



Province of the
EASTERN CAPE
EDUCATION

**NATIONAL
SENIOR CERTIFICATE**

GRADE 10

NOVEMBER 2020

**TECHNICAL MATHEMATICS P1
(EXEMPLAR)**

MARKS: 100

TIME: 2 hours

This question paper consists of 7 pages, including a 1-page diagram sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions in the question paper.

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. A DIAGRAM SHEET is attached at the back of this question paper. Use it to answer QUESTION 6.1.
4. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining the answers.
5. Answers only will NOT necessarily be awarded full marks.
6. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
7. If necessary, round off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are not necessarily drawn to scale.
9. Write neatly and legibly.



QUESTION 1

1.1 Given the following numbers: $\sqrt{5}$; $\sqrt[3]{27}$; $\sqrt{-4}$

Which one of the above numbers is:

1.1.1 rational (1)

1.1.2 imaginary (1)

1.2 Write 147 as a binary number. (2)

1.3 Determine the following and leave your answer as a whole number.

1.3.1 $1101_2 \times 101_2$ (3)

1.3.2 $111111_2 \div 101_2$ (2)

1.4 Write in scientific notation: 0,000004158 (1)

1.5 Determine the value of the following if $x = -5$ and $y = 2$

$$x^2y^2 - 5xy + 4 \quad (2)$$

[12]

QUESTION 2

2.1 Determine the product of the following and simplify:

2.1.1 $(x - 2)(x^2 + 2x + 4)$ (2)

2.1.2 $3a(a - 8) + 3a^2 - 4(a - 1) - a^3$ (5)

2.1.3 $-2i(5 - 3i)$ (3)

2.2 Simplify the following:

2.2.1 $\frac{64^{x-1} \cdot 4^{2x+2}}{8^x}$ (3)

2.2.2 $\frac{1}{x^2 - 4xy + 4y^2} + \frac{x^2 + 2xy + 4y^2}{x^3 - 8y^3} - \frac{1}{x^2 - 4y^2}$ (8)

[21]

QUESTION 3

Factorise the following completely:

3.1 $3x^8 - 3$ (4)

3.2 $x^2 - 5x + 6$ (2)

3.3 $8x^3 - 27$ (2)
[8]

QUESTION 4

4.1 Solve for x :

4.1.1 $(x - 3)(4x + 20) = 0$ (2)

4.1.2 $\frac{4}{x-2} - \frac{10}{x} = \frac{2}{x^2 - 2x}$ (3)

4.1.3 $81^{x-3} = \frac{1}{729}$ (4)

4.2 Solve the following inequality and represent your answer on a number line:

 $-\frac{2}{3}(7x - 2) < 6$ (4)

4.3 Make x the subject of the following formula:

$$\frac{1}{b} + \frac{2b}{x} = 2 \quad (3)$$

4.4 The admission fee at a fair is R15,00 for children and R40,00 for adults. On a certain day, 2 200 people enter the fair and R50 500 is collected. How many children and how many adults attended the fair? (5)
[21]

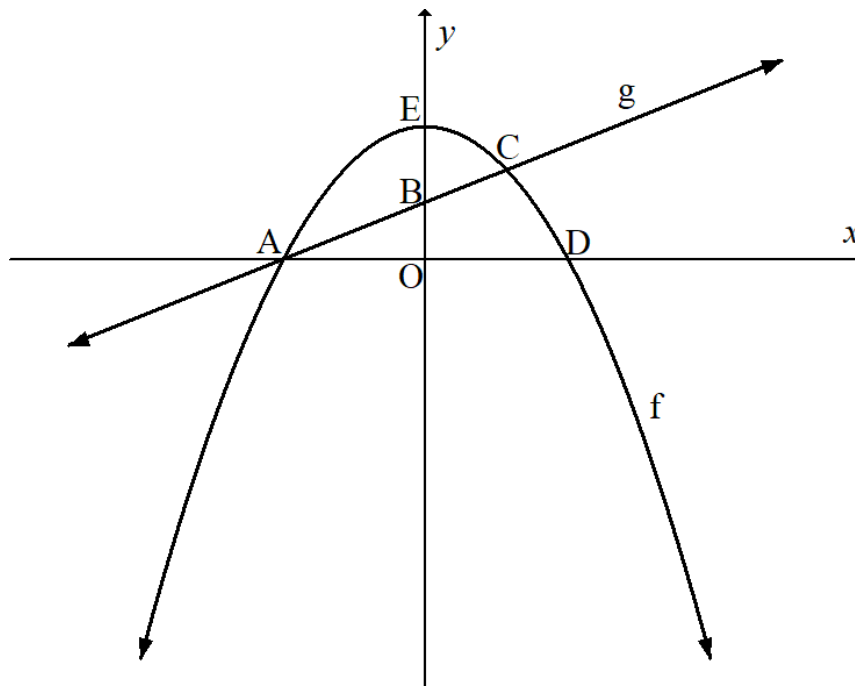
QUESTION 5

- 5.1 An amount of R7 440 is invested in a savings account which pays 5,75% compound interest per annum. Calculate the balance accumulated at the end of 8 years. (3)
- 5.2 Portia wants to buy a television on a hire purchase agreement. The cash price of the television is R8 000. She is required to pay a deposit of 22% and pay the remaining loan agreement off over 12 months at an interest rate of 10% p.a.
- 5.2.1 What is the principal loan amount? (3)
- 5.2.2 What is the accumulated loan amount? (2)
- 5.2.3 What are Portia's monthly repayments? (2)
- 5.2.4 What is the total amount she has paid for the television? (2)
- 5.3 The price of 2 litres of milk is R24,99. How much will it cost in 5 years time if the inflation rate is 15% p.a.? (3)
- [15]



QUESTION 6

- 6.1 Use the DIAGRAM SHEET provided to sketch the graphs of $h(x) = \frac{10}{x}$ and $p(x) = 2 \cdot 2^x$ on the same system of axes. Clearly show all the intercepts with the axes and the asymptotes. (5)
- 6.2 Given the sketch of the straight line $g(x) = mx + c$ and the parabola $f(x) = ax^2 + b$, with the points $A(-2; 0)$ and $D(2; 0)$ as the x -intercepts of $f(x)$ and A is also the x -intercept of $g(x)$. $B(0; 3)$ is the y -intercept of $g(x)$ and $E(0; 7)$ is the y -intercept of $f(x)$. $C\left(\frac{8}{7}; \frac{33}{7}\right)$ is a point where the two graphs intersect.



- 6.2.1 (a) Determine the values of m and c . (3)
- (b) Write down the value of b . (1)
- (c) Hence, determine the value of a . (3)
- 6.2.2 What is the length of EB ? (2)
- 6.2.3 Give the axis of symmetry for $f(x)$. (1)
- 6.2.4 (a) Write down the gradient of the straight line perpendicular to $g(x)$. (1)
- (b) Hence, determine the equation of this new line $q(x)$ passing through point D . (3)
- 6.2.5 For which values of x will $f(x) \geq g(x)$? (2)
- 6.2.6 For which values of x will $f(x) < 0$? (2)

[23]

TOTAL: 100

DIAGRAM SHEET

NAME OF LEARNER:

CLASS:

SCHOOL:

QUESTION 6.1

| | | | | | | | | | |
|--------|----|----|----|----|---|---|---|---|---|
| x | -4 | -3 | -2 | -1 | 0 | 1 | 2 | 3 | 4 |
| $f(x)$ | | | | | | | | | |
| $g(x)$ | | | | | | | | | |

