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Mathematics
Paper 1
July - August, 2023
2 ½ hours



UGANDA MUSLIM TEACHERS' ASSOCIATION
UMTA JOINT MOCK EXAMINATIONS 2023
UGANDA CERTIFICATE OF EDUCATION
Mathematics

Paper 1

2 hours 30 minutes

Instructions to candidates:

- Answer all questions in section A and not more than **FIVE** questions from section B.
- All questions in section B carry equal marks.
- All necessary calculations must be done on the same answer sheets provided.
- Graph papers will be provided.
- Scientific, non-programmable calculators and mathematical tables may be used.

Turn over

SECTION A (40 MARKS)

Attempt all questions in this section

1. Solve the inequality.

(04 marks)

$$\frac{x+1}{2} - \frac{x-3}{4} > \frac{x+2}{3}$$

2. A transformation $M = \begin{pmatrix} -4 & b \\ a & 2 \end{pmatrix}$ maps point P (1, 3) on to point R (5, 8). Find the value of **a** and **b**.

(04 marks)

3. The mean of three numbers is 18. The largest number is four times the smallest number. The difference between the largest and the smallest number is 21. Find the middle number.

(04 marks)

4. Given that $R = \begin{pmatrix} 2 & x \\ 4 & 1 \end{pmatrix}$ and $T = \begin{pmatrix} 0 & 2 \\ 3 & 5 \end{pmatrix}$, and that RT is singular, find the value of **X**.

(04 marks)

5. A sector whose area is 13.2cm^2 subtends an angle of 70° at the centre of the circle. Using $\pi = \frac{22}{7}$, find the radius of the circle, correct to one decimal place.

(04 marks)

6. Make **r** the subject of the formula.

$$y = \sqrt{\frac{2r-1}{r+4}}$$

(04 marks)

7. By matrix methods, solve the equations:

$$2x + 3y - 7 = 0$$

$$2y - 3 + x = 0$$

(04 marks)

8. The probability that Juma will pass a test is 0.4 and the probability that Tom will pass the same test is 0.2. Find the probability that both Juma and Tom will fail the test. (04 marks)

9. Given that $p \cdot q = \frac{p^2 + q^2 - 2pq}{p - q}$. Find the value of $8 \cdot (4 \cdot 3)$.

(04 marks)

10. The perimeter of a rectangle is 38cm. The length is 4cm more than twice the width of the rectangle.

Find the

- i. Width
- ii. Length

(04 marks)

SECTION B (60MARKS)

Answer any **five** questions from this section.

11. The table below shows the marks obtained by 50 students in a test.

Marks	Number of students
10 – 14	2
15 – 19	9
20 – 24	6
25 – 29	12
30 – 34	10
35 – 39	8
40 – 44	3

(a) Draw the cumulative frequency curve and use it to estimate the median mark. (06 marks)

(b) Calculate the mean mark using 27 as the working mean. (06 marks)

12. Triangle **PQR** with vertices $P(2,1)$, $Q(5,6)$ and $R(3,7)$ is reflected in the line $X=0$ to form triangle $P^1Q^1R^1$ which is rotated through a positive quarter turn centre $(0,0)$ forming triangle $P^{II}Q^{II}R^{II}$.

(a) Write down the matrix for

- i. reflection
- ii. rotation.

(04 marks)

(b) Find the coordinates of the vertices of triangle.

(i) $P^I Q^I R^I$

(ii) $P^{II} Q^{II} R^{II}$ (06 marks)

(c) Find a single matrix of transformation that would map PQR on to $P^{II} Q^{II} R^{II}$. (02 marks)

13. (a). Mary bought 2 pencils and 5 pens for shs.3900 from a shop. Sarah bought 3 pencils and 6 pens for shs.4800 from the same shop. Find the cost of a pen and a pencil.

(06 marks)

(b). A poultry farm has three units X, Y and Z. Unit X produces 30 trays of eggs and 25 broilers every month. Unit Y produces 40 trays of eggs and 20 broilers and unit Z produces 35 trays of eggs and 15 broilers during the same period. If a tray of eggs costs shs.14000 and a broiler costs shs.15, 000.

Write down a

(i) 2×3 matrix for the products

(ii) cost matrix of order 2×1 .

(iii) by matrix multiplication, find the sales of the farm if all the eggs and broilers were sold.

(06marks)

14.

(a) Solve the equation

$$\frac{2}{3x+4} + \frac{3}{2x-1} = 1$$
 (06 marks)

(b) Find the coordinates of the points of intersection of the line $y-5x=2$ and the curve

$$y=2x^2 + 5.$$
 (06 marks)

Turn over

15. On a farm, there are three posts A, B and C. A is 5km on a bearing of 120° from B, the bearing of C from B is 040° and the bearing of A from C is 160° . Find the

(a) distance AC; correct to one decimal place. (07 marks)

(b) Angle BAC, hence the distance \overline{BC} correct to one decimal place. (05 marks)

16. (a). Copy and complete the table below for $y = (3x + 1)(5 - 2x)$ in the range $-2 \leq x \leq 4$.

x	-2.0	-1.5	-1.0	-0.5	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
$3x + 1$	-5					2.5							13
$5 - 2x$	9					4							-3
y	-45					10							-39

(05 marks)

(b) Draw the graph of $y = (3x + 1)(5 - 2x)$ for $-2 \leq x \leq 4$, Using scales 2cm to 1 unit on the x-axis and 2cm to 5 units on the y-axis. (04 marks)

(c) Use your graph to solve the equation.

$$-6x^2 + 13x + 5 = 0$$

(03 marks)

17. A school has organized a study tour for 90 students. Two types of vehicles are to be hired. Taxis and coaster buses. The maximum capacity of a Coaster is 30 passengers while maximum capacity of the taxi is 15 passengers. The number of taxis will be greater than the number of coaster buses. The number of taxis will be less than five. The cost of hiring a taxi is shs. 60,000 and the cost of hiring a coaster bus shs. 100,000. There is only shs. 600,000 available.

If X represents the number of taxis and y is the number of coaster buses to be hired,

(a) Write down the six inequalities from the above information. (05 marks)

(b) Determine the possible sets of vehicles to be hired. (05 marks)

(c) Find the set of vehicles that will transport the exact number of students. (02 marks)

END