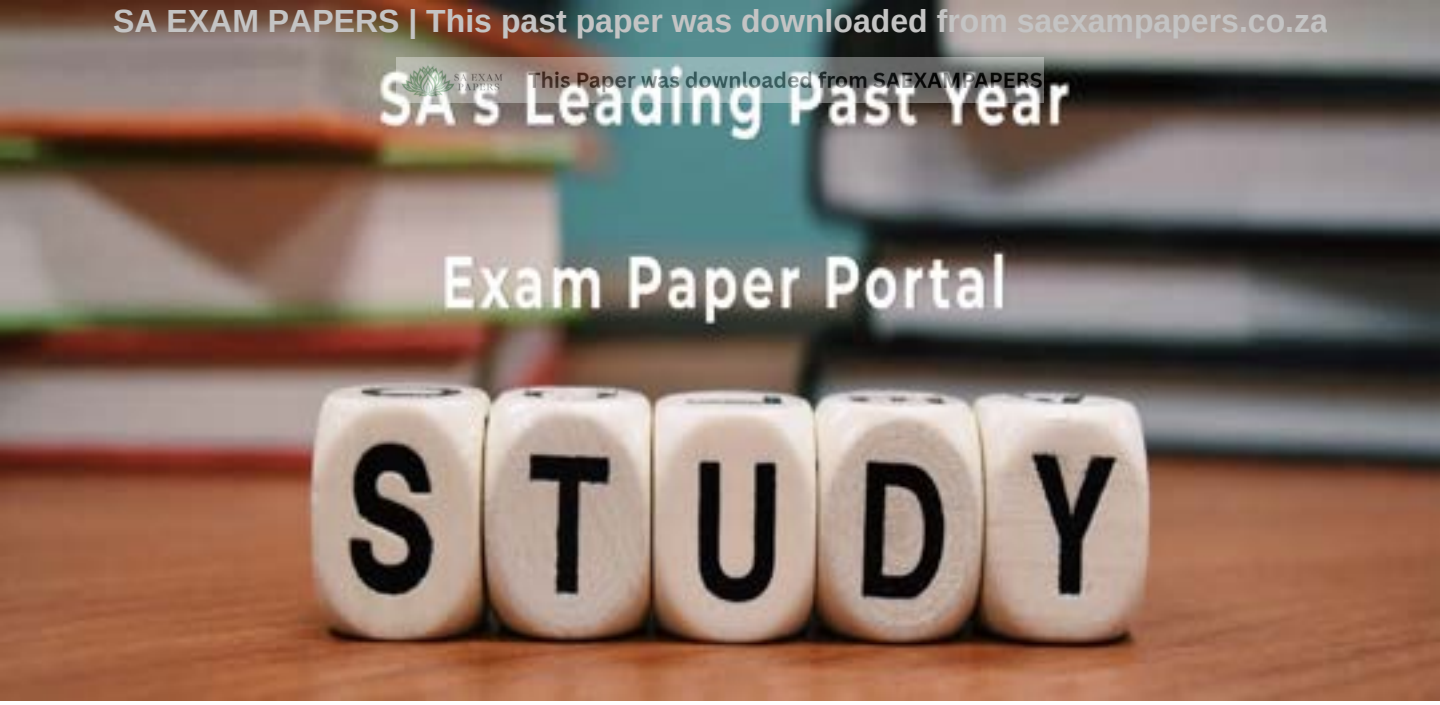


NORTHERN CAPE
DEPARTMENT OF EDUCATION

NOORD KAAP

DEPARTEMENT VAN ONDERWYS

LEFAPHA LA THUTO

PROVINCIAL COMMON TEST

GRADE 12

MATHEMATICS

CONTROL TEST

MARCH 2025

MARKS: 100

TIME: 2 HOURS

This question paper consist of 5 pages and Information sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 6 questions.
2. Answer ALL the questions.
3. Number the answers correctly according to the numbering system used in this question paper.
4. Clearly show ALL calculations, diagrams, graphs, et cetera that you 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 answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. An information sheet is included at the end of the question paper.
10. Write neatly and legibly.

QUESTION 1

1.1 Solve for x:

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

1.1.2 $7x^2+4x-9=0$ (correct to TWO decimal places) (3)

1.1.3 $(3-x)(x+7)<0$ (3)

1.1.4 $3\sqrt{x+3}-5=x$ (5)

1.2 Solve for x and y:

$y=3x+2$

$\frac{1}{y}+\frac{3}{x}=-4$ (5)

1.3 If, $\frac{2^x}{16}=\frac{3^y}{3}$ determine the value of $x+y$ (4)

[22]

QUESTION 2

2.1 Given the sequence $81\ ;\ x\ ;\ y\ ;3$ calculate the value(s) of x and y if:

2.1.1 The sequence is arithmetic. (4)

2.1.2 The sequence is geometric. (4)

2.2 The first four terms of a quadratic pattern are $661\ ;591\ ;525\ ;463$ .....

2.2.1 Determine the nth term of this pattern. (4)

2.2.2 Calculate the value of the lowest term. (3)

2.3 An arithmetic sequence is given such that:

$T_1+T_3+T_5+T_7+.....+T_{2013}=3029$ and $T_2+T_4+T_6+T_8+.....T_{2014}=6050$.

Determine the common difference between each term. (3)

[18]

QUESTION 3

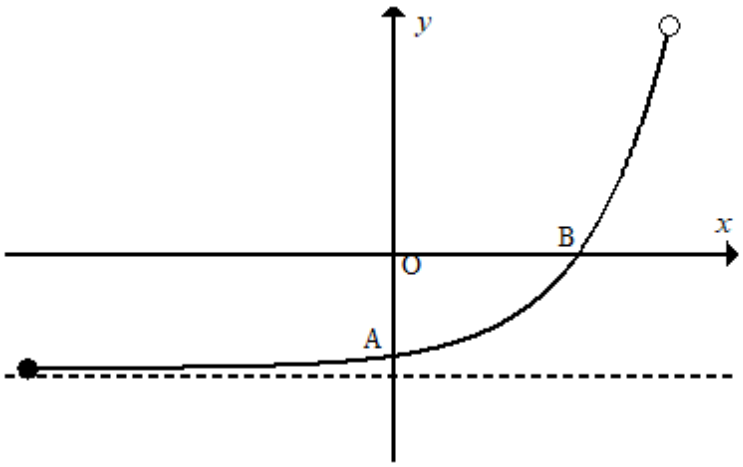
3.1 Prove that $\sum_{k=0}^{\infty} 7.3^{2-k}$ converges. (3)

3.2 Hence , determine the value of m if $\sum_{k=m}^{\infty}\left(7.3^{2-k}\right)=\frac{21}{2}$ (5)

[8]

QUESTION 4

Sketched below is the graph of $h(x)=3^x-9$ for $x\in[-3\,;2)$



4.1 Write down the equation of the asymptote of h (1)

4.2 Determine the coordinates of A. (2)

4.3 Determine the equation of the straight line g, if g is passing through A and B. (3)

4.4 Write down the equation of $m(x)=h(x)+9$ (1)

4.5 Write down the equation of $m^{-1}(x)$ in the form y=…… (2)

4.6 Write down the range of $m^{-1}(x)$ (2)

4.7 Point C is the result of point A when reflected over the line $x=2$.
Calculate the area of ΔABC. (4)

[15]

QUESTION 5

Given that $f(x)=\frac{-2}{x+p}+q$.

- The equations of the axis of symmetry of f are $y=-x+8$ and $y=x+2$

5.1 Determine the value(s) of p and q. (4)

5.2 If $p=-3$ and $q=5$, determine the coordinates of the x and y intercepts. (3)

5.3 Sketch the graph of, clearly show all the intercepts with the axes as well as the asymptotes. (3)

[10]

QUESTION 6

6.1 If $\sin 32^\circ = p$, determine, without using calculator, the following in terms of p.

6.1.1 $\sin 212^\circ$ (2)

6.1.2 $\tan(-32^\circ)$ (2)

6.1.3 $\cos(-482^\circ)$ (3)

6.2 Prove that $\frac{\cos^2(90^\circ+y).\sin(180^\circ-y)-\sin(360^\circ-y).\cos^2 y}{\cos(360^\circ-y)}=\tan y$ (6)

6.3 Given that $\cos x$; $\sin x$; $\sqrt{3}\sin x$ are the first three terms of geometric pattern.

6.3.1 Determine the value of x if $0^\circ < x < 90^\circ$. (3)

6.3.2 Hence calculate the sum of the first 10 terms. (4)

6.4 Determine the general solution to $6\sin^2 x-7\cos x-5=0$. (7)

[27]

TOTAL: 100

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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