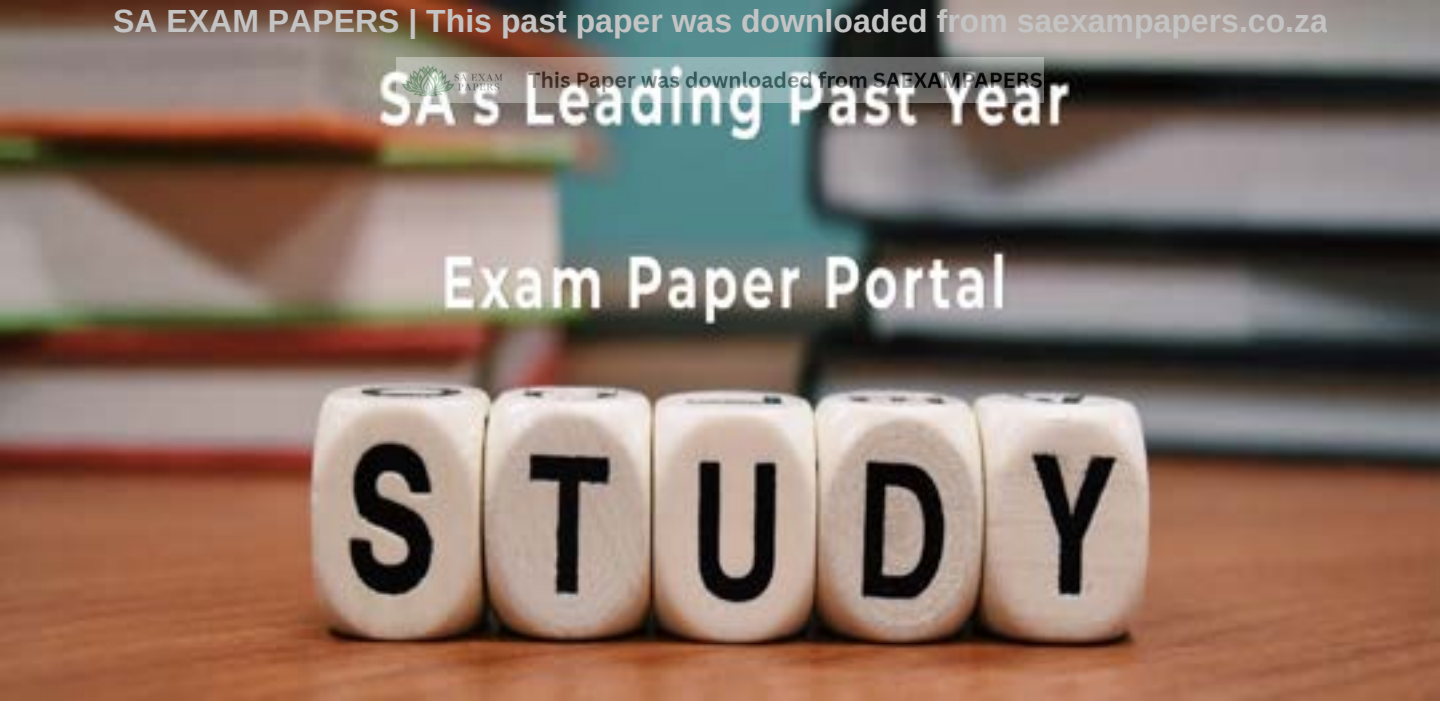


education

MPUMALANGA PROVINCE

REPUBLIC OF SOUTH AFRICA

NATIONAL SENIOR CERTIFICATE

GRADE 12

MATHEMATICS TERM 1 TEST

17 MARCH 2025

MARKS: 58

TIME: 70 minutes

This question paper consists of 6 pages and 1 information sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 5 questions.
2. Answer ALL the questions.
3. Clearly show ALL calculations, diagrams, graphs et cetera that you used to determine the answers.
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. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. An INFORMATION SHEET with formulae is included at the end of the question paper.
9. Write neatly and legibly

QUESTION 1

1.1. Consider the arithmetic sequence: 8; 15; 22; …

1.1.1 Determine the 36^{th} term (2)

1.1.2 Calculate the sum of the first 36 terms (2)

1.1.3 If it is given that $T_{72} + T_{72-m} = 786$, determine the value of m (3)

1.2 $(x-2)^2 + (x-2)^3 + (x-2)^4 + \ldots$ forms a geometric series

1.2.1 Write down the common ratio (1)

1.2.2 Determine the value(s) of x for which the series will converge (2)

[10]

QUESTION 2

2.1 The given number pattern is a combination of a quadratic sequence and an arithmetic sequence : 16; 32; 0; 28; -12; 24; -20; 20;...

2.1.1 Determine the general term of the quadratic sequence (4)

2.1.2 Determine the general term of the arithmetic sequence (2)

2.1.3 The given number pattern has two consecutive terms that are equal in value, determine the positions of the two terms (4)

2.2 Calculate : $\sum_{k=3}^{9} 2(-3)^k$ (4)

[14]

QUESTION 3

3.1

Given : $f(x) = (x-1)^2 - 9$

3.1.1 Determine the turning point of f. (2)

3.1.2 Write down the equation of axis of symmetry of f. (1)

3.1.3 Write down the range of f. (1)

3.1.4 Calculate the y – intercept of f. (2)

3.2 Consider the function $g(x) = x^2$.

3.2.1 What transformation did the graph of $f(x) = (x-1)^2 - 9$ undergo in order to obtain the graph of g. (2)

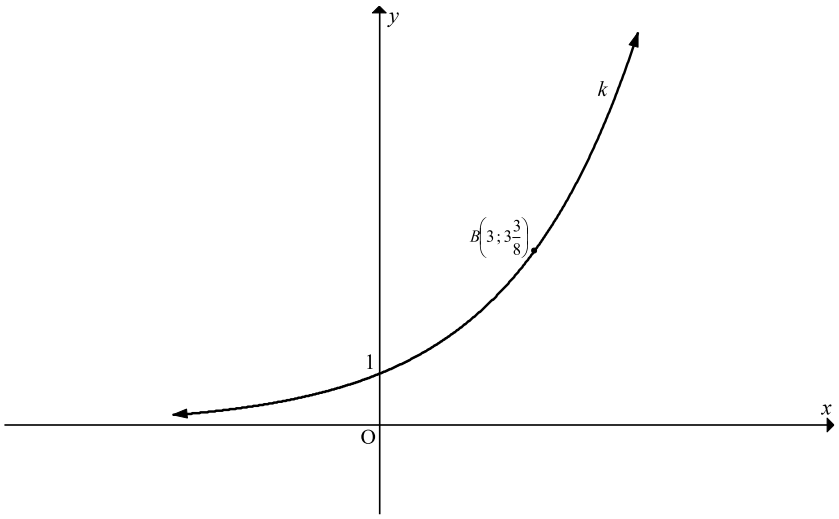
3.2.2 Restrict the graph of g such that the inverse of this graph is a function. (1)

3.2.3 Determine the inverse of g in the form $y = \ldots$. (include all restrictions) (3)

[12]

QUESTION 4

The diagram below shows the graph of $k(x) = a^x$, point $B\left(3\,;\,3\frac{3}{8}\right)$ lies on k.



4.1 Show that $a = \frac{3}{2}$ (2)

4.2 Draw the graph of h, the reflection of k in the line $y = x$ showing all the intercepts with the axes and the coordinates of another point on the graph. (3)

4.3 Write down the equation of h. (2)

4.4 Write down the value(s) of x for which $h < 3$? (1)

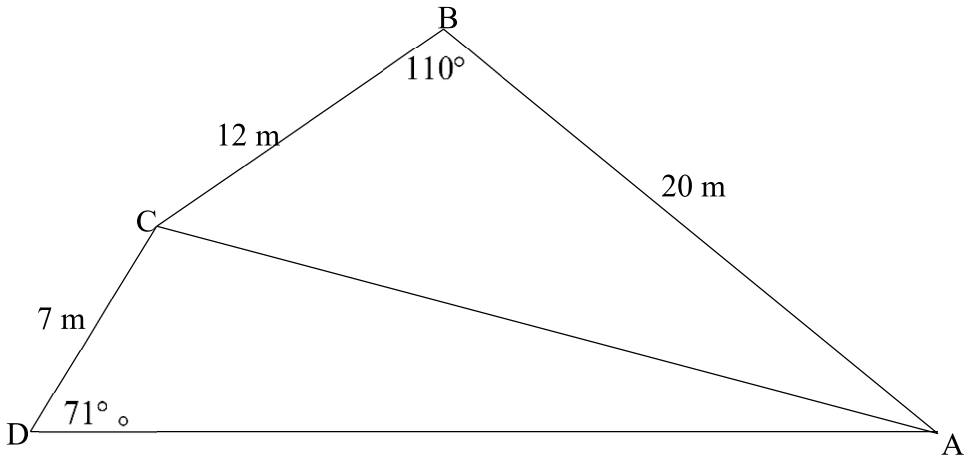
[8]

QUESTION 5

5.1 If $\sin 36^\circ = m$, determine $\cos 36^\circ$ in terms of m. (3)

5.2 Show that : $\dfrac{-2\sin 15^\circ.\cos 15^\circ}{\cos(45^\circ - x)\cos x - \sin(45^\circ - x)\sin x} = -\dfrac{\sqrt{2}}{2}$ (6)

5.3 A piece of land has the form of a quadrilateral ABCD with AB = 20m, BC = 12m and CD = 7m. $\hat{B} = 110^\circ$ and $C\hat{D}A = 71^\circ$.
The owner decides to divide the land into two plots by erecting a fence from A to C.



Calculate:

5.3.1 The length of the fence AC correct to one decimal place. (2)

5.3.2 The size of $D\hat{A}C$ correct to two decimal place (3)

[14]

TOTAL MARKS: 58

INFORMATION SHEET

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + in) \qquad A = P(1 - in) \qquad A = P(1 - i)^n \qquad A = P(1 + i)^n$$

$$T_n = a + (n-1)d \qquad S_n = \frac{n}{2}[2a + (n-1)d]$$

$$T_n = ar^{n-1} \qquad S_n = \frac{a(r^n - 1)}{r - 1};\ r \neq 1 \qquad S_\infty = \frac{a}{1 - r};\ -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i} \qquad P = \frac{x[1 - (1+i)^{-n}]}{i} \qquad f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \qquad \text{M}\left(\frac{x_1 + x_2}{2};\ \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c \qquad y - y_1 = m(x - x_1) \qquad m = \frac{y_2 - y_1}{x_2 - x_1} \qquad m = \tan\theta$$

$$(x-a)^2 + (y-b)^2 = r^2$$

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$ $\qquad a^2 = b^2 + c^2 - 2bc.\cos A$ $\qquad$ Area of $\Delta ABC = \dfrac{1}{2}ab.\sin C$

$$\sin(\alpha + \beta) = \sin\alpha.\cos\beta + \cos\alpha.\sin\beta \qquad \sin(\alpha - \beta) = \sin\alpha.\cos\beta - \cos\alpha.\sin\beta$$

$$\cos(\alpha - \beta) = \cos\alpha.\cos\beta + \sin\alpha.\sin\beta \qquad \cos(\alpha + \beta) = \cos\alpha.\cos\beta - \sin\alpha.\sin\beta$$

$$\cos 2A = \begin{cases} \cos^2 A - \sin^2 A \\ 1 - 2\sin^2 A \\ 2\cos^2 A - 1 \end{cases} \qquad \sin 2A = 2\sin A.\cos A$$

$$\bar{x} = \frac{\sum x}{n} \qquad \sigma^2 = \frac{\sum_{t=1}^{n}(x_1 - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)} \qquad P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx \qquad b = \frac{\sum(x - \bar{x})(y - \bar{y})}{\sum(x - \bar{x})^2}$$