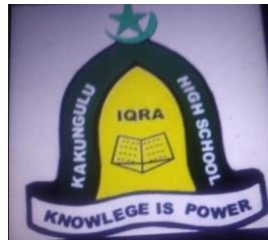


**P425/1**  
**PURE MATHEMATICS**  
**PAPER 1**  
**3 hours**



## **KAKUNGULU HIGH SCHOOL – BOMBO**

### **END OF TERM III EXAMINATION 2024**

#### **SENIOR FIVE PURE MATHEMATICS**

#### **Paper 1**

**Time 3 hours**

#### **INSTRUCTIONS**

*Answer **all** questions in **section A** and not more than **five** from **section B**.*

*Any extra questions answered will not be marked.*

*Silent, non - programmable calculators and mathematical tables may be used.*

#### **SECTION A (40 marks)**

***Answer all questions in this section***

1. A tangent is drawn from  $R(5,1)$  to touch the circle  $x^2 + y^2 + 6x - 4y - 3 = 0$  at  $S$ . Find the length  $RS$ . **(05marks)**
2. Differentiate  $e^{-x^2}x^3\sin x$  with respect to  $x$ . **(05marks)**
3. Solve the equation in:  $9\log_x^5 = \log_5^x$  **(05marks)**
4. In a geometric progression (GP) the third term is 18 and the 6<sup>th</sup> term is 486. Find the 10<sup>th</sup> term of the series. **(05marks)**

5. Solve the simultaneous equations:

$$x - 2y - 2z = 0$$

$$2x + 3y + z = 1$$

$$3x - y - 3z = 3 \quad (05marks)$$

6. Find  $\int x(1 - x^2)^{\frac{1}{2}} dx$ . (05marks)

7. In a triangle  $ABC$  all the angles are acute. Angle  $ABC = 50^\circ$ ,  $a = 10\text{cm}$  and  $b = 9\text{cm}$ . Solve the triangle. (05marks)

8. A cylinder has a radius  $r$  and height  $8r$ . The radius increases from  $4\text{cm}$  to  $4.1\text{cm}$ . Find the approximate increase in the volume. Leave  $\pi$  in your answer. (05marks)

## **SECTION B (60marks)**

### ***Answer five questions in this section***

9. Two aero planes  $M$  and  $N$  were flown in the sky. Plane  $M$  described a path  $y = 20x - 2x^2$  and  $N$  described the path  $y = 4x + 14$  where  $(x, y)$  is the grid reference of the plane in the sky.

(a) Using differentiation, sketch the path traced by the two planes.

(b) At what points were the two planes at the same level?

(c) Find the area enclosed by the path of the two planes. (12marks)

10.(a) Simplify  $\frac{\cos 3\theta + \cos 5\theta}{\sin 5\theta - \sin 3\theta}$  (03marks)

(b) Show that  $\cot 2\theta = \frac{1 - \tan^2 \theta}{2 \tan \theta}$ . Hence solve the equation

$\cot 2\theta = 4 - \tan \theta$  for values of  $\theta$  between  $0^\circ$  and  $360^\circ$ . (09marks)

11. Solve for  $x$  in the following equations:

(a)  $\sqrt{3 - x} - \sqrt{7 + x} = \sqrt{16 + 2x}$  (06marks)

(b)  $\log_4 x^2 - 6 \log_x 4 - 1 = 0$  (06marks)

12.(a) Given that  $f(x) = (x - a)^2 g(x)$ , show that  $f'(x)$  is divisible by

$x - a$ . (03marks)

(b) A polynomial  $P(x) = x^3 + 4ax^2 + bx + 3$  is divisible by  $(x - 1)^2$ .

Use the result in (a) above to find values of  $a$  and  $b$ . Hence solve the equation  $P(x) = 0$ . **(09marks)**

13. Prove that the curve  $y = \frac{4x^2 - 10x + 7}{(x - 1)(x - 2)}$  cannot lie in the region  $-2\sqrt{3}$  and

$2\sqrt{3}$  determine the turning points and sketch the curve. **(12marks)**

14.(a) Show that the circles  $x^2 + y^2 - 2ax - c^2 = 0$  and

$x^2 + y^2 - 2by + c^2 = 0$  are orthogonal. **(07marks)**

(b) If the line touches  $y = mx + c$  the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  Express  $c$  in terms of  $a$ ,  $b$  and  $m$ . **(05marks)**

15.(a) Solve the inequality  $\frac{2x^2 - 7x - 4}{3x^2 - 14x + 11} > 2$  **(07marks)**

(b) Show that  $z = -1$  is a root to the equation  $z^4 - 2z^3 - z^2 + 10 = 0$ .

Find the remaining roots. **(05marks)**

16. Express  $f(x) = \frac{5x^2 - 8x + 1}{2x(x - 1)^2}$  into partial fractions. Hence show that

$\int_4^9 f(x) dx = \ln\left(\frac{32}{3}\right) - \frac{5}{24}$  **(12marks)**

**END**

***Merry Christmas And A Prosperous New Year 2025***