456/2
MATHEMATICS
Paper 2
APRIL/MAY, 2018
Time: *2hrs 30mins*

UGANDA CERTIFICATE OF EDUCATION

PRE-MOCK EXAMINATIONS 2018
MATHEMATICS
PAPER TWO

INSTRUCTIONS TO CANDIDATES:

- *Answer* **all** *the* **ten** *questions in section* **A** *and* **five** *questions from section* **B**.
- *Any additional question(s) will* **not** *be marked.*
- **All** *working* **must** *be shown clearly.*
- *Silent non-programmable calculators and mathematical table with a list of formulae may be used.*
- *Draw this grid on the first page of your answer scripts,* ***do not*** *hand in question paper.*

		Marks attained
	Section A	
Indicate The five Questions Attempted in Section B		
	Total marks	

SECTION A (40 Marks)

1. Find the L.C.M and H.C.F of *80* and *102*. ***(04 marks)***

2. The line $3x = 4y + 2$ cuts the axes at $(a, 0)$ and $(0, b)$. State the values of *a* and *b*, hence find the area enclosed by the line $3x = 4y + 2$ and the axes. ***(04 marks)***

3. The operation * and Δ are defined as $A * B = xA + B$, and $A \Delta B = A^2 - B$. Find the value of *x* if $-4\Delta(2 * 3) = 9$. ***(04 marks)***

4. Express $5.272727.....$ as a fraction in its simplest form. ***(04 marks)***

5. Given that $OA = \begin{pmatrix} 10 \\ -3 \end{pmatrix}$ and $OB = \begin{pmatrix} 13 \\ 1 \end{pmatrix}$, find:

(i) AB

(ii) Modulus of AB. ***(04 marks)***

6. A printer costs $shs.180{,}000$. The dealer offers it on Higher purchase for a down payment of 25% of its cash cost and 8 equal monthly installments of $shs.20{,}000$. Calculate the extra amount a customer pays under Higher purchase.

(04 marks)

7. Given that *P* and *Q* are two sets such that $n(P) = 11x + 9, \quad n(Q) = 11x + 5,$ $n(P \cup Q)^1 = 7$ and $n(\varepsilon) = 42$, find;

(i) The value of x

(ii) $n(P \cup Q)$. ***(04 marks)***

8. If *m* is directly proportional to the square of *n* and $n = 2$ when $m = 1$, find the value of *m* when $n = -4$. ***(04 marks)***

9. Without using tables or a calculator, simplify: $\frac{1}{2}\log 16 - 2\log\left(\frac{a}{5}\right) + \log a^2$.

(04 marks)

10. The bob of a pendulum ***4m*** long is ***25cm*** higher at the top of its swing than it is at the bottom. Find the angle of the swing on each side of the vertical.

(04 marks)

SECTION B (60 Marks)

11. (a) The function h is defined as $h(x) = nx^2 - 2$. Given that $h(3) = 16$, find;

(i) The value of n

(ii) $h^{-1}(6)$. ***(06 marks)***

(b) Given that $f(x) = x + 4$, $g(x) = 3x^2$, find the value of x for which $gf(x) = fg(x)$. ***(06 marks)***

12. Mr. Mabirizi works for an organization that pays him a monthly taxable income of *shs.*1,500,000. The organization also gives monthly top-up allowances as follows:

Medical	*shs.*900,000 per annum
Marriage	*shs.*10% of the monthly taxable income
Unmarried	*shs.*5% of the monthly taxable income
Transport	*shs.*50,000 per month
Housing and food	*shs.*75,000 per month

Family allowance for only 3 children at the rates: A child below 10 years gets *shs.*30,000, a child above 10 years but below 20 years gets *shs.*25,000, and a child above 20 years gets *shs.*15,000. Mr. Mabirizi is married with five children; two of whom are below 10 years, one is 21 years and the other are twins of 26 years each. Each employee of this organization is subjected to an income tax which is calculated as follows:

7.5% on the first *shs.*800,000

12.5% on the next *shs.*500,000

20% on the next *shs.*100,000

30% on the next *shs.*60,000

35% on the remainder.

Calculate;

(a) Mr. Mabirizi's gross monthly income. ***(05 marks)***

(b) His monthly income tax ***(05 marks)***

(c) Express his monthly income tax as a percentage of his monthly net income. ***(02 marks)***

13. In a certain training workshop that is scheduled for 5th June 2016 at ***Serena Hotel***, it has been realized that ***30*** of the invited participants speak Arabic (A), ***25*** speak German (G), ***10*** speak French (F) and Arabic (A). ***4*** speak French and

German only. Those who speak French only are two more than those who speak neither of the three languages. If $n(A \cap G \cap F) = 3$, and $n(A \cap G \cap F^1) = n(A^1 \cap G^1 \cap F^1) = x$, and the probability that a participant chosen at random speaks at least two languages is $\frac{1}{3}$; Use a Venn diagram to find:

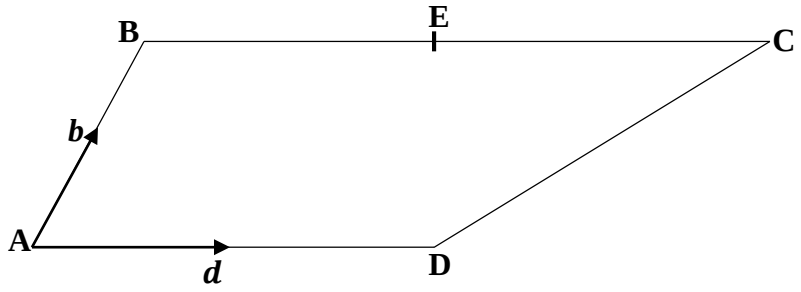
(i) The value of *x*. ***(06 marks)***

(ii) How many participants speak only one language ***(02 marks)***

(iii) $n(\varepsilon)$, where ε is the universal set. ***(02 marks)***

(iv) The percentage of participants speaking German only. ***(02 marks)***

14.



In the above diagram ABCD, $5\overline{AD} = 2\overline{BC}$ and $\overline{BE} : \overline{BC} = 3:5$. Given that $\overline{AB} = b$ and $\overline{AD} = d$;

(a) Express the following vectors in terms of ***b*** and ***d***

(i) ***BD***

(ii) ***AE***

(iii) ***AC***

(iv) ***ED*** ***(09 marks)***

(b) Find the ratio of ***AD : BC.*** ***(03 marks)***

15. A line passing through point $A(1,3)$ is parallel to the line passing through the points $B(2,0)$ and $C(4,2)$. Find the;

(a) Equation of the line through point A. ***(04 marks)***

(b) Coordinates of the point M of intersection of the line in (a) and the line $y + x = 0$. ***(04 marks)***

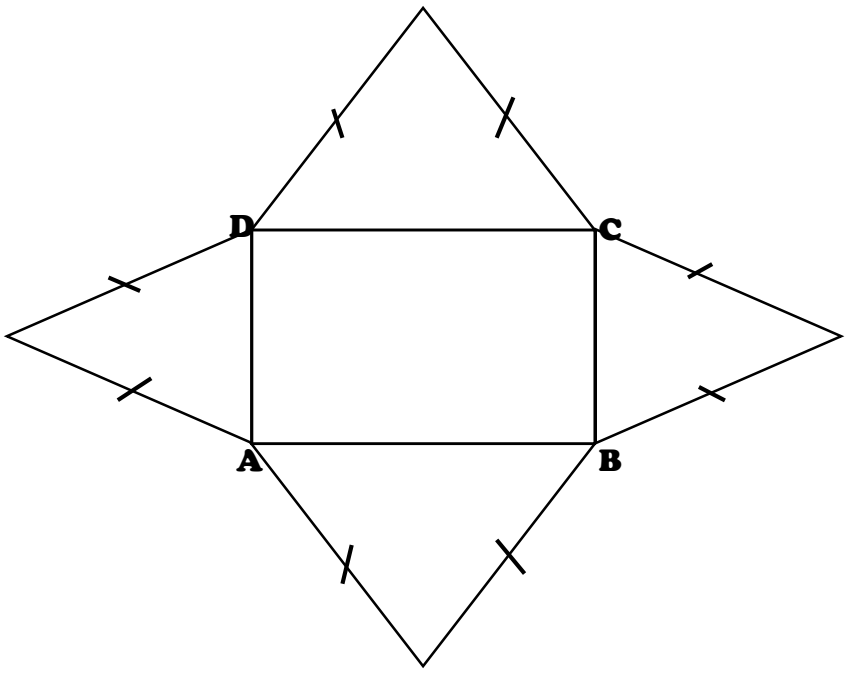
(c) Column vector ***AM***, and hence $|AM|$. ***(04 marks)***

16.(a) Solve for *m*: $16^{m-3} \times 4^{m+3} = \frac{64}{2^{-2m}}$. ***(03 marks)***

(c) Use tables of logarithms to evaluate $\frac{342.0 \times 0.0017}{0.35}$. Give your answer in standard form. ***(05 marks)***

(d) If $\log_{10} x = 0.3779$ and $\log_{10} y = 0.4771$, find the value of $\log_{10} x^3 y$, giving your answer in standard form.

17. The figure below shows a net of a right pyramid with a rectangular base ABCD.



If **V** is the vertex of the pyramid **VABCD** above the base **ABCD**, $AB = 16cm$, $BC = 12cm$, and the slant sides of each triangle measure *26cm*.

(a) Draw the right pyramid showing clearly points VABCD, and find the height of the pyramid.

(b) Find the area of plane VAB

(c) Find the angle between;

(i) Edge VA and the base

(ii) Face VAB and the base.

=END=

Wish you all the best