GWANDA STATE UNIVERSITY

FACULTY OF COMPUTATIONAL SCIENCES

DEPARTMENT OF MATHEMATICS AND STATISTICS

GEOMETRY

CMS 1204

Semester Two 2025/2026 : Examination Paper

This examination paper consists of 2 printed pages, cover page not included.

Date:	**JUNE 2026**
Total:	**100 Marks**
Time:	**3 hours**
Examiner's Name:	**Mr. R.G. Moyo**

INSTRUCTIONS

- Candidates should attempt **ALL** questions from **Section A** and **ANY THREE** questions from **Section B**. Section A carries 40 marks and Section B carries 60 marks.
- All answers and all rough work must be written in the answer booklet(s) provided.
- A line should be drawn through any rough work to indicate to the examiner that it is not part of the work to be graded.

ADDITIONAL MATERIALS

- Scientific Calculator (non-programmable)

SECTION A: Answer ALL questions [40 marks].

A1. Define the following terms

(i) Line [2]

(ii) Complementary angles [2]

(iii) Logical connective [2]

(iv) Axiom [2]

A2. Construct the truth table for the compound statement:

$$\big[(P \to Q) \wedge (\neg Q \to R)\big] \to (P \to R)$$

Hence determine whether the statement is a tautology, contradiction, or contingent. [6]

A3. (i) Show that in any triangle, an exterior angle is equal to the sum of the two opposite interior angles. [4]

(ii) In triangle XYZ, XZ = YZ. Prove that $\angle X = \angle Y$. [4]

A4. (i) State the criteria for similarity of triangles. [3]

(ii) In $\triangle ABC$, $DE \parallel BC$ where D lies on AB and E lies on AC.

(a) Prove that $\triangle ADE$ is similar to $\triangle ABC$. [3]

(b) Given that $AD = 4$, $AB = 10$, and $BC = 15$, find DE. [4]

A5. (i) Write the equation of a circle with centre $C(-3, 2)$ and radius $r = 4$. [3]

(ii) Determine whether the point $Q(-1, 5)$ lies inside, on, or outside the circle in (i). [5]

SECTION B: Answer ANY three questions [60 marks].

B6. (i) Derive the distance formula for a line with vertices $A(x_1, y_1)$ and (x_2, y_2) [4]

(ii) Using the distance formula, find the length of the segment joining $(1, -2)$ and $(7, 4)$. [4]

(iii) Find the midpoint of the line joining $(-3, 5)$ and $(5, -1)$. [1]

(iv) Determine the equation of the line passing through $(2, -1)$ and $(6, 3)$. [2]

(v) Quadrilateral $A(1, 1), B(6, 1), C(7, 4), D(2, 4)$:

(a) Verify if $ABCD$ is a parallelogram. [4]

(b) Calculate the area of $ABCD$. [5]

B7. (i) Write matrices for the following transformations

(a) Reflection in the y-axis [3]

(b) Rotation through $180°$ about the origin [3]

(c) Enlargement with scale factor k centered at the origin [3]

(ii) A point $P(3, -2)$ is reflected in the y-axis and then rotated $180°$ about the origin:

(a) Determine the single transformation matrix. [6]

(b) Find the final coordinates. [5]

B8. (i) State and prove the triangle inequality. [7]

(ii) Triangle with vertices $A(1, 1), B(5, 1), C(3, 5)$:

(a) Show that the triangle is isosceles. [5]

(b) Calculate its area. [8]

B9. (i) List the angle relationships formed when a transversal cuts two parallel lines. [4]

(ii) If one of the angles is $110°$, determine:

(a) The corresponding angle [3]

(b) The alternate interior angle [3]

(c) The co-interior angle [3]

(d) The vertically opposite angle [3]

(iii) Prove that corresponding angles are equal when parallel lines are cut by a transversal. [4]

END OF QUESTION PAPER