Province of the
EASTERN CAPE
EDUCATION

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NATIONAL SENIOR CERTIFICATE

GRADE 11

JUNE 2025

MATHEMATICS P1

MARKS: **100**

TIME: **2 hours**

This question paper consists of 9 pages, including the formula sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions:

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

QUESTION 1

1.1 Solve for x

1.1.1 $(2x-4)(x+1)=c$, given that $c=0$ (3)

1.1.2 $3x^2-5x-4=0$ (correct to TWO decimal places) (3)

1.1.3 $x^2-2x=18-\frac{45}{x^2-2x}$ (5)

1.1.4 $\sqrt{x+6}-x=4$ (4)

1.1.5 $5^{3x}-5^{3x-1}=4$ (4)

1.1.6 (a) $x^2-x-12>0$; where $x<0$ (4)

(b) If $g(x)=x^2-x-12$, write down the values of x for which $g(x-2)>0$. (2)

1.2 The sum of the two numbers is -11 and the product of the same numbers is -570. Determine the value(s) of the two numbers. (6)

1.3 Determine the nature of roots of $2x^2+3x-5=0$ (3)

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QUESTION 2

2.1 Simplify without using a calculator:

2.1.1 $\sqrt[3]{\sqrt{83}-\sqrt{19}}\cdot\sqrt[3]{\sqrt{83}+\sqrt{19}}$ (3)

2.1.2 $\dfrac{\sqrt{80}+\sqrt{45}}{\sqrt{45}}$ (3)

2.1.3 $\dfrac{4^{n+2}-4^{n-1}}{4^{n+1}}$ (3)

2.2 Given: $x=\sqrt{30+\sqrt{30+\sqrt{30+\cdots}}}$

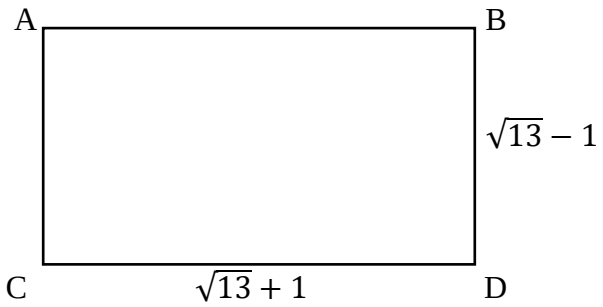
2.2.1 Write down x^2 in terms of x (2)

2.2.2 Hence determine the value of x (4)

2.3 Given rectangle ABCD with

- BD $=\sqrt{13}-1$
- DC $=\sqrt{13}+1$

Determine the length of any diagonal line of rectangle ABCD (leave your answer in the simplest surd form) (3)



[18]

QUESTION 3

Given: $f(x) = \dfrac{-14-3x}{x+2}$

3.1 Show that $f(x)$ can be written as $f(x) = \dfrac{-8}{x+2} - 3$ (2)

3.2 Write down the equations of the asymptotes. (2)

3.3 Calculate the $x-$ and $y-$ intercepts of f. (3)

3.4 Sketch the graph of f ; clearly show all the asymptotes as well as the intercepts with the axes.. (3)

3.5 If $y = x + k$ is a line of symmetry, determine the value of k. (2)

3.6 If $B(-4;6)$ is reflected in the line determined in 3.5 to become B'. Determine the coordinates of B'. (2)

[14]

QUESTION 4

Consider the function $f(x) = -2^{-x} + 1$

4.1 Calculate the coordinates of the intercepts of f with the axes. (4)

4.2 Write down the equation of the asymptote. (1)

4.3 Sketch the graph of f (3)

4.4 Write down the equation of g if g is the graph obtained when the graph of f is shifted 1 unit to the left. (1)

4.5 Solve for x if $f(x) = -3$ (3)

[12]

QUESTION 5

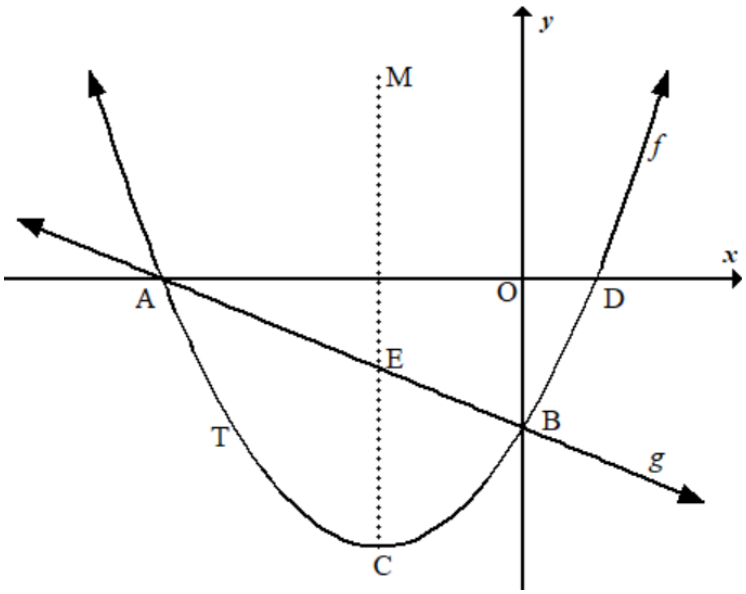
5.1 A parabola has the following properties:

- $a < 0$
- $f(0) = 5$
- $f(-5) = 0$ and $f(1) = 0$
- $f(x)$ is increasing for $-\infty < x < -2$ and decreasing for $-2 < x < \infty$

Draw a possible sketch graph of f showing all the given properties. (5)

5.2 The graphs of $f(x) = x^2 + 4x - 5$ and $g(x) = -x + k$ are sketched below and have the following properties.

- Points A and D are the x −intercepts of f.
- Point B and point C are the y −intercept and turning point of f respectively
- The dotted line CM is the axis of symmetry of f.
- The graphs of f and g intersect at A and B respectively.
- Point E is the point of intersection of g with the axis of symmetry of f.
- Points T and B are symmetrical with respect to the axis of symmetry of f.



5.2.1 Write down the coordinates of B. (1)

5.2.2 Write down the value of k. (1)

5.2.3 Calculate the length of line AD. (3)

5.2.4 Determine the coordinates of C. (2)

5.2.5 Determine the equation of a straight line h which is perpendicular to g passing through point C. (3)

5.2.6 Calculate the average gradient between points B and C. (2)

5.2.7 Determine the coordinates of T. (2)

5.2.8 For which value(s) of x will:

(a) $f(x) - g(x) = 0$? (2)

(b) $f(x) \cdot g(x) < 0$? (1)

[22]

TOTAL : 100

INFORMATION SHEET: MATHEMATICS

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

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

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

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

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

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

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

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

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

In ΔABC:

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C} \qquad a^2 = b^2 + c^2 - 2bc.\cos A \qquad area\,\Delta ABC = \frac{1}{2}ab.\sin C$$

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

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

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

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

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

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