

456/1

Mathematics

Paper 1

September 2023

$2\frac{1}{2}$ hours



PEAS NETWORK POST MOCK EXAMINATION 2023

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 Hours 30 Minutes

INSTRUCTIONS TO CANDIDATES:

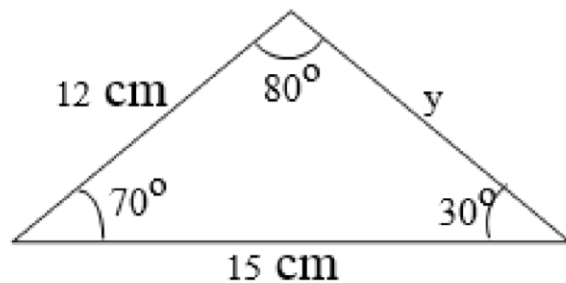
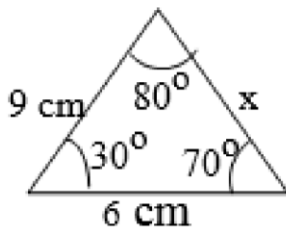
Attempt ALL the questions in Section A and any FIVE questions from Section B.

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. Without using tables or calculator, evaluate $\frac{6x^2-4}{2x-2x+4x^2}$ (4 marks)
2. Solve simultaneous equations; $2a - 7 = 3b$ and $4b + a = -2$ (4 marks)
3. The probabilities that Richard will pass chemistry exam is $\frac{2}{3}$ and the probability that he will pass English is $\frac{4}{5}$. Determine the probability that he passes only one subject (4 marks)
4. The following shows two similar triangles



Find the values of x and y

(4 marks)

5. A rectangle ABCD with area of $a \text{ cm}^2$ is mapped on $A'B'C'D'$ with area of 48 cm^2 , by transformation matrix $\begin{pmatrix} 3 & 2 \\ -3 & -4 \end{pmatrix}$. Find the value of a (4 marks)

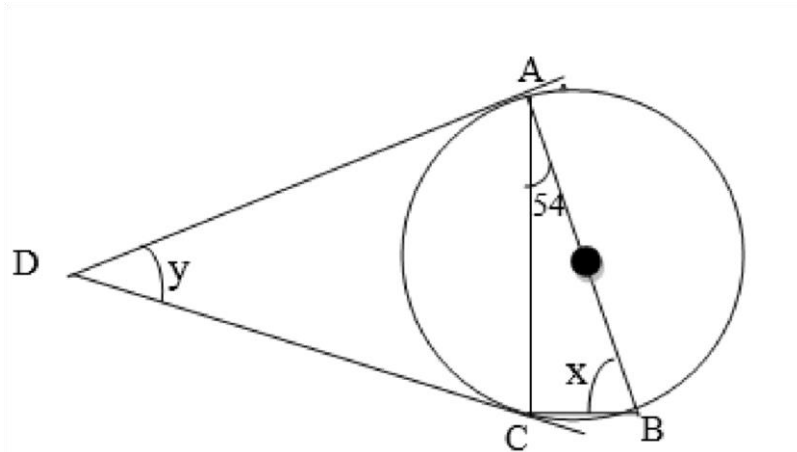
6. The image of (3, 5) is (-1, 4) find the translation matrix thus B' if B (6, 7). (4 marks)

7. Given that $X = \begin{pmatrix} 2 & -1 \\ -4 & 6 \end{pmatrix}$ and $Y = \begin{pmatrix} 4 & -4 \\ -1 & 3 \end{pmatrix}$. Find P^{-1} when $P = X - Y$ (4 marks)

8. Show the solution of the equation $\frac{5x+2}{3} - 2 \leq \frac{7x+2}{5}$ on number line. (4 marks)

9. The distance between two trading centers is 60km. Aman moved a third of the distance at a certain speed. Then the rest at a half of his original speed. Find the speed of the man (4 marks)

10. In the diagram below AB is diameter of the circle. DC and DA are tangents. Find the angles marked x and y (4 marks)



SECTION B (60MARKS)

Attempt at most **five** questions from this section.

11. (a). The table below shows coordinates of the function x and y

X	-7	-6	-5	-4	-3	-2	-1	0	1	2
Y	8	0	-6	-10	-12	-12	-10	-6	0	8

- Plot the graph of the function
- Find the equation of the function on the graph
- Find the point of intersection of the function and the line $y = 2x + 4$ (12marks)

12. The marks of 40 students in exams are shown below

43	40	49	80	76	46	60	55	58	55
75	79	70	83	82	56	67	63	66	63
69	53	73	61	48	58	60	75	73	64
77	62	66	54	64	53	63	73	49	59

- Using 40 – 44 as the first class form a frequency distribution table with uniform intervals (3 marks)
- Find the mean using the working mean of 72 (4 marks)
- Draw a histogram and estimate the mode (5 marks)

13 (a) Given that matrix $A = \begin{pmatrix} 4 & 1 \\ x & -1 \end{pmatrix}$ $B = \begin{pmatrix} x \\ y \end{pmatrix}$ and $C = \begin{pmatrix} 4 \\ 8 \end{pmatrix}$ Find x and y if $AB = C$ (5 marks)

(b) Sam went to the super market and bought 2kg of rice, a bar of soap, 5kg of sugar. In the same super market Sarah bought 2 bars of soap and 2kg of rice while Dan bought sugar and rice each a kg, and 10 bars of soap. If the cost of a kg of sugar is 5000, rice 6200 and soap 4500 a bar.

- Write down 2 matrices to show the information above
- Find how much money the three people spent all together. (7 marks)

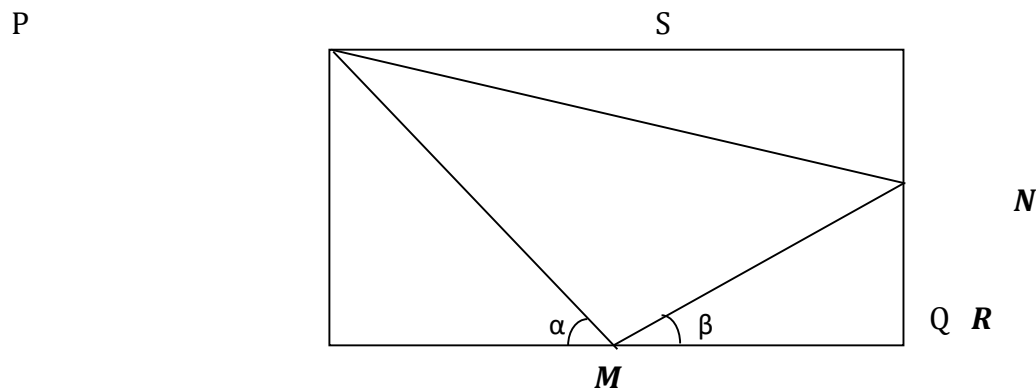
14 (a). A rectangle $A B C D$ with vertices $A(2, 3)$, $B(-3, 4)$, $C(-5, -1)$ and $D(4, -5)$ is mapped on to $A'(4, -6)$ $B'(6, -8)$, $C'(-10, 2)$ and $D'(8, 10)$

(i) Find the matrix of transformation that maps $ABCD$ to its image (4 marks)

(ii) If $A'B'C'D'$ is mapped by the matrix $\begin{pmatrix} -1 & 3 \\ 2 & -2 \end{pmatrix}$ to $A''B''C''D''$ find the coordinates of $A''B''C''D''$ (4 marks)

(iii) Determine the single transformation matrix that would map $A''B''C''D''$ back to $ABCD$ (4 marks)

15. The figure below shows a rectangle $PQRS$ such that $PS = 10\text{cm}$ $PQ = 6\text{cm}$. M and N are mid points of QR and RS respectively



(a) Find the area of triangle PMS (7 marks)

(b) If the area of $MNR = 30\text{cm}^2$ find the value of x (3 marks)

(c) Find the angles α and β (2 marks)

16) Using a ruler, a pencil and a pair of compasses only

- (a) Construct a triangle ABC so that $AB = 8\text{cm}$, angle $ABC = 105^\circ$ and angle $BAC = 45^\circ$. State the length of AC (5 marks)
- (b) Inscribe triangle ABC hence state the radius of the circle (4 marks)
- (c) Find the area of the circle (3 marks)

17. A contractor intends to transport 1000 bags of cement from the factory. He has a lorry and a pick up. A lorry can carry a maximum of 80 bags while a pick up can carry 20 bags, he has to use the 2 vehicles. A pick up must make more than twice the number of trips made by the lorry because it is fast and easy to load. The total number of trips to be made should be less than 30. The cost per trip of a lorry is sh.200000 and for a pick up is sh. 90,000

- (a) Write down the inequalities to show the above information (5 marks)
- (b) Show on the graph the region that satisfies the inequalities (5 marks) (c)
Find the minimum number of trips to be made by the contractor (2 marks)

END