**P425/1**

PURE MATHEMATICS

**Paper 1**

July/August 2024

**3 Hours**



**NATIONAL EDUCATION RESEARCH & EXAMINATIONS BUREAU**

UACE NEREB NATIONAL MOCKS 2024

**PURE MATHEMATICS**

**PAPER ONE**

**3 HOURS**

**INSTRUCTIONS TO CANDIDATES**

* *Answer all the* ***eight(8)*** *questions in section* ***A*** *and only* ***5*** *questions from section* ***B.***
* *Any additional question(s) answered will not be marked.*
* *All working must be shown clearly*
* *Begin each answer on a fresh sheet of paper.*
* *Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

**SECTION A (40 MARKS)**

**Attempt ALL questions in this section**

1. Solve the simultaneous equations: , . (5 marks)

2. Show that the curve  represents a parabola and find the directrix and sketch. (5 marks)

3. Point  lies on a fixed straight line for all values of . Find the Cartesian equation of the line and find the cosine of the acute angle between the line and the plane. (5 marks)

4. Prove that: **.** (5 marks)

5. Find the common ratio of the geometric sequence  and prove that the sum to infinity is . (5 marks)

6. Evaluate: . . (5 marks)

7. Differentiate from first principles: . (5 marks)

8. Solve the d.e. . (5 marks)

**SECTION B (60 MARKS)**

Attempt **ONLY FIVE** questions from this section**.**

9. Given that the first three terms in the expansion in ascending powers of  of  are the same as the first three terms in the expansion of , find the value of  and . (12 marks)

10a) Sketch the curve . (6 marks)

b) Calculate the area of the finite region bounded by the curve, the axis, the line  and . (6 marks)

11a) Describe the locus given by: . (5 marks)

b) Given that  and  , find  and  in the form . (7 marks)

12a) Find the equation of a plane through ,  and 

1. in vector form
2. Cartesian form

1. Find the equation of a plane through  which is perpendicular to the line .
2. Find the point of intersection of the line  and the plane . (12 marks)

13a) Prove that in a triangle ABC; . (6 marks)

b) A point  lies on the line of a triangle  such that  is an equilateral triangle. Show that . Deduce that , where,  is the area of triangle . (6 marks)

14. Find the equation of the tangent and the normal to the curve  at the point . Given that the normal at  meets the curve again at , find the coordinates of . If the tangent at  meets the axis at , find the equation of the locus of the midpoint of .

15a) Differentiate w. r. t.  :

i)  ii)  (6 marks)

b) If , determine the three values of  between  and  for which . (6 marks)

# 16. Evaluate: . (12 marks)