



Basic Education

KwaZulu-Natal Department of Basic Education
REPUBLIC OF SOUTH AFRICA

MATHEMATICS
COMMON TEST
MARCH 2016

**NATIONAL SENIOR
CERTIFICATE**

GRADE 11

MARKS: 75

TIME: 1½ hours

N.B. This question paper consists of 5 pages including this page.

INSTRUCTIONS AND INFORMATION

Read the following instruction carefully before answering the questions.

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

QUESTION 11.1 Simplify full, **without using a calculator**

1.1.1 $\sqrt[3]{3} \cdot 27^{\frac{2}{3}} \cdot \sqrt[3]{3^2}$ (3)

1.1.2 $\frac{4^{2x+1} \cdot 10^{2x-3}}{32^{x-1} \cdot 2^x \cdot 5^{2x-2}}$ (4)

1.2 If the length and breadth of a rectangle is $(\sqrt{5-1})$ and $(\sqrt{5+1})$ units respectively. Determine the length of the diagonal. Leave your answer in its simplest surd form. (3)1.3 **Solve for x :**

1.3.1 $\frac{27^{x-1}}{3^{x+2}} = \sqrt[3]{81^x}$ (4)

1.3.2 $5^{2-x} + 5^{-x} - 130 = 0$ (4)
[18]

QUESTION 22.1 **Solve for x :**

2.1.1 $2x^2 - 5x = 0$ (3)

2.1.2 $11x = 7x^2 + 3$ (Answer correct to 2 decimal places) (4)

2.1.3 $\sqrt{x+8} - 2 = x$ (4)

2.2

2.2.1 Write down the value(s) of x for which $\frac{(x+2)^2}{x}$ is undefined? (1)2.2.2 Hence, solve the following inequality $\frac{(x+2)^2}{x} \geq 0$. (4)2.3 Solve for x and y .

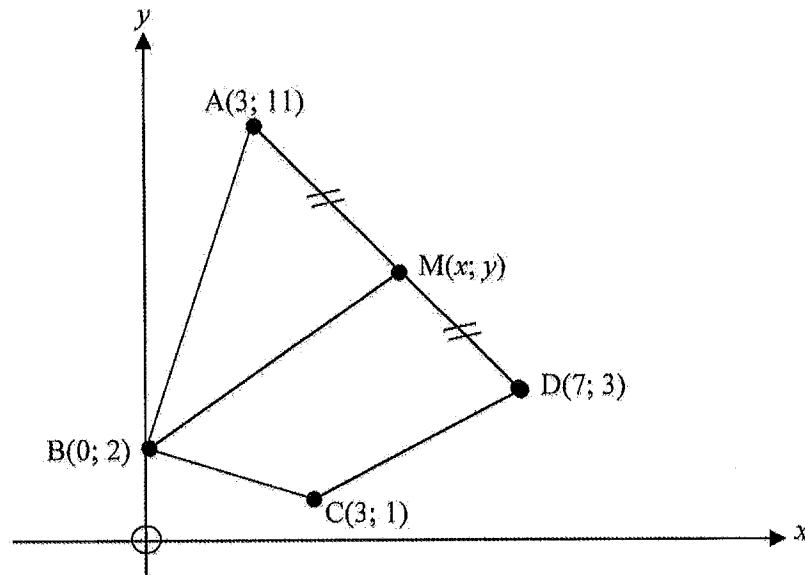
$$\begin{aligned} 3^{x+7} &= 27^{3x-3} \quad \text{and} \\ x^2 + 2xy + x - 2y^2 &= 0 \end{aligned}$$
 (6)

2.4 Simplify $25^{30} \times 2^{60}$ and determine the sum of the digits of the product. (3)

[25]

QUESTION 3

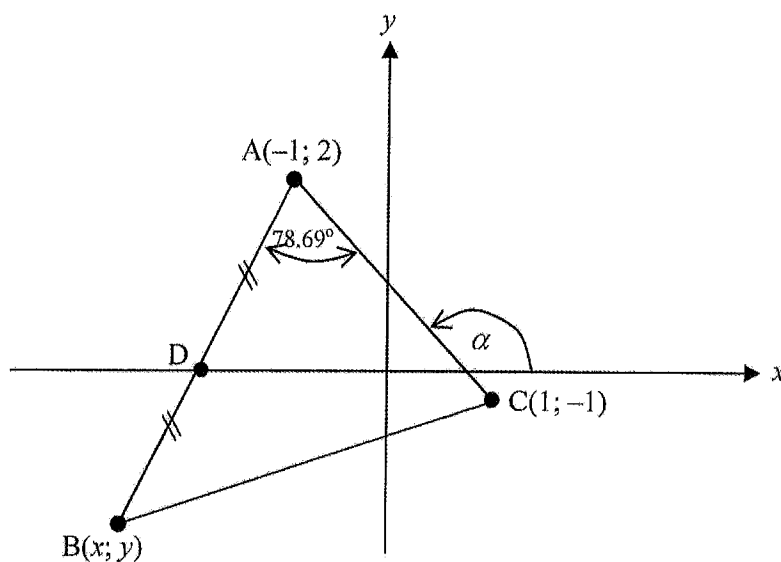
3.1 In the diagram below, ABCD is a quadrilateral with $A(3;11)$, $B(0;2)$, $C(3;1)$, $D(7;3)$



Calculate:

- 3.1.1 The lengths of AB and AD. (4)
- 3.1.2 The coordinates of M, the midpoint of AD. (2)
- 3.1.3 The gradients of BC (2)
- 3.1.4 The equation of BM, in the form $y = mx + c$. (4)
- 3.2 Prove that $AB \perp BC$. (4)

- 3.3 In the diagram below, $A(-1;2)$, $B(x;y)$ and $C(1;-1)$ are the vertices of a triangle. D is the x -intercept and the midpoint of AB . \hat{BAC} is $78,69^\circ$.



3.3.1

3.3.1.1 Calculate the size of angle θ . (2)

3.3.1.2 Hence, find the equation of AB . (3)

3.3.2 Determine the coordinates of D . (2)

3.3.3 Determine the coordinates of B . (2)

3.3.4 Find the equation of a line passing through B and perpendicular to BC in the form:

$$y = mx + c. \quad (4)$$

- 3.5 If the following points $B(x; -3)$, $E(-4; 5)$ and $F(2; 2)$ are collinear, calculate the value of x . (3)

[32]

TOTAL MARKS: 75