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MATHEMATICS
Paper 2
July/ August, 2022
2 ½ hours

BUNYORO REGION EXAMINATIONS BOARD (ABREB)

Uganda Certificate of Education

Mock Examinations, 2022

MATHEMATICS

Paper 2

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

Answer **All** *questions in section* **A** *and Not more than* **five** *from section* **B**

Any additional question(s) attempted will **NOT** *be marked.*

All necessary calculations **MUST** *be shown and should be done on the same page as the rest of the answer.*

Mathematical tables and graph papers will be provided.

Silent non-programmable scientific calculators may be used.

SECTION A (40 marks)

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

1. Find L.C.M and H. C. F of 78 and 42. *(04 marks)*

2. Given that $f(x) = \frac{3x^2+4x=7}{x^2-5x+6}$. Find the values of x which the function is meaningless. *(04 marks)*

3. A car travelled at a steady speed of 85 km hr^{-1} for 5 hours and then it further travelled at a steady speed of 69 $kmhr^{-1}$ for 3 hours. Find the average speed of the car for the whole journey. *(04 marks)*

4. Given that $a = \begin{pmatrix} 10 \\ -14 \end{pmatrix}$, $b = \begin{pmatrix} -4 \\ 5 \end{pmatrix}$ and $p = a - 2b$. Find the length of $p = a - 2b$. Find the length of p *(04 marks)*

5. Exchange rates in a Forex Bureau are that a Us dollar to Uganda shillings is 1$=2785 and a pound sterling to US dollar is £1=$2.59. How much sterling will a Ugandan trader get from shs 4,570,185. *(04 marks)*

6. It takes 6 days for 9 men to dig a trench of 108 m. How many days will 12 men take to dig a trench of 129 m, if they are to work at the same rate? *(04 marks)*

7. Simplify $\frac{\sqrt{63}+\sqrt{28}}{\sqrt{175}-\sqrt{63}}$ in this simplest form. *(04 marks)*

8. Given that T= (the first triangle numbers) and E= (all even numbers between 0 and 12). Find;

   (a) E-T

   (b) n(E-T) *(04 marks)*

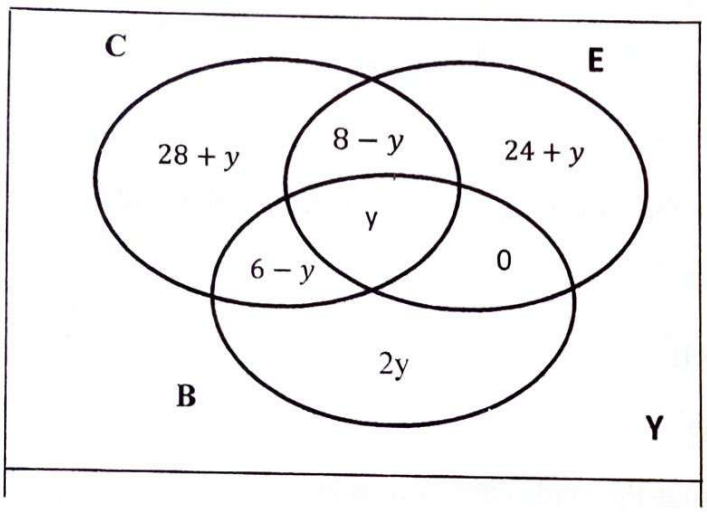
9. Solve the equator; $\log_{10}(10x + 50) - \log_{10}(x - 4) = 2$. *(04 marks)*

10. Isaac bought s kettle and s saucepan each at shs. 6000. He later sold the kettle at a loss of 20% and the saucepan at a profit of 25%. Find his net profit.

(4 marks)

SECTION B (60 MARKS)

11. The Venn diagram below shows how teachers in Hoima Town save their money in different Banks, Centenary(C). Equity (E) and Barclays (B). The District Education officer says that the probability that a teacher does not save any of this money in the three banks is $^1/_{15}$.



Using the information above, Determine;

(i) The number of teachers who save in all the three banks.

(ii) The total number of teachers in Hoima town.

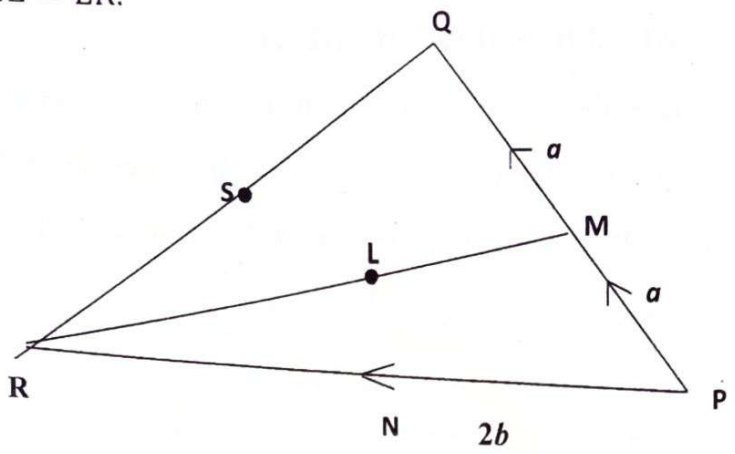
(iii) Which one of these banks is very popular with the teachers?

(iv) The probability that a teacher picked at random saves in at least two banks.

(v) The ratio in its simplest form of the number of teachers saving in Barclays only to that of Equity only.

(12 marks)

12. In the figure below, $\overrightarrow{PQ} = 2a$ and $\overrightarrow{PN} = 2\overrightarrow{NR} = 2b$. M and S are the mid-points of $\overline{PQ}$ and $\overline{QR}$ respectively. L is a point on $\overline{MR}$ such that $\overline{ML} = \overline{LR}$.



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

(i) $\overrightarrow{MR}$

(ii) $\overrightarrow{ML}$

(iii) $\overrightarrow{QL}$

(b) Show that P, L and S are collinear.

13. (a) Express $y^2 + y - 12$ in the form $(y + p)^2 + q$. Hence solve the equation $y^2 = y - 12 = 0$. (06 marks)

(b) Given the functions $h(a) = \frac{a+3}{2}$ and $g(a) = \frac{1-2a}{5}$, determine the values of a for which $hg(a) = \frac{4a^2+12a+4.5}{5}$. *(06 marks)*

14. A man earns a gross annual income of shs. 10,500,000. He is entitled to the following monthly allowance.

Children; shs 15,000 for each child aged 12 and below

Shs 12,000 for each child between age 13 and 18 inclusive.

Lunch; shs 60,000.

Transport; sh. 110,000

Medical; $^{1}/_{10^{th}}$ of gross monthly income.

Marriage; $^{1}/_{25^{th}}$ of gross monthly income

Housing $^{1}/_{100^{th}}$ of gross annual income.

The man is married with five children of whom two are aged 12 and below, the other two aged 21 and 24 and the other aged 17. The following tax structure is applicable on the taxable income in excess of shs. 30,000.

Taxable income (shs)	**Rate (%)**
30,001-130,000	8.0
130,001-260,000	14.5
260,001-380,000	23.0
380,001-490,000	28.5
490,001-590,000	35.0
590,001 and above	42.5

(NB: A month has days and a year has 360 days).

Calculate;

(a) The man's;

(i) Total monthly allowance

(ii) Monthly taxable income

(iii) Monthly income tax.

(b) The percentage of his gross annual income that goes to tax.

15. The distance between two towns **P** and **Q** is 432 km. A lorry traveling at a steady speed of 72 km hr^{-1} leaves town **P** at 6:45 am for town **Q**. one and a half hours later, a mini-bus leaves town **P** at a steady non-stop speed of 108 km hr^{-1} heading for town **Q**.

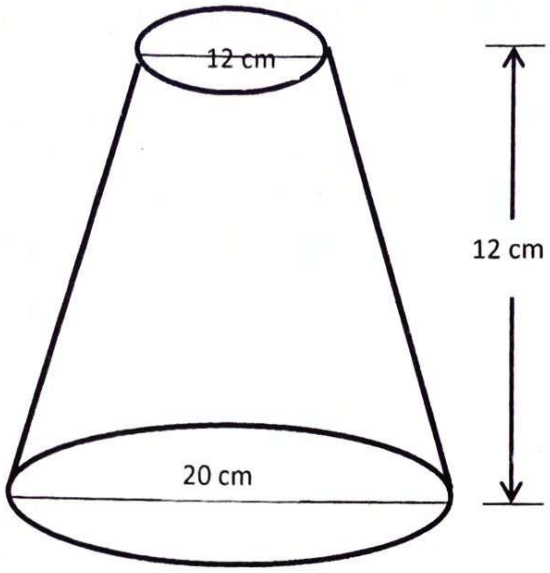
Determine;

(i) Where and when from town **P** when the mini-bus overtakes the lorry.

(ii) The times when the two vehicles arrive in town **Q**.

(iii) The difference in the times of arrival of the two vehicles. *(12 marks)*

16. The lampshade shown below has a height of 12 cm. its upper and lower diameters are 10 cm and 20 cm respectively.



Calculate the area of the material required to cover the curved outer surface of the lampshade. (use π =3.142). (12 marks)

17. (a) Given that $log_{10}^{p} = 0.3979$ and $log_{10}^{q} = 0.4771$ find the value of

$log_{10}^{p^3 q}$ *(04 marks)*

(b) Use logarithm tables to evaluate:

$$\frac{\sqrt{33.7} \times 0.429}{76.1}$$

END