education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

TECHNICAL MATHEMATICS P1

JUNE 2024

MARKS: 100

TIME: 2 hours

This question paper consists of 6 pages, 1 answer sheet and a 2-page information sheet.

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of SIX questions.
2. Answer ALL the questions.
3. Answer QUESTION 5.1.5 on the ANSWER SHEET provided. Write your name and surname in the space provided on your ANSWER SHEET and hand in the ANSWER SHEET with your ANSWER BOOK.
4. Number the answers correctly according to the numbering system used in this question paper.
5. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
6. Answer only will NOT necessarily be awarded full marks.
7. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
8. If necessary, round off answers to TWO decimal places, unless stated otherwise.
9. Diagrams are NOT necessary drawn to scale.
10. An information sheet with formulae is included at the end of the question paper.
11. Write neatly and legibly.

QUESTION 1

1.1 Solve for x

1.1.1 $x(x-1)=0$ (2)

1.1.2 $3x^2-5x=4$ (correct to two decimal place) (4)

1.1.3 $x^2+6=-5x$ (4)

1.1.4 $2x+\frac{8}{x+1}=8$ (4)

1.2 The product of two consecutive integers is 30. Determine two integers. (3)

[17]

QUESTION 2

2.1 Solve the following inequality.

$x^2+3x\geq 28$ (4)

2.2 Solve for x and y simultaneously:

$y-x=-1$ and $y+7=x^2+2x$ (7)

2.3 Given: $v=v_o+xt$

2.3.1 Make *x the* subject of the formula. (2)

2.3.2 Hence, calculate the value of *x,* If $v=15$, $v_o=5$ and $t=2$. (2)

[15]

QUESTION 3

3.1 Given: $2x^2-x+4=0$

3.1.1 Determine the numerical value of discriminant. (2)

3.1.2 Hence, describe the nature of the roots of the equation. (1)

3.2 Determine for which values of t the equation $x^2+(t+1)x+t=0$ will have equal roots. (4)

[7]

QUESTION 4

4.1 Simplify the following without using a calculator.

4.1.1 $125^{\frac{2}{3}}$ (3)

4.1.2 $\dfrac{\sqrt{48}+\sqrt{12}}{\sqrt{27}}$ (4)

4.1.3 $\dfrac{9^{2x-1}.12^{x+1}}{36^{x}.8^{1-x}}$ (4)

4.1.4 $\dfrac{2^{x+1}-2^{x-2}}{2^{x-1}+2^{x}}$ (5)

4.1.5 $\log 8+2\log 20-\log 4-3\log 2$ (4)

4.2 Solve the following equations.

4.2.1 $3x^{\frac{3}{2}}=375$ (3)

4.2.2 $5.3^{2x+1}-3^{2x+2}=18$ (4)

4.2.3 $3^{x}=2$ (2)

4.2.4 $\log(x+2)+\log(x-1)=1$ (5)

[34]

QUESTION 5

5.1 Given: $p(x) = 2^x - 4$ and $r(x) = x^2 - 2x - 3$

5.1.1 Write down the *y*-intercept of *p*. (2)

5.1.2 Write down the equation of the asymptote of *p*. (1)

5.1.3 Determine the *x*- and *y*-intercept(s) of *r*. (3)

5.1.4 Write down the turning point of *r*. (3)

5.1.5 Hence, sketch the graphs of *p* and *r* on the same set of axes on the ANSWER SHEET provided.

Clearly show the intercept with the axes, turning point and any asymptote(s). (7)

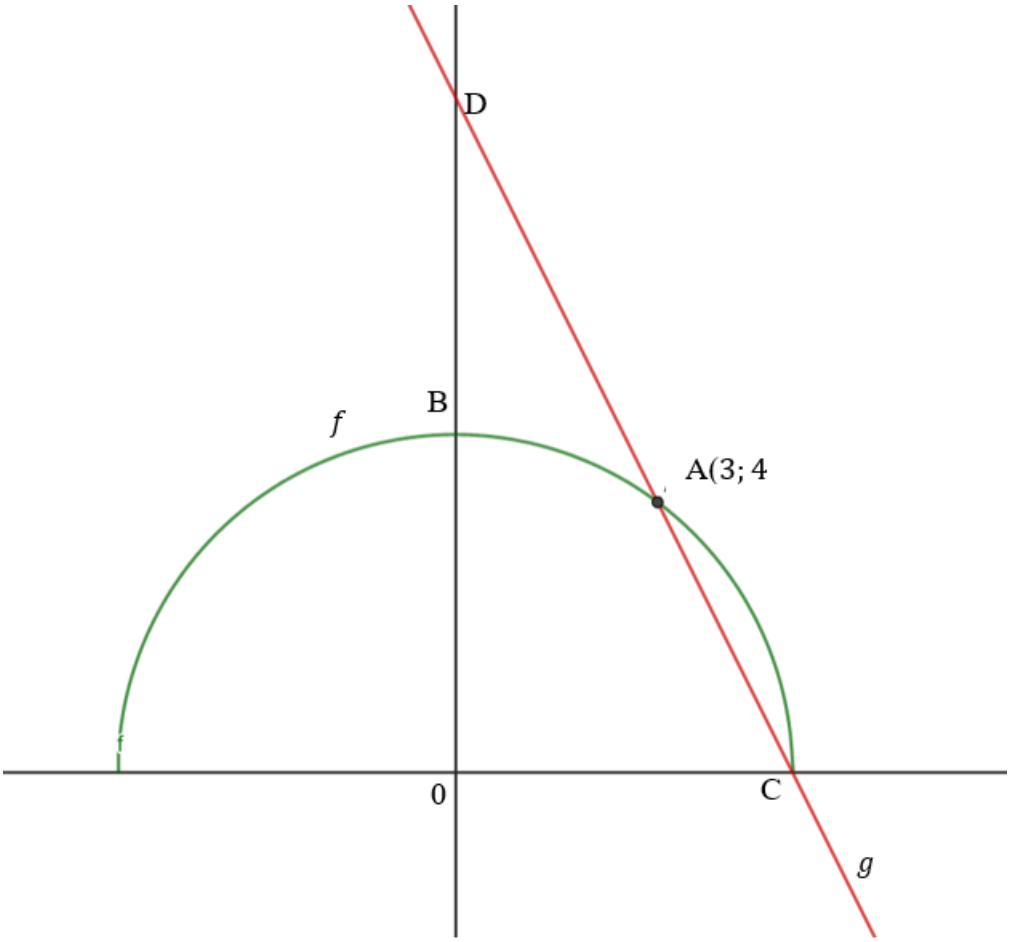
5.2 If $k(x) = \frac{a}{x} + q$, determine the numerical value of a if k is the graph Passing through $(-1;2)$ and has the same horizontal asymptote as *p* (3)

[19]

QUESTION 6

Sketch below are the graphs of f and g defined by:
$f(x)=\sqrt{r^2-x^2}$ and $g(x)=-2x+10$ respectively.

- A $(3;-4)$ and C are point of intersection of f and g.
- B and D are the y-intercept of f and g respectively.



Determine:

6.1 The coordinate of C (2)

6.2 The length of DB (2)

6.3 The equation of f (2)

6.4 The value(s) of x for which $g(x)-f(x)>0$ (2)
[8]

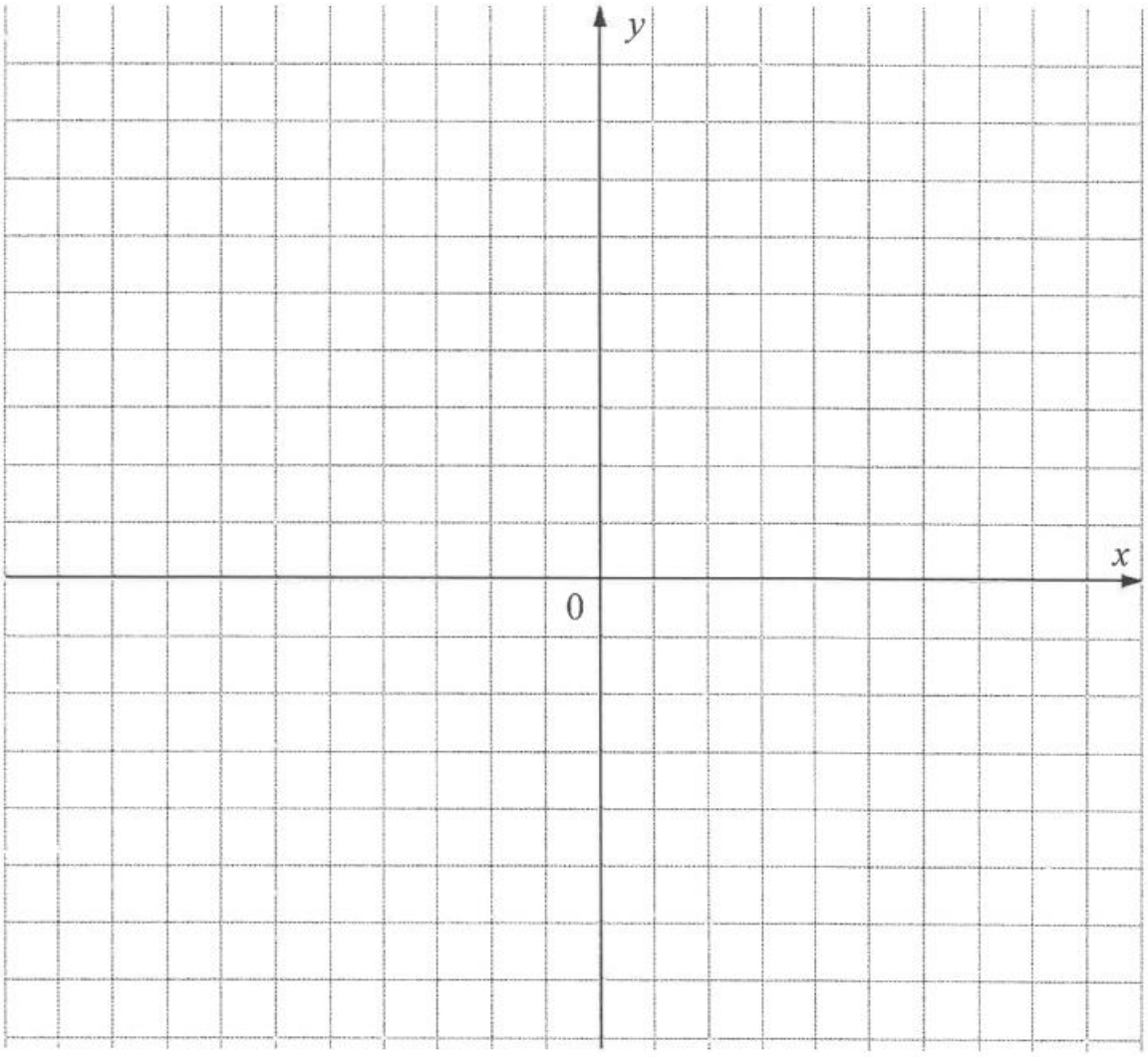
TOTAL: 100

ANSWER SHEET

NAME AND SURNAME: _____

GRADE: _____

QUESTION 5.1.5



INFORMATION SHEET: TECHNICAL MATHEMATICS

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

$$a^x = b \Leftrightarrow x = \log_a b, \ a > 0, \ a \neq 1 \text{ and } b > 0$$

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

$$i_{eff} = \left(1 + \frac{i}{m}\right)^m - 1$$

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

$$\int kx^n dx = \frac{kn^{n+1}}{n+1} + C \quad n, k \in \mathbb{R} \text{ with } n \neq -1 \text{ and } k \neq 0$$

$$\int \frac{k}{x} dx = k \ln x + C \quad , x > 0 \text{ and } k \in \mathbb{R}; k \neq 0$$

$$\int ka^{nx} dx = \frac{ka^{nx}}{n \ln a} + C \ , a > 0 , a \neq 1 \text{ and } k, a \in \mathbb{R}; k \neq 0$$

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

$$\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$$

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

Area of $\Delta ABC = \dfrac{1}{2} ab.\sin C$

$$\sin^2\theta + \cos^2\theta = 1 \qquad 1 + \tan^2\theta = \sec^2\theta \qquad 1 + \cot^2\theta = \cos ec^2\theta$$

$\pi rad = 180°$

Angular velocity $= w = 2\pi n$ where $n =$ rotation frequency

Angular velocity $= 360°$ where $n =$ rotation frequency

Circumferential velocity $= v = \pi Dn$ where $D =$ diameter and $n =$ rotation frequency

Area of a sector $= \frac{rs}{2}$ where $r =$ radius, and $s =$ arc length

Area of a sector $= \frac{r^2\theta}{2}$ where $r =$ radius, and $\theta =$ central angle

in radians

$4h^2 - 4dh + x^2 = 0$ where $h =$ height of segment, $d =$ diameter of circle and $x =$ length of chord

$A_T = a\left(\frac{o_1 + o_n}{2} + o_2 + o_3 + ... + o_{n-1}\right)$ where $a =$ equal parts, $o_i = i^{th}$ ordinate

and $n =$ number of ordinate

$A_T = a(m_1 + m_2 + m_3 + ... + m_n)$ where $a =$ equal parts, $m_1 = \frac{o_1 + o_2}{2}$, $o_i = i^{th}$ ordinate

and $n =$ number of ordinate