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MATHEMATICS
Paper 1
June/July 2022
2½ hours

MWALIMU EXAMINATIONS BUREAU

UCE RESOURCE MOCK EXAMINATIONS – 2022

MATHEMATICS

Paper 1

2 hours 30 minutes

Instructions

- *Answer* **ALL** *the questions in Section* ***A*** *and any* **FIVE** *questions from Section* **B.**
- *Any additional question(s) answered will not be marked.*
- *All the necessary calculations must be done in the answer sheets provided. No paper for rough work is required.*
- *Silent non programmable calculators and mathematical tables with a list of formulae may be used.*

SECTION A: (40 Marks)

1. Given that $A = \begin{pmatrix} 3 & 2 \\ 5 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 3 & 4 \\ -6 & 8 \end{pmatrix}$, find $(AB)^{-1}$ **(4 marks)**

2. Solve the inequality $x + 5 \leq 4x + 2 \leq 3x + 6$ and show the solutions on a number line. **(4 marks)**

3. Janet is six years older than her sister Rose. In 10 years time Rose will just be a third her father's age and the sum of their ages (the father's and daughters') will be 81. Find their current ages. **(4 marks)**

4. Study the table below and use it to find:

(a) the value of a, if mean mark is 34.6 **(2 marks)**

(b) the modal mark. **(2 marks)**

Marks	30	32	34	36	38	40
Frequency	5	6	7	a	3	5

5. Given that $4\tan\theta - 3 = 0$, evaluate $4\sin\theta - 2\cos\theta$ without using tables or calculators if θ lies between 180^o and 270^o. **(4 marks)**

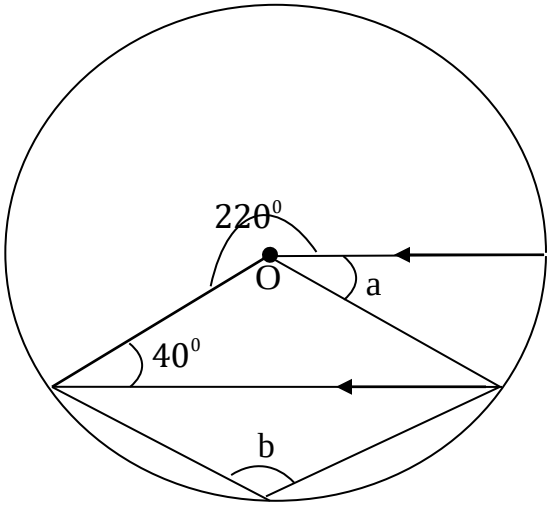
6. Solve the simultaneous equations: $\begin{aligned} xy - x^2 &= -24 \\ x - y &= 8 \end{aligned}$ **(4 marks)**

7. If $\begin{pmatrix} 4 & a \\ -2 & 1 \end{pmatrix}\begin{pmatrix} b \\ 5 \end{pmatrix} = \begin{pmatrix} -7 \\ 1 \end{pmatrix}$, find the values of a and b. **(4 marks)**

8. Point $A(4,3)$ was mapped onto $A'(-2,0)$ after an enlargement of scale factor -2. Find the coordinates of the centre of enlargement. **(4 marks)**

9. Given that y varies directly as x^2 and inversely as r, When $y = 6, x = 4$ and $r = 8$. Find the value of r, when $y = 8$ and $x = 6$. **(4 marks)**

10. Study the diagram below and find the angles marked a and b given that O is the centre of the circle. **(4 marks)**



SECTION B (60 Marks)

11. (a) Alice was given three numbers; 3, 1 and 5 to form three digit numbers. Write down the possible three digit numbers she formed. If a number is picked at random find the probability that it is less than the range of numbers formed.

(b) The probability of picking a white ball is $\frac{2}{5}$ a red ball is $\frac{1}{4}$ and there are seven green balls in that same bag. Find the number of;

(i) white

(ii) red balls in the bag. **(12 marks)**

12. Copy and complete the table below;

X	-4	-3	-2	-1	0	1	2	3	4	5
6					6					6
$-x^2$	-4									
Y	-16						-4			

(a) On the same axes draw the graphs of $y = 6 + x - x^2$ and $y = 2 - 2x$.

(b) From your graphs find the values of x for which $6 + x - x^2 = 2 - 2x$.

(c) Form a quadratic equation that satisfies the values in (b) above. **(12 marks)**

13. (a). On a squared paper, plot the points A (2, 3.5), B (6.5, 3.5) C (4.5, 6.5). Join them to form triangle ABC.

(b) Using a ruler and pair of compasses only, draw a circle that passes through A, B and C.

(c). State the coordinates of the centre of the circle.

(d). Calculate the area of the minor segment cut off by the chord AC.

(12 marks)

14. . Triangle ABC has vertices A (2, 0), B (1, -3), and C (-2, 1). It undergoes a transformation $T = \begin{bmatrix} 4 & 2 \\ -1 & 1 \end{bmatrix}$ to give triangle $A'B'C'$. $A'B'C'$ is transformed by transformation $R = \begin{bmatrix} 2 & -1 \\ 0 & 1 \end{bmatrix}$ to triangle $A''B''C''$

(a). Find the coordinates of the vertices of;

i. triangle A'B'C'

ii. triangle A''B''C''

(b). Find a single matrix of transformation which maps ABC onto triangle A''B''C''

(c). The area of triangle ABC is 6.5 units. Use a single matrix in (b) to determine the area of triangle A″B″C″. **(12 marks)**

16. The table below shows the weight of staff members in a certain school.

Weight (kg)	Number of staff
49.5 - 54.5	2
54.5 - 59.5	10
59.5 - 64.5	13
64.5 - 69.5	5
69.5 - 74.5	4
74.5 - 79.5	6
79.5 - 84.5	3
84.5 - 89.5	1
89.5 - 94.5	1

(a). Calculate;
   i) Mean weight
   ii) Modal weight

(b). Draw a cumulative curve and use it to estimate the median weight.
(12 marks)

17. A farmer had a field of 70 acres in which he plants potatoes and corn. The seed for potatoes costs sh.20,000 per acre while the seed for corn costs sh.60,000 per acre. The farmer has put aside sh.3,000,000 to spend on the seed. The profit per acre of potatoes is sh.150,000 and the profit per acre of corn is sh.50,000 per acre. Let x represent the acres of potatoes and y represent acres of corn planted.
   (a) Write down 4 inequalities for the problem.
   (b) Write the profit equation
   (c) Find the maximum profit. **(12 marks)**

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