education

Department:
Education
North West Provincial Government
REPUBLIC OF SOUTH AFRICA

PROVINCIAL ASSESSMENT

GRADE 11

TECHNICAL MATHEMATICS P2

JUNE 2024

MARKS: 100

TIME: 2 hours

This question paper consist of 8 pages, including information sheet and a diagram sheet.

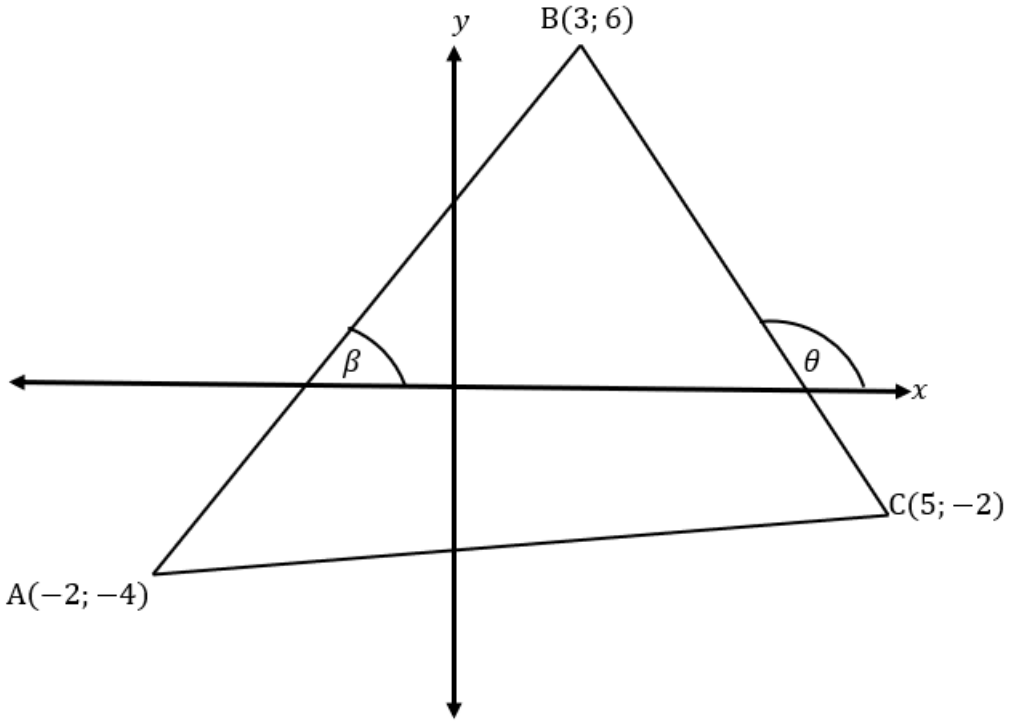
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. Answer ALL the questions.
2. Write ALL the answers in your answer book.
3. Start the answers to EACH question at the top of a NEW page.
4. Number the answers correctly according to the numbering system used in this question paper.
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 off answers to TWO decimal places, unless stated otherwise.
8. Diagrams are NOT necessarily drawn to scale.
9. An information sheet with formulae is included at the end of the question paper.
10. Write neatly and legibly.

QUESTION 1

The diagram below has vertices $A(-2;-4)$, $B(3;6)$ and $C(5;-2)$.



1.1 Determine the gradient of BC. (3)

1.2 Calculate the equation of line AC. (4)

1.3 Determine the size of θ correct to TWO decimal places. (3)

1.4 Calculate the midpoint of AC. (2)

1.5 Calculate the length of AB. (3)

1.6 Determine the equation of a line which passes through the midpoint AC and parallel to BC. (3)

1.7 Prove that the equation of the perpendicular bisector of BC is $4y - x = 4$ (4)

1.8 Determine the size of $\hat{ABC}$ (6)
[28]

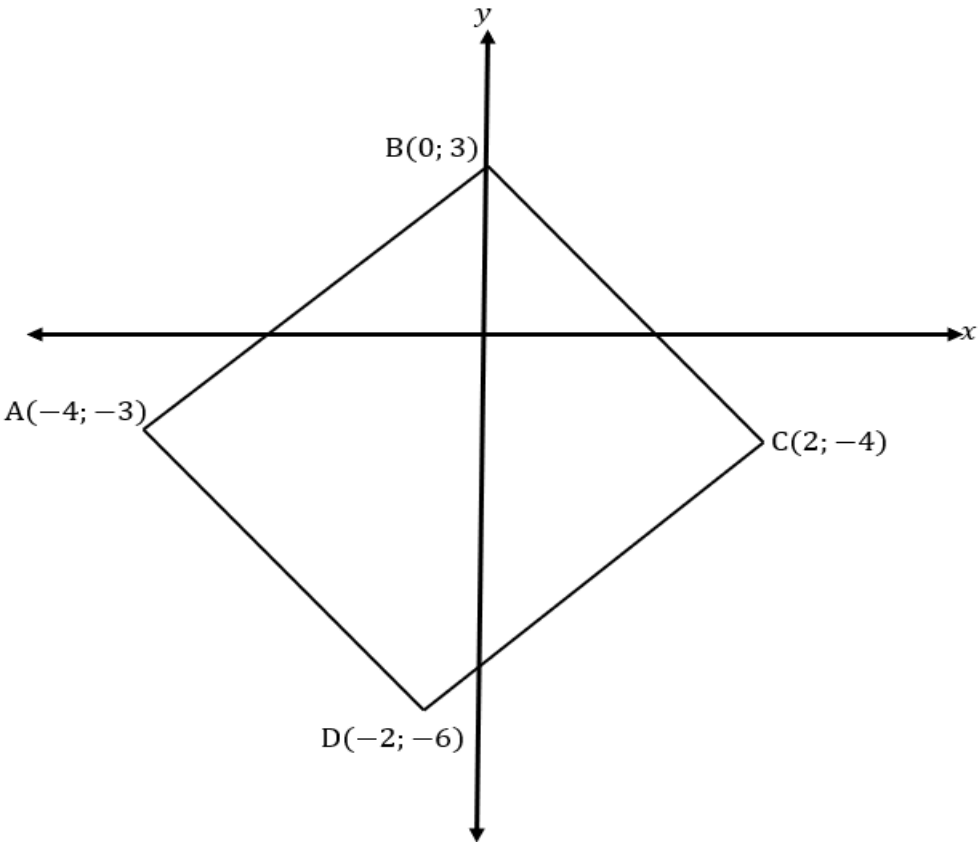
QUESTION 2

2.1 Given: point $A(2;3)$, $B(-1;-1)$ and $C(-2;p)$.

2.1.1 If A,B, and C are collinear, calculate the value of p. (3)

2.1.2 Calculate the value of p if AB is perpendicular to BC. (3)

2.2 The diagram below has vertices A(-4;3), B(0;3), C(2;-4) and D(-2;-6).



Prove that ABCD is not a square. (6)
[12]

QUESTION 3

Given: $f(x) = 2\sin x$ and $g(x) = \cos x + 1$ for $x \in [0°;360°]$

3.1 Use the diagram sheet provided to sketch the graphs of f and g on the same set of axes. (5)

3.2 Write down the period of f and g. (2)

3.3 What is the amplitude of f. (1)

3.4 Write down the range of g. (2)

3.5 For which values of x is $f(x).g(x) \leq 0$. (2)
[12]

QUESTION 4

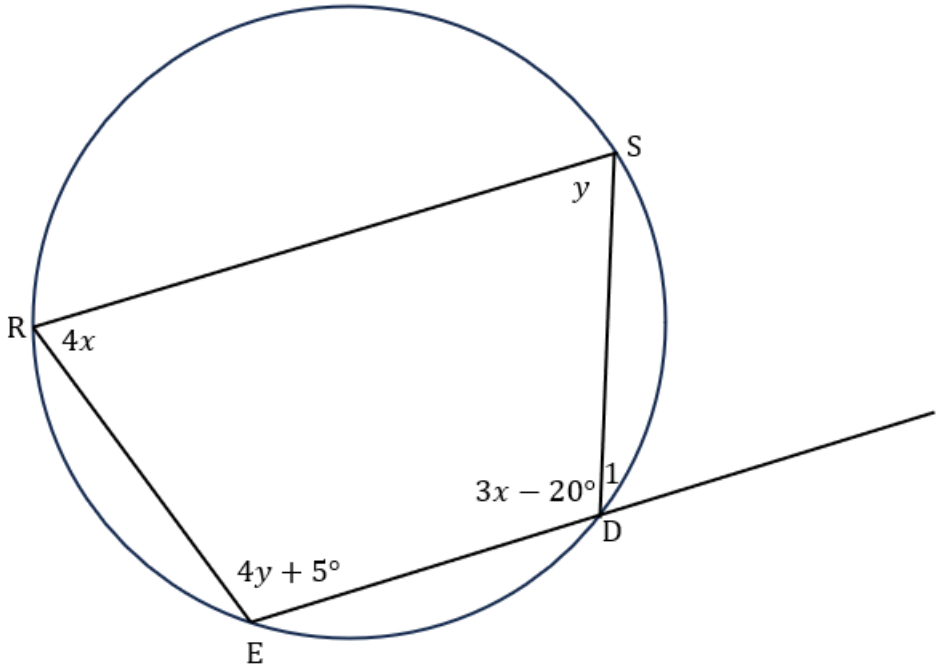
4.1 Complete the following statements below by filling in the missing words so that the statement is correct

4.1.1 The opposite angels of a cyclic quadrilateral are … (1)

4.1.2 The angles subtended by a chord at the center of a circle is … (1)

4.2 In the diagram below, RSDE are points on the circumference of a circle such that

$\widehat{R} = 4x$, $\widehat{S} = y$, $\widehat{D} = 3x - 20°$ and $\widehat{E} = 4y + 5°$,



Calculate with reasons the measure of:

4.2.1 y (3)

4.2.2 x (3)

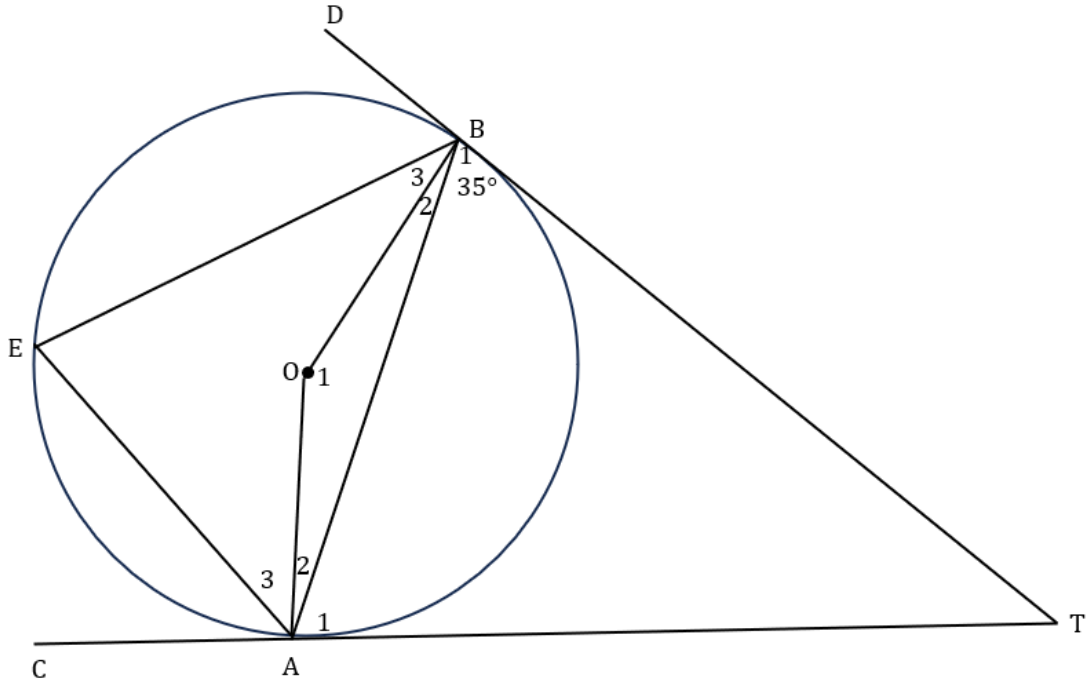
4.2.3 $\widehat{D}_1$ (2)
[10]

QUESTION 5

In the diagram below O is the center of the circle,

CAT and DBT are tangents to the circle at point A and B respectively,

E is a point on the circumference of the circle and $\widehat{B}_1 = 35°$.



Calculate the size of the following angles with reasons:

5.1 $O\widehat{B}T$ and $O\widehat{A}T$ (3)

5.2 $\widehat{B}_2$ (2)

5.3 $\widehat{A}_1$ (2)

5.4 $\widehat{O}_1$ (4)

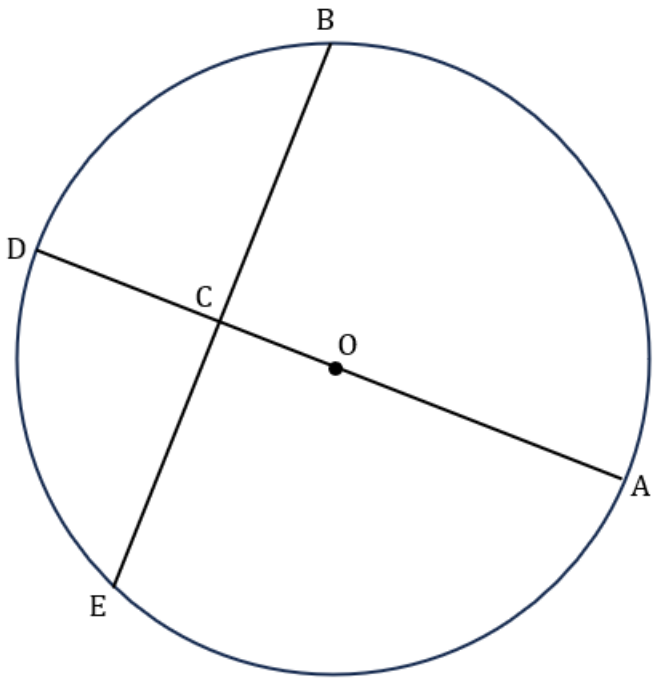
5.5 $\widehat{E}$ (2)
[13]

QUESTION 6

In the diagram below O is the center of the circle with ABDE as points on the circumference,

AOCD is a diameter to the circle.

$\text{OC} = 2\text{CD}$ and $\text{BE} = 30$ cm.



Calculate with reasons:

6.1	BC	(1)
6.2	$\text{B}\hat{\text{C}}\text{A}$	(2)
6.3	If $\text{CD} = K\ units$, determine OC in terms of K	(2)
6.4	Hence calculate OB	(2)
6.5	the value of k if $\text{AB} = 20\text{cm}$	(4)
6.6	Radius of circle OCD	(2)
		[13]

QUESTION 7

7.1 Convert the following:

7.1.1 $102{,}635°$ to degrees-minute-second. (3)

7.1.2 $70°44'90''$ to degrees (3)

7.2 What is the measure in degrees of central angle θ that intersect an arc length of 20 cm on a circle with radius of 8 cm? (4)

7.3 Simplify, (answer must be in degrees).

$17\pi - \frac{3}{4}\pi - 135°$ (2)

[12]

TOTAL: 100

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

$$\sin^2\theta + \cos^2\theta = 1 \qquad 1 + \tan^2\theta = \sec^2\theta \qquad 1 + \cot^2\theta = \text{cosec}^2\theta$$

$\pi rad = 180°$

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

DIAGRAM SHEET 1

QUESTION 3.1

NAME_____