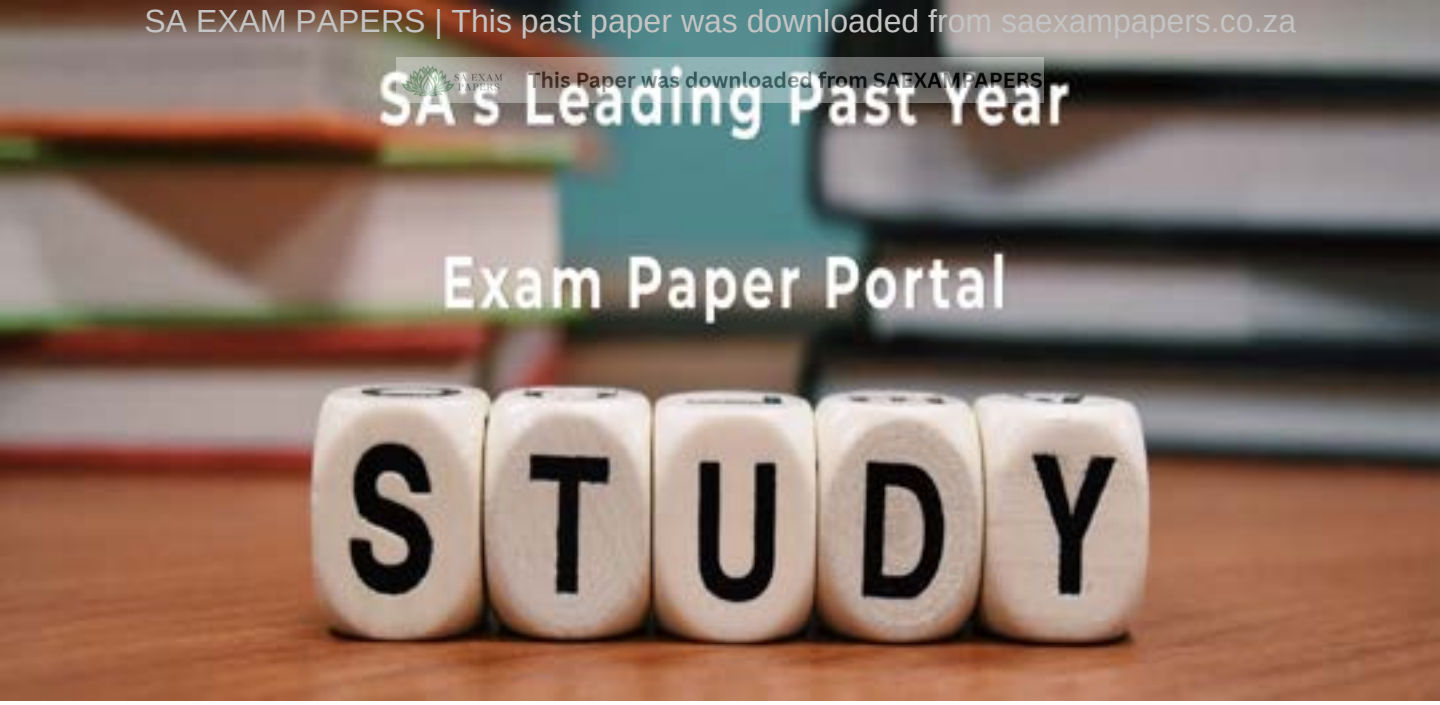


NSC

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

DEPARTMENT OF
EDUCATION

GRADE 12

MATHEMATICS
TEST 1
MARCH 2026

MARKS: 100 **DURATION: 2 HOURS**

This Question papers consists of 8 pages and 1 information sheet.

INSTRUCTIONS AND INFORMATION

1. This question paper consists of EIGHT questions.
2. Clearly show ALL calculations, diagrams, et cetera which you have used in determining the answers.
3. Number the answers correctly according to the numbering system used in the question paper.
4. ANSWER ONLY will not necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. Write neatly and legibly.

QUESTION 1

Solve for x

1.1 $x^2 - 2x + 1 > 0$ (3)

1.2 $2x - 1 = \sqrt{4 - 5x}$ (4)

[7]

QUESTION 2

2.1 Given the finite arithmetic sequence: 5 ; 1 ; -3 ; … , -83 ; -87

2.1.1 Write down the fourth term (T_4) of the sequence. (1)

2.1.2 Calculate the number of terms in the sequence. (3)

2.1.3 Calculate the sum of all the negative numbers in the sequence. (3)

2.2 The tenth and the seventeenth terms of an arithmetic sequence are 21 and 49 respectively

2.2.1 Determine the common difference of the sequence. (3)

2.2.2 Calculate: $T_1 + T_{18}$ (3)

2.3

Given: $\sum_{n=1}^{m}(4n - 19) = 1189$

2.3.1 Write down the first three terms of the series. (1)

2.3.2 Calculate the value of m. (4)

[18]

QUESTION 3

3.1 - 78; - 76; - 72; - 66; … is a quadratic number pattern.

3.1.1 Write down the next two terms of the number pattern. (1)

3.1.2 Determine the n^{th} term of the number pattern in the form, $T_n = an^2 + bn + c$ (4)

3.2 Given: 5; 10; 20; … a geometric sequence.

3.2.1 Determine the n^{th} term (1)

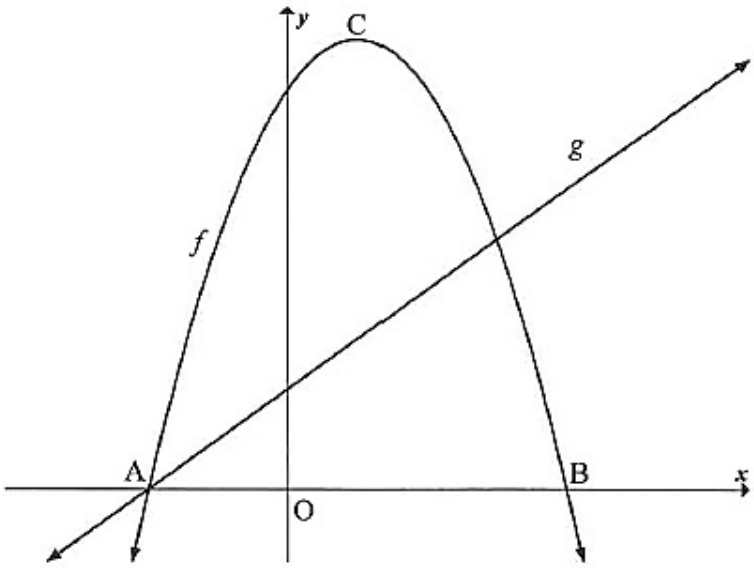
3.2.2 Calculate the sum of the first 18 terms. (2)

3.3 The first and second term of a geometric series is given as $(2x - 4)$ and $(4x^2 - 16)$ respectively. Determine the value(s) of x for which the series will converge. (4)

[12]

QUESTION 4

Sketched below are the graphs of $f(x) = -2x^2 + 4x + 16$ and $g(x) = 2x + 4$.
A and B are the *x*-intercepts of *f*. C is the turning point of *f*.



4.1 Calculate the coordinates of A and B. (3)

4.2 Determine the coordinates of C, the turning points of *f*. (2)

4.3 Write down the range of *f*. (1)

4.4 The graph of $h(x) = f(x + p) + q$ has a maximum value of 15 at $x = 2$.
Determine the values of p and q (3)

4.5 Determine the equation of g^{-1}, the inverse of *g*, in the form $y = \ldots$ (2)

4.6 For which value(s) of *x* will $g^{-1}(x).g(x) = 0$? (2)

[13]

QUESTION 5

Given the exponential function: $f(x) = 3^x$

5.1 Write down the range of f. (1)

5.2 Determine the equation of f^{-1} in the form $y = \ldots$ (2)

5.3 The point M(a ; 2) lies on f^{-1}. Calculate the value of a. (2)

5.4 Sketch, in your answer book, the graphs of f and f^{-1}, showing clearly ALL intercepts with axes (include the second point on each graph). Draw and name the line of symmetry between the two graphs. (5)

5.5 Is f^{-1} a function? Justify your answer. (2)

[12]

QUESTION 6

6.1 If $\cos\theta = -\frac{5}{13}$ where $180° < \theta < 360°$, determine, **without using a calculator,** the value of:

6.1.1 $sin^2\,\theta$ (3)

6.1.2 $\cos(\theta - 135)$ (4)

6.2 Prove that $2cos^2(45° + 1) = 1 - sin2x$ (4)

6.3 Consider the expression: $\sin(A - B) - \sin(A + B)$

6.3.1 Prove that $\sin(A - B) - \sin(A + B) = -2cosAsinB$. (2)

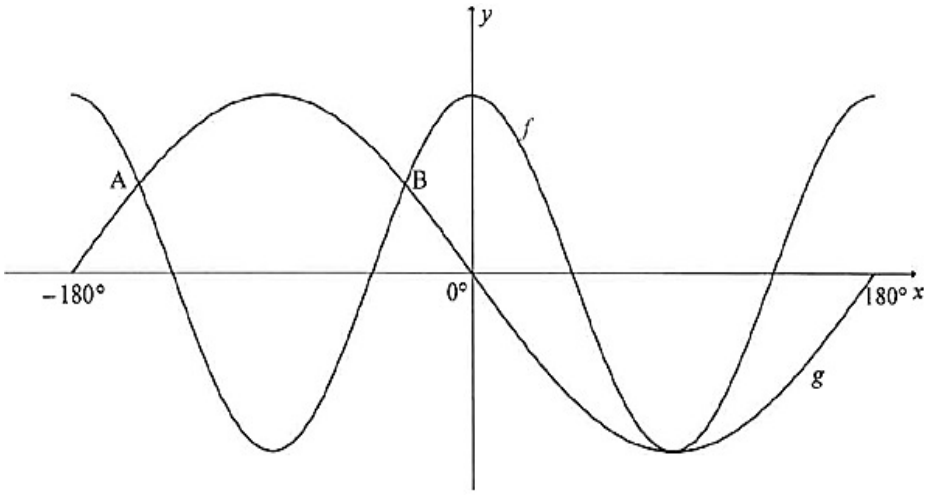
6.3.2 Simplify the following expression to a single term: $sin4x - sin10x$. (2)

6.3.3 Hence, determine the solution for $sin4x - sin10x = sin3x$ for $x \in [0°; 30°]$. (5)

[20]

QUESTION 7

In the diagram below, the graph of $f(x) = cos2x$ and $g(x) = -sinx$ are drawn for the interval $x \in [-180° ; 180°]$ A and B are two points of intersections of f and g.



7.1 Write down:

7.1.1 The period of f (1)

7.1.2 The amplitude of g (1)

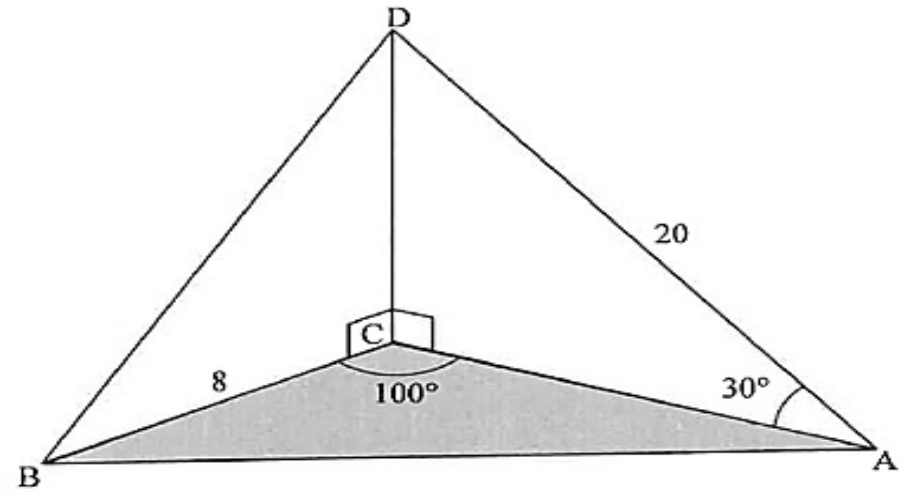
7.2 **Without using a calculator**, determine the value of x for which $cos2x = -sinx$ in the interval $x \in [-180° ; 180°]$. (6)

7.3 Use the graphs above to determine how many degrees apart are points A and B from each other? (2)

[10]

QUESTION 8

In the diagram, A, B and C are points in the same horizontal plane. D is a point directly above C, that is DC ⊥ AC and DC ⊥ BC. It is given that $A\hat{C}B = 100°$, $C\hat{A}D = 30°$, AD = 20 units and BC = 8 units.



8.1 Calculate the length of:

8.1.1 AC (2)

8.1.2 AB (3)

8.2 If it is further given that $A\hat{B}D = 73{,}4°$, calculate the size of $A\hat{D}B$. (3)

[8]

TOTAL: [100]

INFORMATION SHEET

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

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

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

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

$$F = \frac{x\left[(1+i)^n - 1\right]}{i} \qquad P = \frac{x\left[1-(1+i)^{-n}\right]}{i}$$

$$f'(x) = \lim_{h \to 0} \frac{f(x+h) - f(x)}{h}$$

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

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

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

In ΔABC: $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

$$a^2 = b^2 + c^2 - 2bc.\cos A$$

$$\text{area } \Delta ABC = \frac{1}{2}ab\sin C$$

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

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

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

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

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

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