

5.5 Draw neat sketches of f and g on the same system of axes, clearly indicating all asymptotes and intercepts with the axes. (6)

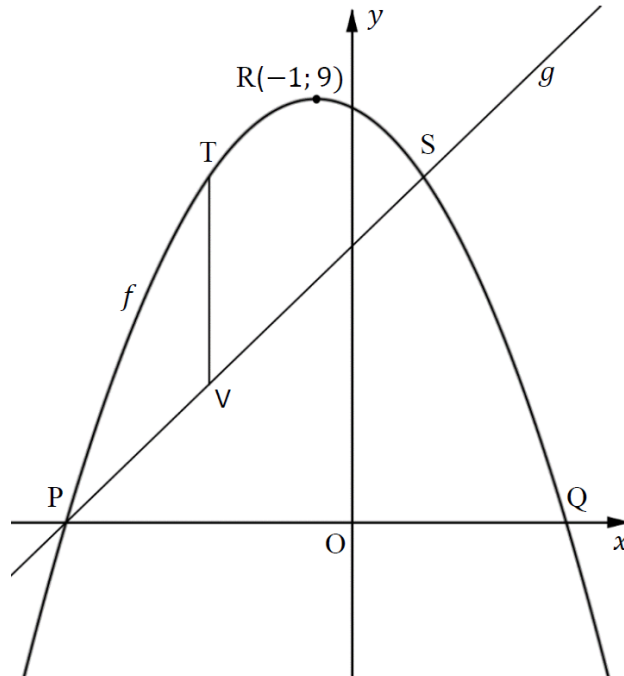
5.6 Determine the axis of symmetry of f which has a positive gradient. (2)

5.7 Given that $h(x) = f(x) + b$, determine the value of b such that the range of f is $y \neq 0$. (2)

[18]

QUESTION 6

$R(-1; 9)$ is the turning point of the graph: $f(x) = ax^2 + bx + c$. P and Q are the x -intercepts of f . TV is a straight line parallel to the y -axis. The graph of $g(x) = x + 4$ has an x -intercept at P. S is a point of intersection of f and g .



- 6.1 Determine the coordinates of P. (2)
 - 6.2 Hence, or otherwise, write down the coordinates of Q. (2)
 - 6.3 Calculate the average gradient between P and R. (2)
 - 6.4 Show that for f , $a = -1, b = -2$ and $c = 8$. Show ALL your working. (6)
 - 6.5 Calculate the coordinates of S, the point of intersection of f and g . (5)
 - 6.6 Determine the maximum length of TV between the points P and S. (5)
 - 6.7 Determine the values of x for which $x \cdot f(x) < 0$ (3)
- [25]**

QUESTION 7

- 7.1 The value of a laptop depreciates on a reducing balance method, at a rate of 13,4% p.a. Calculate the original value of the laptop given that it had depreciated to R7 210 over a period of 5 years. (4)
- 7.2 Calculate the effective interest rate if an investment offers a nominal interest rate of 8,2% p.a. compounded quarterly. (3)
- 7.3 Allen invested an amount of R20 000 on 1 January 2015, at an interest rate of 10,3% p.a. compounded monthly. At the start of the second year, he deposited R15 000 into the same account but the interest rate increased to 11,5% p.a. compounded monthly. At the end of the third year, he withdrew a certain amount of money from his savings and kept the rest of the money in his account for a further 2 years at an interest rate of 16,8% p.a. compounded quarterly.
- 7.3.1 What was the balance of his investment on 31 December 2015? (4)
- 7.3.2 How much money, to the nearest rand, did he withdraw at the end of the third year, given that his final bank balance at the end of the fifth year was R30 183,64? (6)
- [17]

QUESTION 8

- 8.1 A bag contains 3 red and 5 yellow tennis balls. A player picks a ball at random, observes the colour and does **not** replace it. She then picks a second ball.
- 8.1.1 Draw a tree diagram to represent the above information, showing all possible outcomes. (5)
- 8.1.2 Determine the probability that the player picks balls of a different colour. (4)
- 8.2 The probability that South Africa reaches the finals of the 2019 Rugby World Cup is 0,35 and the probability that New Zealand reaches the finals is 0,5. The probability that neither South Africa nor New Zealand reaches the final is 0,06.
- 8.2.1 Draw a Venn diagram to represent the information above. (3)
- 8.2.2 Determine the probability that both South Africa and New Zealand reach the finals. (2)
- [14]

QUESTION 9

The partially-completed table below shows the number of distinctions obtained by male and female learners in a particular district, in three subjects: Mathematics, Accounting and Physical Sciences.

	Mathematics (M)	Accounting (A)	Physical Sciences (PS)	Total
Male	60	<i>a</i>	97	<i>b</i>
Female	65	81	114	260
Total	125	164	211	500

- 9.1 Determine the values of *a* and *b*. (2)
- 9.2 Use the information on the table to determine if the events
 $M = \{\text{a learner obtains a distinction in Maths}\}$ and
 $F = \{\text{a learner is female}\}$, are independent events.
Support your answer with necessary calculations. (4)
- 9.3 If a learner is selected at random, calculate the probability that the learner is a female who achieved a distinction in Mathematics or Physical Sciences. (3)

[9]**TOTAL: 150**