**P425/1**

**Pure Mathematics**

**Paper 1**

# Uganda Advanced Certificate of Education

# Pure Mathematics

# Paper 1

# Form five

# 3 HOURS

**Instructions**

- *Attempt **all** the eight questions in Section **A** and any **five** from section **B***
- *Clearly show all the necessary working*
- *Silent, simple non-programmable scientific calculators maybe used*
- *Mathematical tables with a list of formula may be used.*

***Section A (40marks)***

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

1. Solve for $x: \log_4 x = \log_2(3-2x)$ (05marks)
2. Prove by induction that $\sum_{r=1}^{n} r^2 = \frac{n(n+1)(2n+1)}{6}$ (05marks)
3. Solve the equation $1-2\sin\theta-4\cos 2\theta=0$ for the values of $\theta$ between $0^0 \wedge 360^0$ (05marks)
4. Differentiate $y=\sqrt{x}$ from first principles (05marks)
5. Find the possible values of K if the quadratic equation $2kx^2-8x+1=2k(x-2)$ has equal roots (05marks)
6. Find the coefficient of $x^{17} \in$¿ the expansion of $\left(x^3+\frac{1}{x^4}\right)^{15}$ (05marks)
7. The roots of the quadratic equation $x^2+(7+p)x+p=0$ are $\alpha \wedge \beta$. Given that $\alpha \wedge \beta$ differ by 5. Find the possible values of p. (05marks)
8. A man deposits shs. 150,000 at the beginning of every year in a micro finance bank with the understanding that at the end of seven years, he is paid back his money with 5% per annum compound interest. How much does he receive? (05marks)

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## SECTION B

**9. (a)** Expand $(1-x)^{\frac{1}{3}}$ as far as the term in $x^3$. Use your expansion to deduce $\sqrt[3]{24}$ correct to three significant figures (05marks)

(b) In the expansion of $(1+ax)^n$, the first three terms are $1-\frac{5}{2}x+\frac{75}{8}x^2$ . Find n and a, state the range of values for which the expansion is valid (07marks)

10. A is an acute angle and B is Obtuse such that $tanA=\frac{4}{3}$ and $tanB=-2$, without using tables or calculators, find the values of

(i) $\sin(A-B)$

(ii) $\cos(A+B)$ (06marks)

(b) Prove that, in any triangle ABC, $\frac{a^2-b^2}{c^2}=\frac{\sin(A-B)}{\sin(A+B)}$ (06marks)

11 (a) If $\alpha \wedge \beta$ are roots to the equation $2x^2-7x+1=0$, show that $\left(\sqrt{\frac{\alpha}{\beta}}-\sqrt{\frac{\beta}{\alpha}}\right)^2=\frac{41}{2}$. (5mrks)

(b) Given that $(x-2)^2$ is a factor of the polynomial $f(x)=x^4+ax^3+bx^2+cx+4$ and $f(x)$ leaves a remainder of 2 when divided by $(x-1)$. find the values of $a$, $b$ and $c$ (7marks)

12.(a) T is a tangent to the curve $y=x^2+6x-4\,at\,(1,3)$ and N is a normal to the curve $y=x^2-6x+18\,at\,(4,10)$. find the coordinates of the point of intersection of T and N. (7marks)

(b) Determine the nature of the turning points to the curve $y=x^3-3x^2+3x-1$ (05marks)

13. Solve for $x$ in; $9^x-3^{x+1}=10$ (05marks)

(b) Solve the simultaneous equations

$\log_2 x^2+\log_2 y^3=1$

$\log_2 x - \log_2 y^2 = 4$ (07marks)

14. The sum of the first two terms of a geometric progression (G.P) is 9 and sum to infinity is 25. If the G.P has a positive common ratio, r. find r and first term (05marks)

(b) An arithmetic progression (A.P) has a common difference 3. A geometric progression (G.P) has a common ratio of 2. A sequence is formed by subtracting the terms of the A.P from the corresponding terms of the G.P. The third of the sequence is 4 and the sixth term of the sequence is 79. Find the first term of the;

(i) A.P

(ii) G.P

15(a). Solve the equation $sinx + \sin 5x = \sin 3x$ for $0^0 \leq x \leq 180^0$ (06marks)

(b) By expressing $5cosx + 8sinx \in form\ of\ Rcos(x + \beta)$, where R is a constant and $\beta$ is an acute angle, solve $5cosx + 8sinx = 7$ for $0^0 \leq x \leq 360^0$ (06marks)

**END**

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