456/2

MATHEMATICS

Paper 2

July/August,2023

2½ hours

TESO SECONDARY SCHOOLS MOCK EXAMINATION ASSOCIATION (TESSMEA)

Uganda Certificate of Education

MATHEMATICS

Paper 2

2½ hours

INSTRUCTIONS

1. *Attempt all questions in section **A** and **ANY FIVE** in section **B***
2. *Any extra questions done will not be marked*
3. *Square papers and mathematical tables are provided*

SECTION A

1. Find the GCD and LCM of 18, 42 and 48 *(4marks)*
2. A straight line passing through points A $(-2,-4)$ and B $(3,-2)$ meets the X-axis at point C. Determine the coordinates of C. *(4marks)*
3. Evaluate without using tables or calculator

   $\left(\frac{81}{16}\right)^{-\frac{3}{4}} \times \left(\frac{9}{4}\right)^{\frac{1}{2}} X\ (27)^{\frac{2}{3}}$ *(4marks)*
4. Given the column vectors $\mathbf{a} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$, $\mathbf{b} \begin{pmatrix} -3 \\ -6 \end{pmatrix}$ and $\mathbf{c} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and that $\mathbf{P} = 3\mathbf{a} - \frac{1}{3}\mathbf{b} + \mathbf{c}$, determine the length of vector $\mathbf{p}$

   (4marks)
5. Draw a papygram to illustrate the relation "exceeds by more than 2" among the numbers of set
   $A = \{6, 8, 9, 12\}$ *(4marks)*
6. Given the sets;
   $P = \{\text{all natural numbers less than } 15\}$
   $Q = \{\text{all prime numbers between 5 and } 15\}$
   Find
   (i) $n(P \cap Q')$
   (ii) $n(P' \cap Q)$ *(4marks)*
7. On a map of a certain district in Teso, a lake is represented by an area of $18cm^2$. Given that the actual area of the lake is 28,800 km^2. Determine
   (i) The scale of the map
   (ii) the actual distance between the two schools separated by the line 10.5cm long. *(4marks)*
8. what is the net salary of a primary teacher who earns a total sum of Ug Shs. 640, 000 if free pay is Ug. Shs. 130,000 and the rest is taxed at 30%?

   (4marks)
9. A rectangular full of water cistern measuring 2.5 metres long, 1.8 metres wide and 1.2 metres high is half of water. All this water is poured into an empty cylindrical tank of diameter 2.8 metres. Calculate to one decimal place the height in centimetres to which the water rises. *(4marks)*

10. Emorimor Papa Iteso drove from his home to a town 120km a way at a legal speed limit. If he had travelled 30km/h faster, he would have reached there 40 minutes earlier. Determine the legal speed limit. *(4marks)*

SECTION B

11. A school has a teaching staff of 22 teachers who teach humanities. 8 of them teach Geography, 7 teach History, and 4 teach Religious studies. 3 teach both Geography and History, and 1 teaches Geography and Religious studies. No teacher teaches all the 3 subjects. The number of teachers who teach History and Religious studies is equal to that of those who teach Religious studies but not History.

(a) Represent the above information on a venn diagram. *(4marks)*

(b) Find the number of teachers who teach

i. Geography only *(1mark)*

ii. History only *(3marks)*

iii. None of the 3 subjects *(2marks)*

(c) Find the probability that a teacher picked at random teaches only one or none of these subjects. *(2marks)*

12. Given $f(X) = \frac{X+3}{5}$ and $g(X) = \frac{1-2X}{3}$

Determine;

i. $f(1/4)$ *(2marks)*

ii. $g^{-1}(5)$ *(3marks)*

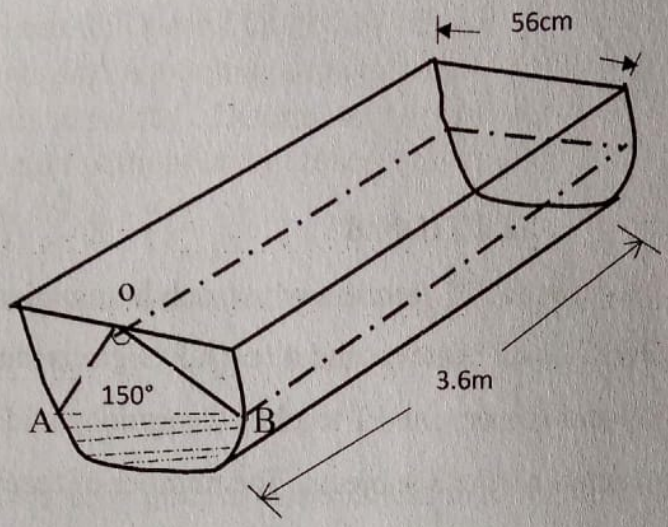
iii. The values of X for which

$fg(X) = \frac{9+24X+8X^2}{10}$ *(7marks)*

13. Esunget left a will directing that his 18-hectare land be divided among his three sons; Omutia, Arereng and Ebutung in the ratio of 3:4:5 respectively. He also directed that his savings from NSSF of Shs. 2, 250,000 be divided

among the 3 sons in the order mentioned above in the ratio of 5: 3:1. If each of the three sons sold his piece of land at Shs. 8,000,000 per hectare, determine how much money each finally received. *(12marks)*

14.

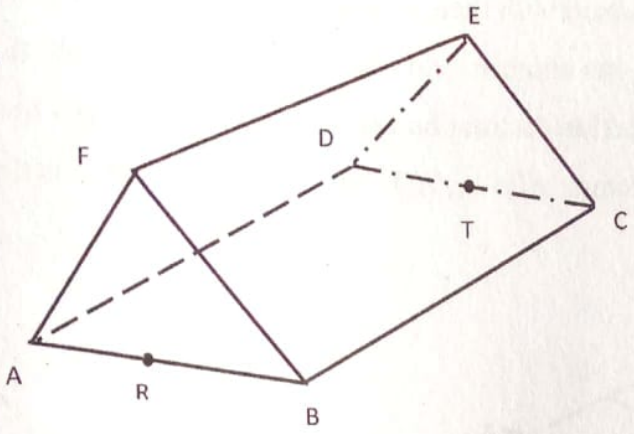


The diagram above represents a trough made by cutting a huge drum exactly in to two. The cross section of the cross is a semi-circle of diameter 56cm and it is 3.6m long. The trough contains water to a level which subtends an angle of 150° at the centre as shown.

(a) Calculate to the nearest litre the volume of water in the trough. *(6marks)*

(b) Determine the wetted surface area of the trough in square centimetres *(6marks)*

15.



The diagram above shows a triangular prism with AB = 18cm, BC = 25cm, AF = BF = 12cm.R and T are the mid points AB and CD respectively.

Calculate:

(a) The length of;

(i) FR

(ii) BE

(iii) BT *(6marks)*

(b) The size of the angle between

(i) BE and the base *(2marks)*

(ii) The planes ABCD and BCEF *(2marks)*

(c) The volume of the prism *(2marks)*

16. The distance between Fred's home and Aaron's home is 40km. one day, Fred left his home at 9:00 am and cycled towards Aaron's home at an average speed of 20km/h. Aaron left his home at 10:30 am on the same day and cycled towards Fred's home at an average speed of 30km/h.

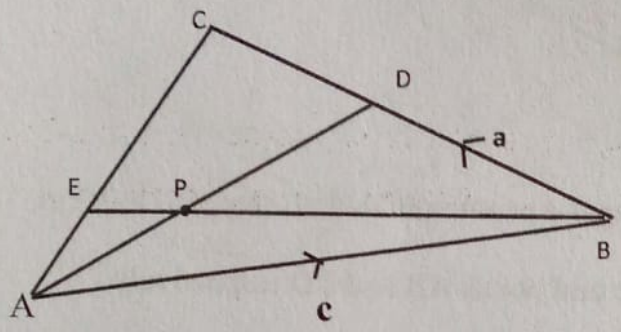
(a) By calculation determine;

(i) The distance from Fred's home to the point the two cyclists met. *(6marks)*

(ii) The time of the day when they met. *(2marks)*

(b) The two cyclists continued with their respective journeys wearing helmets and never recognized one another until each reached his destination. Determine who reached his destination earlier and by how long. *(4marks)*

17. In the figure below vectors, AB = **c**, BD = **a**, AP = 2 PD and D is the mid-point of BC.



(a) Determine in terms of **c** and **a** the vector;

(i) AD *(2marks)*

(ii) AP *(2marks)*

(iii) BP *(2marks)*

(b) Given further that BE = h BP and AE = t AC where h and t are scalars, determine the value of h and t. *(6marks)*

END