456/1
MATHEMATICS
PAPER 1
2½ hours

WAKISSHA

Uganda Certificate of Education

MATHEMATICS

Paper 1

2hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *Answer **all** questions in section **A** and any **five** questions from section **B**.*
- *Any additional question(s) answered will not be marked.*
- *All necessary calculations **must** be done in the same answer booklet/sheets provided, with the rest of the answers. Therefore no paper should be given for rough work.*
- *Graph paper is provided.*
- *Silent non-programmable scientific calculators and mathematical tables with a list of formulae may be used.*

SECTION A (40 marks)

Answer **all** *questions in this section*

1. Factorise $(x + 5)^2 - (x + 2)^2$. Hence solve the equation $(x + 5)^2 - (x + 2) = 9$. (4 marks)

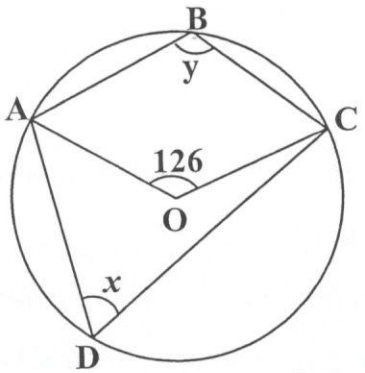
2. Given that $w * z = w^2 - z$.
   Find the value of:-
   (i) $2 * 1$ (2 marks)
   (ii) z if $w * z = 76$ (2 marks)

3. Each exterior angle of a polygon is 18^0. Find the sum of the interior angles. (4 marks)

4. Solve the simultaneous equations
   $2x + 5y + 11 = 0$
   $3x - y - 8 = 0$
   (4 marks)

5. A translation $T = \begin{pmatrix} 2 \\ -4 \end{pmatrix}$ maps point p (a, b) onto p^1 (4, 5).
   Determine the coordinate of point p. (4 marks)

6. Find the inverse of the matrix $\underset{\sim}{m} = \begin{pmatrix} 9 & -2 \\ -8 & 2 \end{pmatrix}$. (4 marks)

7. 

   The figure above shows a circle of centre O Angle AOC = 126^0.
   Determine the value of angles x and y. (4 marks)

8. A right angled triangle where base is 12cm has area of $60cm^2$.
   Determine;-
   (a) The height of the triangle. (2 marks)
   (b) The hypotenuse of the triangle. (2 marks)

9. The table below shows the distribution of students by their ages.

Age (years)	14	15	16
Number of students	2p	p	10

   If the mean age of the student is 15, find the value of p. (4 marks)

10. Two dice are tossed once. Find the probability that the sum of the scores is less than 7. (4 marks)

SECTION B (60 marks)

Attempt any **five** *questions from this section. All questions carry equal marks.*

11. (a) Copy and complete the table below. (4 marks)

x	-4	-3	-2	-1	0	1	2	3	4
$y = x^2 + x - 8$				-8					12
$y = 4 - x - x^2$				4					-16

(b) Plot on the same axes the graphs of $y = x^2 + x - 8$ and $y = 4 - x - x^2$ for $-4 \leq x \leq 4$. (4 marks)

(c) Use your graphs to solve the equation $x^2 + 4 - 8 = 4 - x - x^2$ (4 marks)

12. In buying produce, John went to 4 markets P, Q, R and S. From market P he bought 3 bags of beans, 5 bags of maize, 10 bags of potatoes and 3 bags of millet. From market Q, he bought 1 bag of millet. From market R, he bought 5 bags of beans, 1 bag of maize. From market S, he bought 4 bags of beans, 3 bags of maize, 6 bags of potatoes and 1 bag of millet. John bought the items as follows;-
Shs. 250,000 per bag of beans
Shs. 60,000 per bag of maize
Shs. 20,000 per bag of potatoes
Shs. 90,000 per bag of millet.

(a) From a 4×4 matrix to show the quantity of every item John bought from the four markets. (2 marks)

(b) (i) Form a cost matrix for the price of the produce. (2 marks)
(ii) By matrix multiplication, find the amount of money spent on the produce in each market. (6 marks)

(c) Find the total amount of money he spent on the items. (2 marks)

13. Using a ruler and a pair of compass only;-
(a) Construct a triangle ABC with AB = 6cm, BC = 10cm, angle BAC = 105^0.

(b) (i) Draw a perpendicular line to BC from A. The perpendicular meets BC at point P.

(ii) Measure the distance AB and find the area of the triangle ABC.

(c) Circumscribe a circle on the triangle ABC and measure its radius.
(12 marks)

Turn Over

14. A triangle P Q R has vertices P (1, 2); Q (4, 1); R (4, 7), PQR is transformed by the matrix M to form P^1 (-1, -2); Q^1 (-4, -2); R^1 (-4, -7).

(a) Sketch PQR and $P^1Q^1R^1$ on the same axes. (4 marks)

(b) Describe the transformation fully. (2 marks)

(c) State the matrix of transformation. (2 marks)

(d) $P^1Q^1R^1$ is then transformed using matrix $N = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$ to form $P^{II}Q^{II}R^{II}$.

Find the single matrix that would map P^{II} Q^{II} R^{II} back onto PQR. (4 marks)

15. The table below shows the marks scored by 60 students in a test.

Marks	No of students
10 – 14	5
15 – 19	6
20 -24	10
25 – 29	20
30 – 34	5
35 – 39	2
40 – 44	2

(a) Calculate the mean mark using a working of mean of 27 (7 marks)

(b) Represent the data on a histogram. (3 marks)

(c) Using the graph estimate the modal mark. (2 marks)

16. (a) Given that $c^2 - d^2 = 60$ and $c + d = 30$.
Find the volume of c and d. (6 marks)

(b) Rebecca went to a super market and bought 3kg of rice, and 2kg of posho. Racheal on the hand bought 2kg of rice and 3kg of posho from the same super market. Given that Rebecca and Racheal spent Shs. 10,000 and Shs. 9,500 respectively for buying their items.
Determine the price of rice and posho. (6 marks)

17. A produce dealer wishes to transport at least 600bags of maize for sale. Two types of trucks A and B are at his disposal for use. Truck A can carry 50 bags at a cost of shs 40,000 per trip. Truck B can carry 75 bags at a cost of shs 50,000 per trip. There is shs 600,000 available for transport. The number of trips made by truck A should not exceed 7. The number of trip made by truck B should not exceed the number of trips made by truck A.

(a) If x and y are the trips made by trucks A and B respectively, write down four inequalities certifying the given conditions. (4 marks)

(b) On the same axes draw the graphs of the inequalities and shade the un wanted regions. (6 marks)

(c) Use the graph in (b) to determine the number of trips each truck should make so as to minimize the transport cost. (2 marks)

END