456/1

Mathematics

Paper 1

July/August, 2023

2 ½ Hours.

TESO SECONDARY SCHOOLS MOCK EXAMINATIONS ASSOCIATION (TESSMEA)

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 Hours 30 Minutes

Instructions to Candidates

- *Attempt all questions in section A and only five in section B*
- *Silent non-programmable calculators will be allowed*
- *Graph paper will be provided. State the degree of accuracy at the end of the answer to each question attempted using a calculator or tables, and indicate cal for calculator, tab for mathematical tables.*

Turn Over

SECTION A

1. The sum of three consecutive whole numbers is 99. If the first number is n, find the three numbers. (04marks)

2. Given $27^{y} = \frac{1}{243^{x}}$, find $\frac{x}{y}$ (04marks)

3. Solve for y in the equation

$$\frac{y-3}{5} - \frac{y+2}{3} = \frac{y}{2} - 1/3$$ (04marks)

4. A box contains n red balls and (n-8) blue ones. The probability of drawing a red ball is ¾ . Find the number of balls in the box. (04marks)

5. Given that $\tan A = -5/12$. Where A is obtuse without using tables or calculators. Find the value of 2SinA + CosA. (04marks)

6. Make P the subject of the formula;

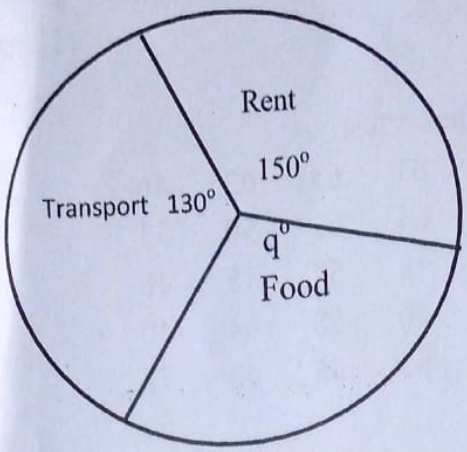
$E = \frac{2x + \sqrt{p}}{q}$. Hence find p when E = 8, q = 3 and x = 4 (04marks)

7. In the recent competition in cross country, the time taken by 8 students were recorded as shown below in minutes 16.4, 20.5, 16.3, 18.7, 15.5, 14.5, 25.3 and 24.2. Calculate the time taken by the ninth student. If the mean for all the 9 students was 18.8 minutes. (04marks)

8. Factorise completely $x^3 - 9xy^2$. (04marks)

9. If $A = \begin{pmatrix} 3 & 1 \\ -2 & 2 \end{pmatrix}$ and $B = \begin{pmatrix} -4 & 3 \\ 0 & 3 \end{pmatrix}$, find P^{-1} given that P = AB. (04marks)

10. The pie chart below represents Isaac's monthly expenditure.



(a). Find the value of q in degrees.

(b). If Isaac spends shs 36,000 more on rent than on transport, calculate his monthly income. (04marks)

SECTION B

Answer any five questions from this section. All questions carry equal marks.

11. In a game, a player throws two fair dice, each with faces numbered 1to 6 when the two dice show different numbers, the player scores the sum of the two numbers. When the two dice show the same number, the player scores twice the sum of the two numbers. Calculate the probability that a player;
(a). scores 6 in one throw of the two dice.
(b). scores a multiple of 4 in one throw of the two dice.
(c). scores 3 in each of the two successive throws of the two dice. (12marks)

12. Draw the graph of the fraction $y = 2x^2 - 4x - 7$ for the values of x from -4 to 2.
(a). Write down;
(i). the equation of its line of symmetry.
(ii). The least value of the function.
(b). Using the graph drawn, solve the equation $2x^2 + 5x - 8 = 0$.

(c). Determine the quadratic equation whose roots are the x-coordinates of the points of intersection of the curve and the line $y = 2x - 3$. (12marks)

13. Below are marks scored in a maths test.

64	58	54	59	83	65	62	46
43	70	50	35	64	62	50	53
55	54	32	59	48	54	35	48
71	74	55	70	40	58	64	40
75	45	40	55	55	45	48	72

(a). Form a frequency distribution table with equal class interval of 6 starting with 30 as the lower class limit of the first class. (05marks)

(b). State;

(i) median class (01mark)

(ii) modal frequency

(c). Calculate:

(i) mean (02marks)

(ii) mode (02marks)

(iii) median (02marks)

14. (a). Two positive integers differ by 4 and the sum of their squares is 136. Form an equation and solve it to find the numbers. (06marks)

(b). A man is now four times as old as his son. Eight years ago, the product of their ages was 220 years. Find the son's present age. (06marks)

15. Stephen and Ronald went to mega supermarket for shopping.
Stephen bought 5kg of sugar, 5 bars of soap, 8 counter books and 4 bottles of cooking oil.
Ronald bought 8kg of sugar, 4 bars of soap and a dozen of counter books.
The cost of sugar per kg was Ugx 3500, a bar of soap was Ugx 6500, a counter book was Ugx 5000 and a bottle of cooking oil was Ugx 3500.

(a). Write down a

(i) 2 x 4 matrix for the items purchased by the two people.

(ii) 4 x 1 matrix for the cost of each item.

(i) Expenditure of each person by matrix multiplication.

(ii). Total expenditure of both Stephen and Ronald.

(c). Who spent more money and by how much did he spend than the other?

16. A rectangle MNPQ with vertices M(1,4), N(4,4), P(4,2) and Q(1,2) is mapped onto quadrilateral M′ N' P' Q' under the transformation defined by matrix$\begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$

Find the;

(i). co-ordinates of the vertices M' N' P' Q' and draw (on the same diagram) rectangle MNPQ and its image M' N' P' Q' .

(ii). Matrix that will transform M' N' P' Q' back onto MNPQ

(iii). Area of M' N' P' Q' (12marks)

17. A farmer has x goats and y cows . The food cost for each goat is shs 800 per day and for each cow is shs 1600 per day. A total of shs 14,400 is available for animal food, and there is space for at most 14 animals. In addition there must be at least 9 goats and at least 3 cows.

(a). Write inequalities representing the information above. (04marks)

(b). Use your inequalities to express the information graphically. (06marks)

(c). Determine the number of each animal that the farmer should keep to give him minimal cost. (02marks)

END