## ACHOLI SECONDARY SCHOOLS EXAMINATIONS COMMITTEE

Uganda Advanced Certificate of Education
Joint Mock Examinations, 2018
PURE MATHEMATICS
Paper 1
3 hours
INSTRUCTIONS TO CANDIDATES:
$\checkmark$ Answer ALL the EIGHT questions in section A and any FIVE questions in section B.
$\checkmark$ All necessary working MUST be shown clearly.
$\checkmark$ Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

Secondary Schools Examinations Committee

## SECTION A (40 marks)

Answer ALL the questions in this section. All questions carry equal marks.

$$
2 \text { - }
$$

$\neq 0$ ). Find the

1. A curve is defined by the parametric equations: $\mathrm{x}=\mathrm{t}, \mathrm{y}=(\mathrm{t}$
equation of the tangent to the curve at the point where the curve cuts the x -axis.
2. If $\mathrm{z}=2+i$ is a root of the equation $2 \mathrm{z}^{3}-9 \mathrm{z}^{2}+14 \mathrm{z}-5=0$, find the other roots. (05 marks)

## 1

3. (i) Find the binomial expression of ${ }_{2} u$ p to and including the term $\square a \square b x \square$ $\mathrm{x}^{3}$.
(ii) Given that the coefficient of the $x$ term is equal to the coefficient of the $x^{2}$ term, show that $3 b+2 a=0$.
4. Find the coordinates of the point C on the line joining the points $\mathrm{A}(-1,2)$ and $B(-9,14)$ which divides $A B$ internally in the ratio $1: 3$. Find also the equation of the line through C which is perpendicular to AB . ( 05 marks)
5. Solve the equation $5 \operatorname{Cos} \square-3 \operatorname{Sin} \square=4$ for $0^{\circ} \leq \square \leq 360^{\circ}$. ( 05 marks)

$$
\sqrt{ }
$$

6. Evaluate $\square^{5}{ }^{x} \square_{x} \square 1 \square \mathrm{dx}$
7. Find the Cartesian equation of the plane passing through the midpoint of $A B$ with $\mathrm{A}(-1,2,-5)$ and $\mathrm{B}(3,0,-1)$ which is perpendicular to the line $\mathrm{x} \underline{\square} \mathrm{y} \underline{\square}$ 76 ㅁ

प्र. (05 marks) 2 प38
8. Solve the equation: $-\quad \square \mathrm{y} \tan \mathrm{x} \square \operatorname{Cos} \mathrm{x}$, given $\mathrm{y}=0$ at $\mathrm{x}=.(05 \mathrm{marks})$ dx 2

## SECTION B (60 marks)

Answer only FIVE questions from this section. All questions carry equal marks. Question 9:
${ }^{12} \square 5 \mathrm{x}^{3} \mathrm{D}$ 12x—4$\square$
(a)Evaluate $\square / \sqrt{\square \quad{ }_{2} \square}$ dx (05 marks)

ㅁ 1 ㅁ

(b) By means of the substitution $t=\tan x$, prove that find ${ }_{0} 1 \square \sin 2 \times 2$
the value of ${ }^{9 / 4} \quad \mathrm{dx} \quad \square_{2}$.
marks) ${ }^{\circ} \square 1 \square \sin 2 x \square$

## Question 10:

(a) If $\mathrm{z}_{1}$ and $\mathrm{z}_{2}$ are complex numbers, solve the simultaneous equations:
$4 \mathrm{z}_{1}+3 \mathrm{z}_{2}=23 \mathrm{z}_{1}+i \mathrm{z}_{2}=6+8 i$, giving your answers in the form $\mathrm{x}+$ iy. (06 marks)
(b) Find the value of the complex number z given that $\mathrm{z}^{3}$ ___ $5 \mathrm{D} i \cdot(06$ marks)

$$
2 \square 3 i
$$

## Question 11:

(a) Find the angle between line $x \underline{\square} 2 \square_{-} \square^{\mathrm{z}} \underline{\square}^{1}$ and $4 \quad 3 \quad 2$
the plane $-3 x+5 y+6 z=10$.
(04 marks)
(b) A plane $\mathrm{P}_{1}$ passing through the points $(1,-1,0)$ and $(1,0,-3)$ is perpendicular to the plane $P_{2}$ having equation: $x+y=6 z=0$. Find:
(i) the equation of $\mathrm{P}_{1}$
(ii) the angle between $\mathrm{P}_{1}$ and another plane $\mathrm{P}_{3}$ with equation: $\mathrm{x}-\mathrm{y}+\mathrm{z}=7$.
(08 marks)

## Question 12:

A disease is spreading at a rate proportional to the product of the number of people already infected and those who have not yet been infected. Assuming that the total number of people exposed to the disease is N ; (a) Write down a differential equation.
(b) Initially $20 \%$ of the population is infected. Two months later $40 \%$ of the population is infected. Determine how long it takes for only $25 \%$ of the population to remain uninfected.
(12 marks)

## Question 13:

(a) Determine the equation of the circle passing through the points $\mathrm{A}(-1,2)$, $B(2,4)$ and $C(0,4)$. (06 marks)
(b) If $y=m x-5$ is a tangent to the circle $x^{2}+y^{2}=9$, find the possible values of m . (06 marks)

## Question 14:

日2 x —1
points．（12 marks）

## Question 15：

（a）Determine the maximum value of the expression： $6 \operatorname{Sin} x-3 \operatorname{Cos} x$ ． （03 marks）

Cos11ロ～Sin110
（b）Prove that $\square \tan 56 \square$（03 marks）
$\operatorname{Cos} 11 \mathrm{C}$（in11ロ
（c）In a triangle $A B C$ ，prove that $\operatorname{Sin} B \square \operatorname{Sin} C \square \operatorname{Sin} A \square 4 \operatorname{Cos}^{A} \operatorname{Sin}^{-B} \operatorname{Sin}^{\mathrm{C}}$

## Question 16：

（a）Using Maclaurin＇s theorem，expand $\mathrm{e}^{-\mathrm{x}} \operatorname{Sin} \mathrm{x}$ up to the term in $\mathrm{x}^{3}$ ．Hence， evaluatee ${ }^{\square_{x x}} \operatorname{Sin} \underline{\underline{D}}_{\text {to }} 4$ significant figures．（05 marks） 3
（b）The curve $\mathrm{y}=\mathrm{x}^{3}+8$ cuts the x and y axes at the points A and B respectively．The line $A B$ meets the curve again at point $C$ ．Find the coordinates of $\mathrm{A}, \mathrm{B}, \mathrm{C}$ and hence，find the area enclosed between the curve and the line．（07 marks）
＊THE END＊

The End.

DOWNLOAD MORE RESOURCES LIKE THIS ON ECOLEBOOKS.COM

