P425/1
PURE MATHEMATICS
PAPER 1
June 20173
Hours

## Uganda Advanced Certificate of Education <br> MOCK EXAMINATIONS 2017 <br> PURE MATHEMATICS <br> Paper 1 <br> 3 hours

## INSTRUCTIONS TO CANDIDATES:

- Attempt ALL the EIGHT questions in section A and any FIVE from section B.
- All working must be clearly shown.
- Begin each question on a fresh sheet of paper.
- Mathematical tables with list of formulae and squared paper are provided.
- Silent, non-programmable calculators should be used.

> Section A ( 40 Marks)
> (Answer all questions in this section)

Qn 1: Simplify: $\qquad$
$\qquad$ ! +

Qn 2: Solve the inequality: > _.

Qn 3: Prove that $\tan \quad+\tan \quad=\tan \quad-$.

Qn 4: The area enclosed by $=\sin$ and the $=$ axis for $0 \leq \leq \quad$ is rotated about the -axis. Show that the volume generated is - .

Qn 5: A curve is defined by parametric equations $=3-2$ and $=$. Find
$\qquad$

Qn 6: Solve the equation: $3 \sin 2 \#+8 \cos \#=9$ for $0^{\circ} \leq \# \leq 360^{\circ}$.

Qn 7: Find the point of intersection of the line $=-= \pm$ with the plane

$$
\begin{equation*}
3+4+2 .-25=0 . \tag{5}
\end{equation*}
$$

Qn 8: Find the equation of the circle which passes through the point $-3,1$ and the points of intersection of $+\quad--5=0$ and $+\quad+$ $2+5-1=0$.

## Section B ( 60 Marks)

(Answer only five questions from this section)

## Question 9:

The line through the points $0,-7,-5$ and $6,5,10$ intersects the line through $2,11,5$ parallel to $33-5+56$.
(i). Find the equations of the lines.
(ii). Determine the coordinates of the points of intersection.
(iii). Calculate the angle between the lines.

Question 10:
(a). If A, B and a triangle,

$$
\begin{aligned}
\frac{\sin 2 A+\sin 2 B+\sin 2 C}{\sin A+\sin B+\sin C}=8 \sin \frac{A}{2} \sin \frac{B}{2} \sin \frac{C}{2} & \begin{array}{l}
\text { C are angles of } \\
\text { prove that }
\end{array} \\
& =2 \sin x+6 \cos ^{2}\left(\frac{x}{2}\right.
\end{aligned}
$$

(b). Show that: can be written in the form where $0^{\circ} \leq=\leq 360^{\circ}$ and. State the $\begin{array}{clc}a+r \cos (x-\beta) & \text { values of } ;,<\text { and } . & r>0 \text { What is the maximum } \\ \beta & \text { value of : } . & {[12]}\end{array}$

## Question 11:

(a). If the roots of ; $+>+$ ? $=0$ are in the ratio @: B , prove that ;? @+B = > @B
(b). If C and $=$ are the roots of ; $\quad+>+$ ? $=0$, form the equation whose

$$
\begin{equation*}
\operatorname{roots~are~}_{D}^{\mathrm{D}} \text { and }{ }_{\mathrm{E}}^{\mathrm{E}} \tag{12}
\end{equation*}
$$

Question 12: Given that is a real number, prove that the function : $=$ does

F not lie
between 2 and 6 .
(i). Find the turning points and distinguish between them.
(ii). State the equations of the assymptotes.
(iii). Sketch the graph of $=$ :.

## Question 13:

I
(a).

$$
\text { Evaluate: } \mathrm{G}_{.^{-\frac{1}{2}}}^{\sqrt{3-4 x-4 x^{2}}}
$$

Evaluate: $\mathrm{G}_{x^{2}-x}^{-\frac{1}{2}}$
K.
(b). Find: G K.

Question 14:

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During a chemical reaction, two substances 7 and 8 decompose. The number of grams, , of substance 7 present at time, , is given by $=!^{\mathrm{L}} \mathrm{M}$. There are grams of 8 present at time, , and " is directly proportional to the
product of and . Given that $=20$ and " $\quad-\quad=-40$ when $=0$, show that
$-\quad=\quad=-\mathrm{m}$. Hence determine as a function of . Determine the
$"!\quad$ amount of substance 8remaining when the reaction is essentially complete.

## Question 15:

Two perpendicular corridors in a building are of width ; and $>$. Prove that the length of the longest ladder which can be taken in a horizontal position from Fo
one corridor to the other is $\mathrm{N} ; \mathrm{o}_{\mathrm{F}}+>\mathrm{O}_{\mathrm{FP}}$.

## Question 16:

(i). Show that the equation of the normal to the parabola $=4$; at the point Q ; , 2 ; is $+=2 ;+$; ${ }^{\mathrm{F}}$.
(ii). If this normal meets the -axis at R , show that the midpoint, S , of QR has coordinates;+;,;
(iii). If P is a variable point on the parabola in (i) above, find the Cartesian equation of the locus of M .
***END***

