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MATHEMATICS
Paper 1
July/Aug. 2023
2 ½ hours



UGANDA TEACHERS' EXAMINATIONS SCHEME

Uganda Certificate of Education

JOINT MOCK EXAMINATIONS

MATHEMATICS

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

*Answer **all** questions in section A and any **five** questions from section B.*

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

***All** necessary working must be shown clearly.*

squared paper is provided.

Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

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Turn over

SECTION A:(40 MARKS)

Answer **all** questions in this section.

1. In a pie-chart showing classes, S.1, S.2, S.3, S.4 and S.5, the sector for S.1 is a quadrant. The percentage of students in S.2, S.3 and S.5 are 30%, 18% and 10% of the total population. If the school has 200 students, how many students are S4? (04 marks)
2. A translation $\begin{pmatrix} -3 \\ y \end{pmatrix}$, maps a point P (5, -4) onto P'(x, 1). Find the values of x and y. (04 marks)
3. Express $\frac{2x^2+5x-3}{-x-3}$ in the form $ax + b$. (04 marks)
4. Find the values of n, for which the matrix A has no inverse.
 $\begin{pmatrix} 2n+3 & -1 \\ -4 & 2n+3 \end{pmatrix}$ (04 marks)
5. Amon is 36 years old. Dina is 11 years old. In how many years from now will Amon be twice as old as Dina will then be? (04 marks)
6. Find the value of a in the equation $\frac{5}{6}a = 2(a-1) - \frac{3}{4}(2a-3)$. (04 marks)
7. A regular polygon has an exterior angle of 144° less than interior angle. Calculate the interior angle sum of the polygon. (04 marks)
8. A teacher recorded marks for six students as 70, 65, 56, 53, 66 and 68. Calculate the mean mark using assumed mean of 60 marks. (04 marks)
9. On a level ground, points P and R are such that P is due South East of R. Find the bearing of R from P. (04 marks)
10. Find the smallest integral value of x which satisfy the inequality $8 - x \leq \frac{1}{2}(2x - 1)$. (04 marks)

SECTION B (60 Marks)

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

All question carry equal marks.

11. (a) A tetrahedron has faces numbered 1, 2, 3 and 4. Another tetrahedron has faces numbered 3, 4, 5 and 6.

In a game, two tetrahedrons are tossed together. The sum of scores on the first tetrahedron and the second tetrahedron is recorded.

(i) Draw the sample space for the scores (02 marks)

(ii) Find the probability of getting a score which is a factor of 20. (02 marks)

(iii) What is the probability of getting a score which is at most 6? (02 marks)

- (b) The probability that Tina will arrive late at school is $\frac{2}{5}$. The probability that Sam will arrive late at school is $\frac{4}{7}$.

(i) find the probability that both Sam and Tina will arrive late at school. (04 marks)

(ii) What is the probability that Sam will arrive late at school and Tina arrive early. (02 marks)

12. A retailer bought commodities from four different wholesalers.

- He bought 4 bags of rice, 6 bags of flour, 2 bags of salt and 2 bags of sugar from Brain wholesale shop.
- He bought 3 bags of rice, 4 bags of salt and 5 bags of sugar from Kato's shop.
- He bought 3 bags of rice, 8 bags of flour, 5 bags of salt and 3 bags of sugar from Dan's shop.

Turn over

All the wholesalers sold each bag of rice, flour, salt and sugar at shs. 230,000, shs. 140,000, shs 25,000 and shs 200,000 respectively.

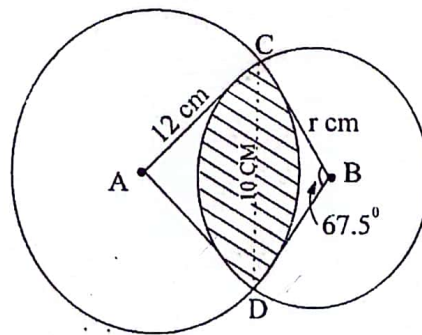
- (a) Write down a matrix for the
- Commodities bought with order of 3×4 .
 - Prices of commodities with order of 4×1 (03 marks)
- (b) Using matrix multiplication of matrices in (a) above, find the retailers total expenditure. (06 marks)
- (c) The retailer sold all the commodities at his shop and got a total of shs. 8,202,000. Determine the profit or loss the retailer got. (03 marks)

13. Use graphical method to solve the following pair of simultaneous equation using values of x , from -3 to +4. (12 marks)

$$y - x^2 + x + 6 = 0.$$

$$y + x + 2 = 0.$$

14. Two circles with centres A and B intersect at C and D. The common chord $CD = 10\text{cm}$ length $\overline{AC} = 12\text{cm}$, $\overline{CB} = r\text{cm}$ and angle $DBC = 67.5^\circ$.



- Calculate the angle CAD. (04 marks)
- If the shaded area is 17.07cm^2 , determine the radius r (correct to 2sf) (08 marks)

15. A transformation $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$ maps a triangle with vertices P (1,2), Q (3,2) and R (3, 1) onto $P_1 Q_1 R_1$. A transformation, whose matrix is $\begin{pmatrix} 4 & -2 \\ 3 & -1 \end{pmatrix}$, then maps triangle $P_1 Q_1 R_1$ and $P_2 Q_2 R_2$.

Determine the

- (a) Coordinates of $P_1 Q_1$ and R_1 . (04 marks)
- (b) Coordinate of $P_2 Q_2$ and R_2 . (04 marks)
- (c) Single transformation matrix that can map $P_2 Q_2 R_2$ onto PQR. (04 marks)

16. Okello and Adam left town A for town B, each cycling at a space 16km/h. After covering 20km, Adam reduced speed to 10km/h for the rest of the journey but Okello maintained his speed up to town B. At town B, Okello waited for 9 minutes before Adam arrived.

Calculate;

- (a) The time Adam cycle before reducing speed.
 - (b) The distance they covered,
 - (c) Adam's covering speed. (12 marks)
17. The lines AB, AC and $x + y = 12$ are boundaries of a feasible region. The coordinates of A, B and C are (2, 2) (4, 8) and 10, 6) respectively.
- (a) Represent the feasible region on a graph with AC, as a broken line, and the rest of the lines are solid. (05 marks)
 - (b) Use line AB and AC to find two inequalities that describe the feasible region. (05 marks)
 - (c) Determine the minimum value of $3x + y$ in the feasible region. (02 marks)

END