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MATHEMATICS
Paper 1
Jul./Aug. 2023
2 ½ Hours



SENIOR EDUCATION CONSULTANTS (SEC) 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** from section B.
- **All** necessary calculations **must** be done in the same answer booklet provided.
- Mathematical tables, squared papers may be provided.
- Silent, non-programmable scientific calculators may be used.
- Any additional question(s) answered will **not** be marked.

Turn Over

SECTION A (40 MARKS)

Attempt *all* questions in this section

- Factorise $(x - 1)^2 - yx + y$ completely.
- Given that $5 \cos \theta + 4 = 0$, for $0^\circ \leq \theta \leq 180^\circ$. Without using table or calculators, find the value of $\tan \theta$.
- Solve for x in $\frac{x}{1-x} - \frac{x}{1+x} + \frac{2x}{1-x^2} = 1$
- Given that the formula $A = P + \frac{PRT}{100}$, express P in terms of A, R and T . hence find the value of P if $A = 1,000, R = 20$ and $T = 5$.

5. The table below shows marks scored by S.4 students in mathematics test

| Score | fx |
|---------|-------|
| 41 – 48 | 222.5 |
| 49 – 56 | 787.5 |
| 57 – 64 | 1452 |
| 65 – 72 | 753.5 |
| 73 – 80 | 918 |
| 81 – 88 | 253.5 |

- State the modal class.
 - Calculate the mean score.
- If $\begin{pmatrix} 4 & 1 \\ x & -1 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$, determine the value of x and y .
 - Without using table or calculators, evaluate $5.2(3.75^2 - 1.25^2)$.
 - Given that $3x - 2 < 10 + x < 2 + 5x$, show the solution on a number line.
 - A girl is looking at the top of a tree. The girl is 1.8m tall and the angle of elevation of a bird on top of a tree from the girl is 40° . What is the height of the tree if the girl is 20m away from the tree?

10. If 3kgs of sugar and 4kgs of rice cost shs.22,400 while 2kgs of rice and 5kgs of sugar cost shs.21,000. How much will Sarah spend to buy 6kgs of rice and 9kgs of sugar?

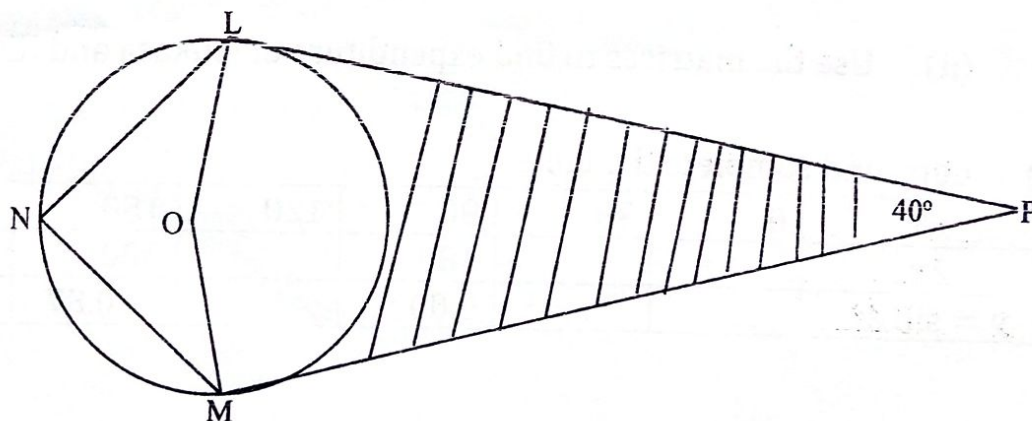
SECTION B (60 MARKS)

11. In a game, a player throws two fair dice, each with faces labeled 1 to 6. When the two dice show different numbers, the player scores the sum of the two numbers, the player scores twice the sum of the two. When dice show same numbers, Calculate the probability that the player
- Scores 6 in one throw of the two dice.
 - Scores a multiple of 4 in one throw of the two dice.
 - Scores 3 in each of two successive throws of the two dice.
12. (a) Using matrix method, find the value of x and y which satisfy the equations.
- $$2x - 3y = 12$$
- $$x + 2y + 1 = 0$$
- (b) Mukasa bought 4 exercise books, 4 graph books and 5 counter books. While Kisakye bought 10 exercise books, 7 counter books and 6 graph books. The cost of an exercise book, a graph book and a counter book is shs.2,000, shs.1,500 and shs.800 respectively.
- Write down a 2×3 matrix for the items bought and a 3×1 matrix for the price.
 - Use the matrices to find expenditure of Mukasa and Kisakye.

13. (a) Copy and complete the table

| | | | | | | |
|---------------|---|----|------|-----|-------|-----|
| x^0 | 0 | 30 | 90 | 120 | 150 | 180 |
| $2x$ | | | 180 | | 300 | |
| $y = \sin 2x$ | | | 0.00 | | -0.87 | |

- (b) Draw the graph of the curve $y = \sin 2x$ for $0^\circ \leq x \leq 180^\circ$. Use 1cm to represent 0.1 units and 2cm to represent 30° .
- (c) Use your graph, determine the values of x for which $4 \sin 2x = 3$.
14. Using a ruler and a pair of compasses only
- (a) Construct a triangle ABC in which $AB = 6\text{cm}$, $BC = 8\text{cm}$ and angle $ABC = 75^\circ$
- (b) Inscribe a circle in the triangle ABC and measure its radius.
- (c) Construct a perpendicular from vertex C to meet AB at T . calculate the area of the triangle ABC .
15. (a) The image of triangle $X(2, 1), y(4, 1)$ and $z(3, 4)$ is $X^1(-1, 2), y^1(-1, 4)$ and $z^1(-4, 3)$ under transformation matrix T . Find matrix T and describe it fully.
- (b) Triangle $X'y'z'$ is then mapped on to $X''y''z''$ after a reflection in line $y + x = 0$. Find the coordinates of $X''y''z''$.
- (c) Determine a single matrix of transformation that maps triangle xyz directly on to $x''y''z''$.
16. In the diagram below, PL and PM are tangents to the circle with centre O and radius 5cm.



Find

- (a) the angles
 - (i) LOM
 - (ii) LNM

(b) the area of the shaded region.

17. A construction company wishes to transport its 240 workers to a working site using x small vans of capacity 20 persons each and y buses of capacity 40 persons each. The transport department has a maximum of 10 drivers on duty and largest number of buses is 5.
- (i) Write down three inequalities representing the restriction on values of x and y .
 - (ii) Plot on the same axes the inequalities, shading out the unwanted regions.
 - (iii) If the cost of using each small van and the bus is shs.200,000 and shs.300,000 respectively, determine the maximum cost.

END