456/1
MATHEMATICS

Paper one
July/Aug 2023
2 ½ hours

# *KAMSSA* JOINT MOCK EXAMINATIONS

## Uganda Certificate of Education
## MATHEMATICS

**Paper one**

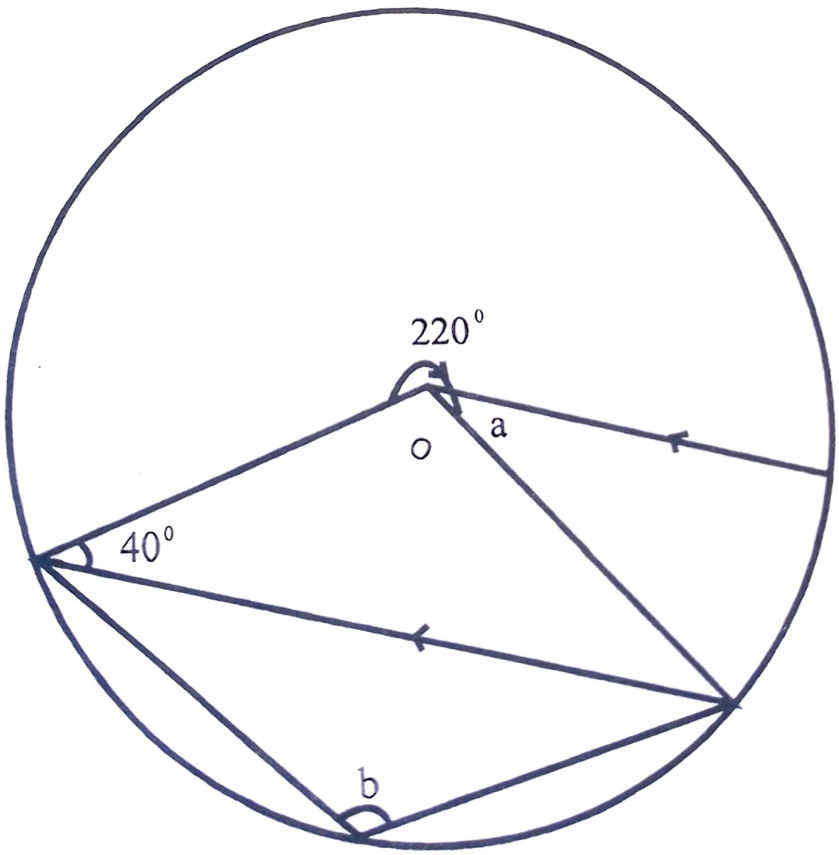
***2 ½ HOURS***

## *INSTRUCTIONS*

- *Answer all questions in section A and any five from section B,*
- *Any additional questions answered will not be marked.*
- *All necessary calculations must be done on the same page as the rest of the answers.*
- *Only silent non – programmable scientific calculators may be used.*

## SECTION A (40 marks)

1. Factorise $2x^2 - x - 10$ hence solve $2x^2 - x - 10 = 0$.
2. Given that matrix $A = \begin{pmatrix} 1 & 4 \\ -2 & 3 \end{pmatrix}, C = \begin{pmatrix} 7 & 6 \\ 6 & 13 \end{pmatrix}$ *and that* $A + 2B = C$. Find matrix B and hence determinant of matrix B.
3. Joshua bought 3 pens and 4 books both at shs 5,800 while Isma bought only 5 pens from the same shop at 3,000. Find the cost of each pen and book.
4. A translation T maps point A (x,y) into its image A'(x-3, y+2).
   i. Find the transformation T.
   ii. Find B if B' is (-2,7).
5. Calculate the area of a triangle ABC in which AB=14cm, AC=9cm and angle BAC=$120^0$.
6. A man of height 1.5m stands a level ground to see the roof of a building at angle of elevation of $54^0$. If the man stands 20m away from the foundation of the building. Find the height of the building.
7. The probability of picking a blues ball at random from the box containing blue and white balls is $^2/_3$. If 8 balls were white, how many balls are in the box?
8. Solve the inequality $-8 < \frac{3}{4}x - 2 \leq x - 6$ and show the solution on a number line.
9. Given that $p * q = p^2 - pq^2$. Find;
   i. 3*-1
   ii. 4*(3*-1)
10. In the figure below O is the center of the circle.




Find the Angles marked a and b.

## SECTION B (60 marks)

**Attempt not more than five questions from this section.**

11(a) Solve the equation $\frac{6}{x} + \frac{1}{x-5} = 2$.

(b) The power of an engine is given by formular $H = \frac{(W_1 - W_2)CN}{3.3 \times 104}$. Make C the subject of the formular and find its value when H=54, N=225, $W_1$=423, and $W_2$=27

12. The probabilities that Kobusingye , Nalubwama and Tumukunde will attend the party at Sheraton are $\frac{3}{4}, \frac{4}{7}$ *and* $\frac{7}{8}$ *respectively. Find the probability that;*

a) All the three will attend the party.
b) None of them will attend the party.
c) Only one attends.
d) Atmost one of them attends.

13. The Headteacher of a certain school orders for T-shirts from the tailor as follows in term 1 and term 2.

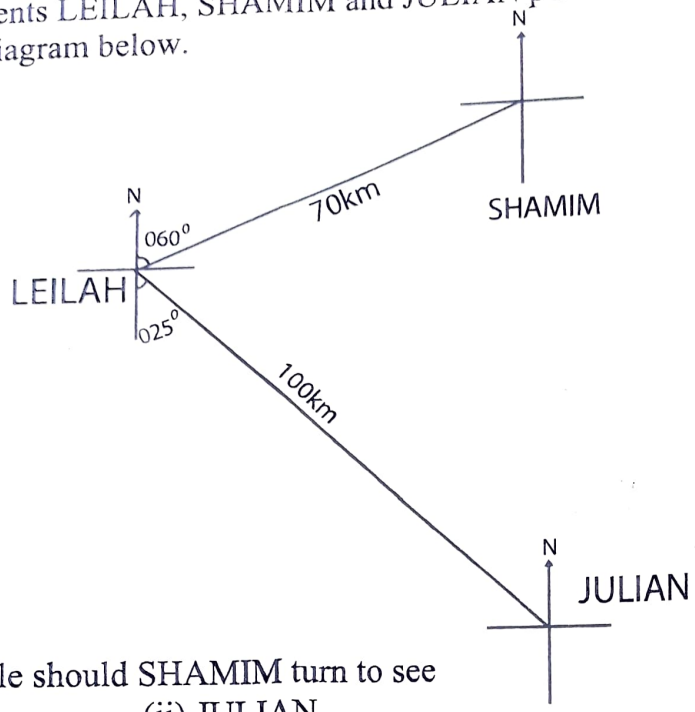
| | Term one | SIZE | | |
|---|---|---|---|---|
| | | Small | Medium | Large |
| Colours | Blue | 15 | 30 | 5 |
| | Green | 0 | 40 | 2 |
| | White | 30 | 28 | 10 |
| | red | 25 | 42 | 0 |

| | Term Two | SIZE | | |
|---|---|---|---|---|
| | | Small | Medium | Large |
| Colours | Blue | 20 | 35 | 0 |
| | Green | 10 | 42 | 8 |
| | White | 25 | 15 | 10 |
| | Red | 24 | 30 | 2 |

If the cost of a small sized T-shirt of any colour is 20,000while that of medium size is Shs 22,000. The cost of a large-sized T-shirt is shs 5,000 more than the cost of a small-sized shirt.

a) Write down a 4X3 overall matrix for the T-shirts bought in both terms.
b.i) Find the cost of large sized T-shirts.
ii) Form a 3X1 matrix for the cost of the T-shirts.
c) Use the matrices formed in (a) and (b) above to find the head teachers expenditure on the T-shirts in the two terms.

14. Three students LEILAH, SHAMIM and JULIAN positioned themselves as shown below in the sketch diagram below.




a) In which angle should SHAMIM turn to see
(i) LEILAH (ii) JULIAN
b) Using a scale of 1cm:10km, make an accurate drawing on a graph paper showing clear position of these students.
c) How far is Julian from Shamim. Give your answer in Km.

15(a) A transformation matrix $M = \begin{pmatrix} 2 & 4 \\ 3 & -1 \end{pmatrix}$ maps the vertical of a triangle ABC to A'(-12,-11) B'(14,-7) C'(22,-2). Find the coordinates of the triangle ABC.
b) If the image triangle further reflected in the line $y + x = 0$ to form A" B"C".
i) Write down the reflection matrix for $y + x = 0$.
ii) Use the reflection matrix in b(i) above to find the image triangle A" B" C"
c) Find a single Matrix of transformation which maps ABC direct to A" B" C".

16. There are more than 108 tourists that are to visit Mt. Rwenzori. They are to use a taxi and a coaster. The capacity of the taxi is 18 people while that of a coaster is 27 people. Each trip the taxi and coaster make cost shs 24 000 and shs 30,000 respectively. These tourists had contributed shs 240,000 for this trip.
The trips made by the taxi should not exceed those made by the coaster by more than 2. If x and y are the number of trips made by the taxi and the coaster respectively.
a) Write down 5 inequalities representing the above information.
b) Plot these inequalities on the same axes.
c) Show the possible number of trips each vehicle will make given that all the money for transport is to be used.
d) Find the total number of tourists that went for the trip.

17a) Using a equilateral triangle of sides 2 units and without using a calculator, show that
$\text{Cos}30^0 = \text{Sin}60^0 = \frac{\sqrt{3}}{2}$.
b(i) Draw a graph of $y = \sin\theta$ for $-180^0 \leq \theta < 360^0$ using an interval of $90^0$
ii) Use this graph to solve $2\sin\theta = 1$

END