education

Department of
Education
FREE STATE PROVINCE

GRADE 11

MATHEMATICS P2

EXAMINATION

JUNE 2025

MARKS: 100

TIME: 2 HOURS

This question paper consists of 10 pages and 1 information sheet.

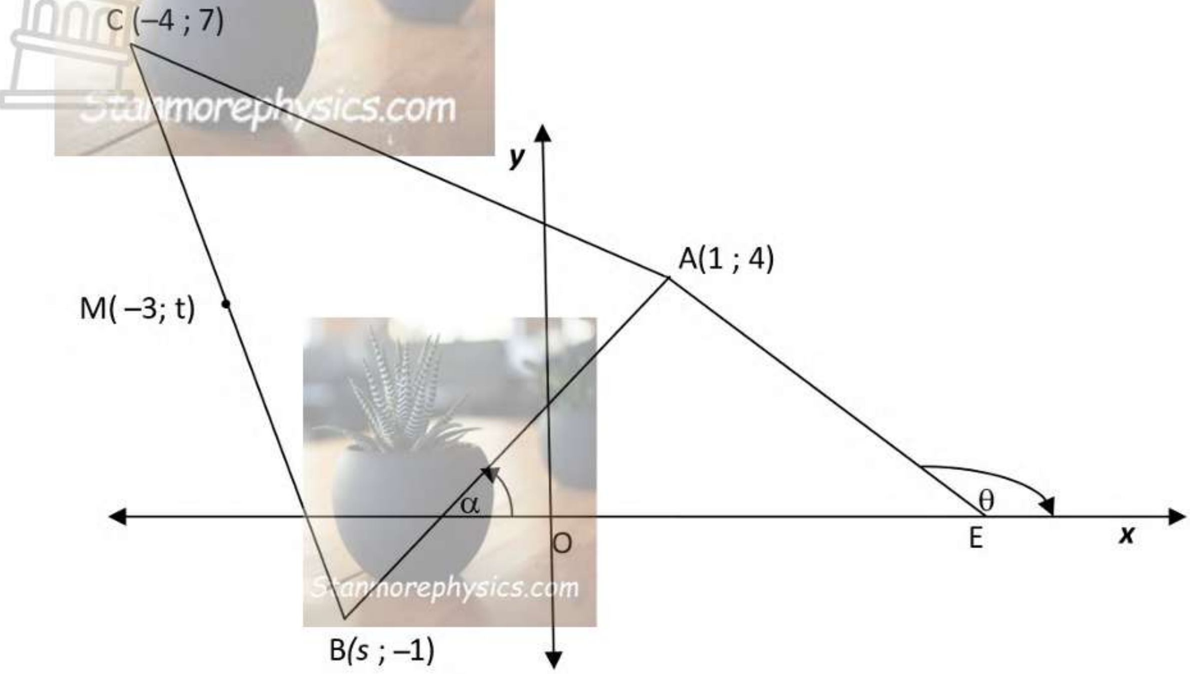
INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 7 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided.
3. Clearly show ALL calculations, diagrams, graphs, etc. which you have used in determining your answers.
4. Answers 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 correct to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly.

QUESTION 1

In the figure, C $(-4; 7)$, A $(1; 4)$ and B$(s\,;-1)$ are vertices of ΔCAB. E is the x - intercept of line AE with equation $y=-3x+7$.



1.1 Determine the length of AC. (2)

1.2 Determine the values of s and t if M $(-3\,;t)$ is the midpoint of BC. (3)

1.3 Prove that ΔCAB is a right-angled triangle. (4)

1.4 Determine the equation of a line passing through C and parallel to AB. (4)

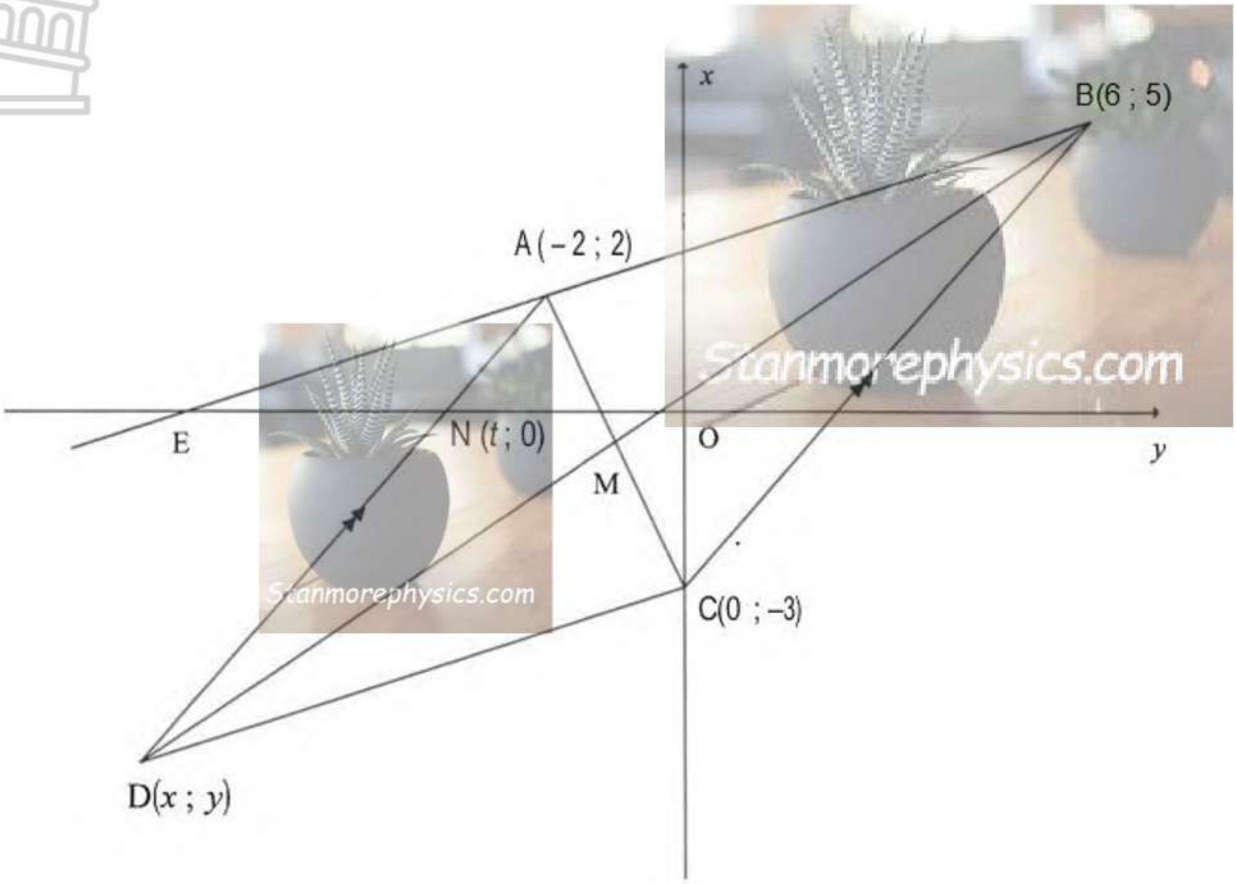
1.5 Calculate the size of $B\hat{A}E$. (6)

1.6 Determine p if CA is extended to D $(p\,;1)$ such that C, A and D are collinear. (3)

[22]

QUESTION 2

In the diagram, A(–2 ; 2), B(6 ; 5), C(0 ; –3) and D(*x* ; *y*) are the vertices of a quadrilateral having AD || BC. BA produced has an *x*-intercept at E. BD and AC intersect at M. N(*t* ; 0) is a point on AD.



2.1	Calculate the gradient of BC.	(2)
2.2	Determine the equation of AD.	(3)
2.3	Determine the value of *t*.	(2)
2.4	Determine the coordinates of D if ABCD is a parallelogram.	(3)
2.5	Determine the equation of the perpendicular bisector of AD	(4)
		[14]

QUESTION 3

3.1 If $7\sin A - 3 = 0$ and $90^{\circ} < A < 270^{\circ}$, determine the following **without using a calculator** and with the aid of a sketch:

3.1.1 $\cos A$ (4)

3.1.2 $\dfrac{\sin A}{\tan A}$ (2)

3.2 If $\cos 26^{\circ} = k$, express the following in terms of k.

3.2.1 $\sin 26^{\circ}$ (2)

3.2.2 $\tan 296^{\circ}$ (2)

[10]

QUESTION 4

4.1 Simply without using a calculator:
$\tan 330^{\circ} - \sin 120^{\circ}\cos 240^{\circ}$ (5)

4.2 Simplify the following to one trigonometric ratio :

$$\frac{\sin(180^{\circ}-\theta)\cos(-\theta)\cos 25^{\circ}}{\sin(90^{\circ}+\theta)\sin 425^{\circ}}$$ (5)

4.3 Prove the following identity: $\dfrac{\sin\theta - \tan\theta.\cos^{2}\theta}{\cos\theta - 1 + \sin^{2}\theta} = \tan\theta$ (4)

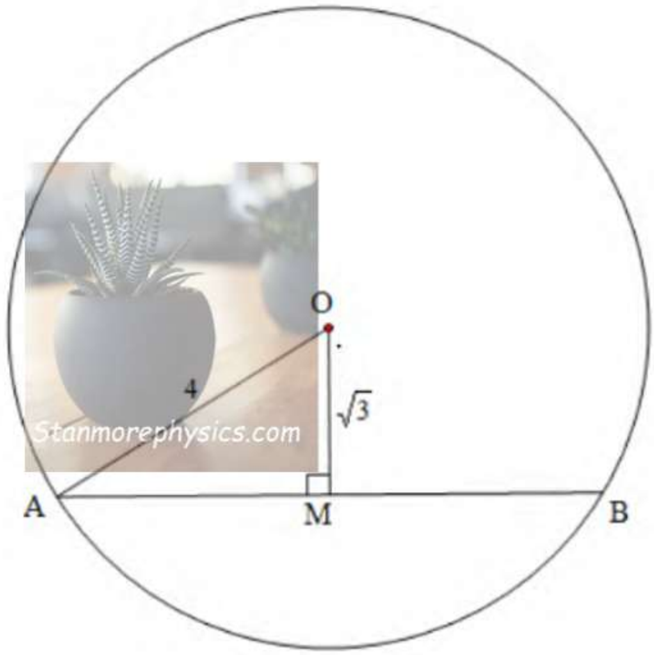
4.4 Determine the general solution of the following equation:
$6\cos^{2}x - 7\cos x - 3 = 0$ (6)

[20]

QUESTION 5

5.1 Complete the theorem:
The perpendicular drawn from the centre of the circle to the chord ……….the chord (1)

5.2 In the diagram below, O is the centre of the circle. AB is a chord, and OM is drawn such that OM $\perp$ AB. Radius OA = 4 units and OM = $\sqrt{3}$ units.



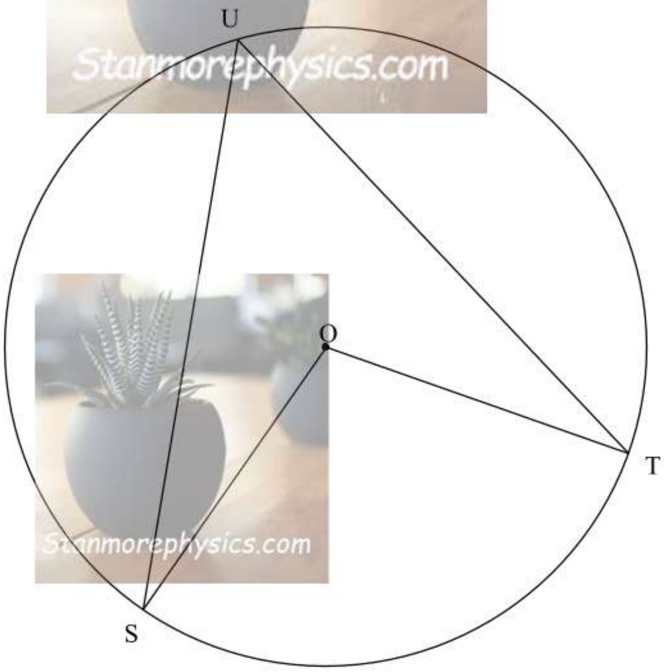
Calculate the length of AB, giving reasons.

(4)
[5]

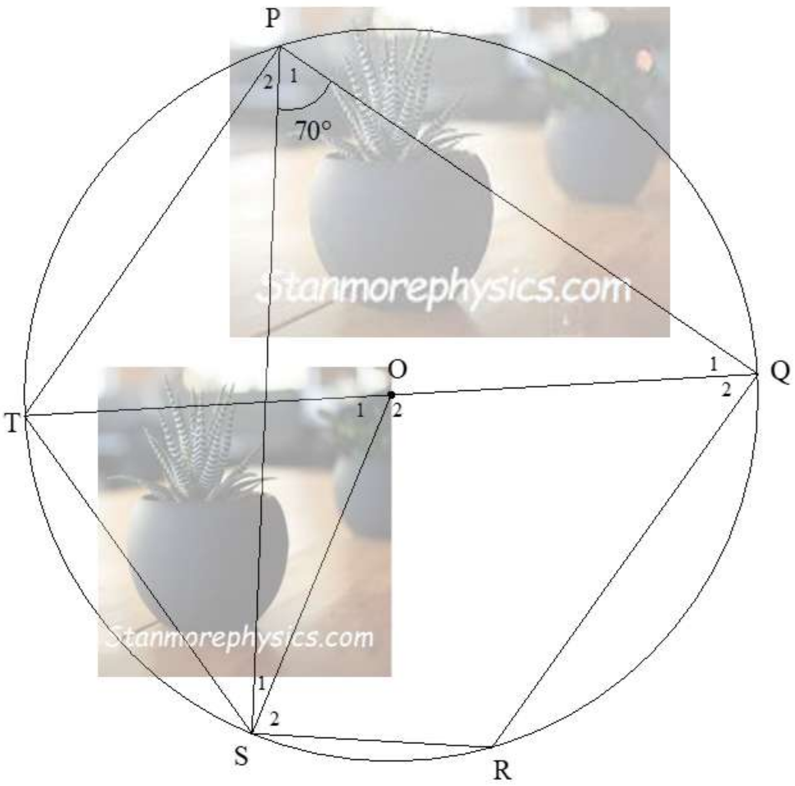
QUESTION 6

6.1 Use the diagram below to prove the theorem that states that:

The angle that an arc of a circle subtends at the centre of the circle is twice the angle it subtends at the circumference of the circle (5)



6.2 In the diagram, O is the centre of the circle. P, Q, R, S and T lie on the circumference of the circle and TQ is a diameter of the circle. Chord PT and radius OS are drawn. $\hat{P}_1 = 70^{\circ}$



Determine, with reasons, the size of the following angles:

6.2.1 $\hat{R}$ (2)

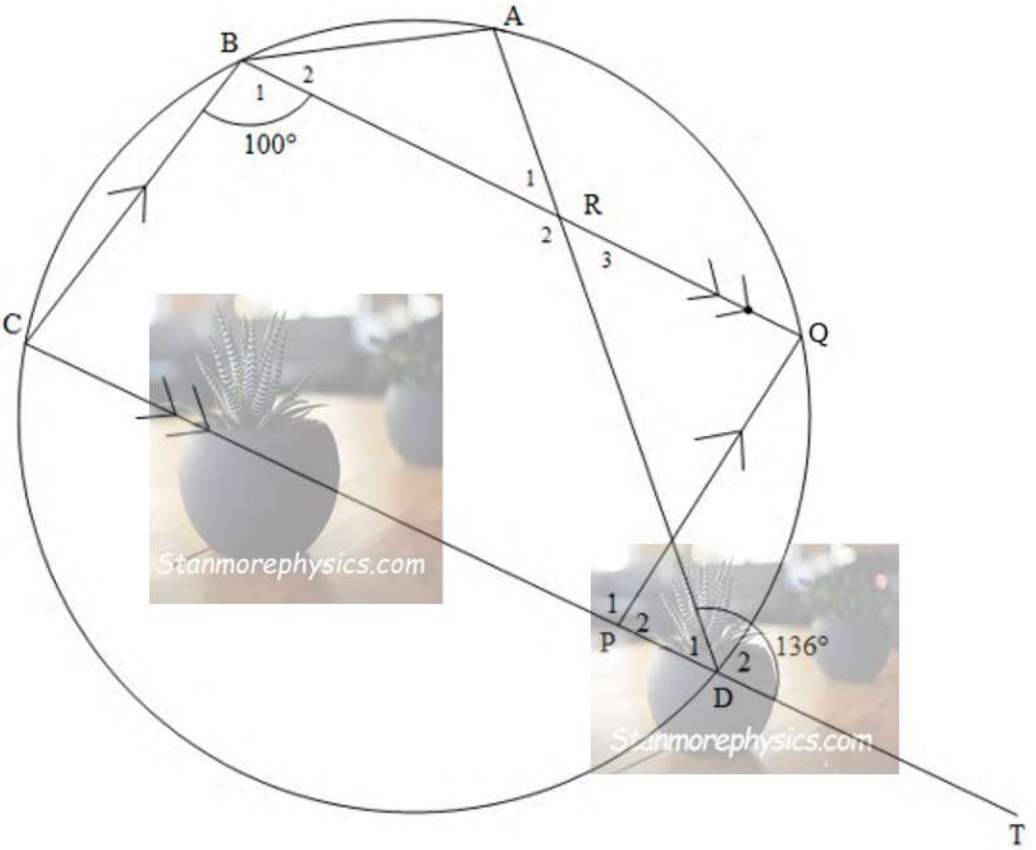
6.2.2 $\hat{P}_2$ (2)

6.2.3 $\hat{O}_1$ (2)

[11]

QUESTION 7

7.1 In the diagram, ABCD is a cyclic quadrilateral. Chord CD is produced to T. P is a point on CD and Q is a point on the circle such that BCPQ is a parallelogram.



Determine, with reasons, the size of:

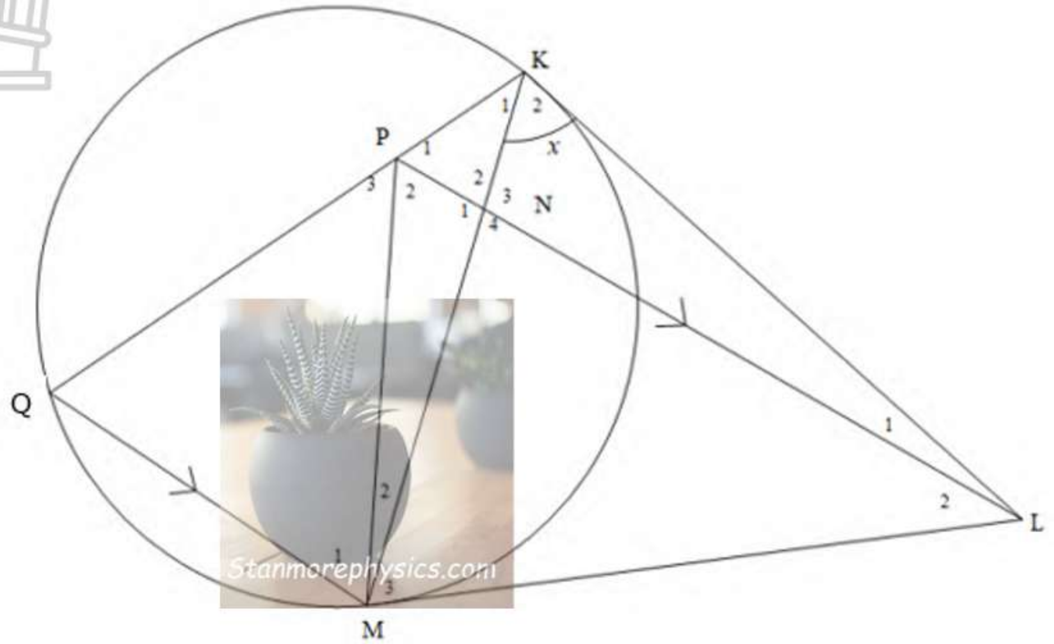
7.1.1 C (2)

7.1.2 B_2 (2)

7.1.3 $\hat{A}$ (2)

7.2 In the diagram, LK and LM are tangents to the circle at K and M respectively. Q is a point on the circle and P is a point on chord QK such that PL || QM. KM and PM are drawn. PL intersects KM at N.

Let $\hat{K}_2 = x$



7.2.1 Write down with reasons, THREE other angles EACH equal to x. (6)

7.2.2 Prove, giving reasons, that:

(a) PKLM is a cyclic quadrilateral (2)

(b) Δ QMP is isosceles (4)

[18]

TOTAL 100

INFORMATION SHEET

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

$\sin 2\alpha = 2\sin\alpha.\cos\alpha$

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

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

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