456/1
MATHEMATICS
PAPER 1
Aug, 2017
2 ½ hrs

UNNASE MOCK EXAMINATIONS

Uganda Certificate of Education

MATHEMATICS

Paper 1

2 hours 30 minutes

INSTRUCTIONS TO CANDIDATES:

- *Answer all questions in Section A and any five from section B.*
- *Any additional question(s) answered will not be marked.*
- *All necessary calculations must be done in the answer booklet provided. 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.*

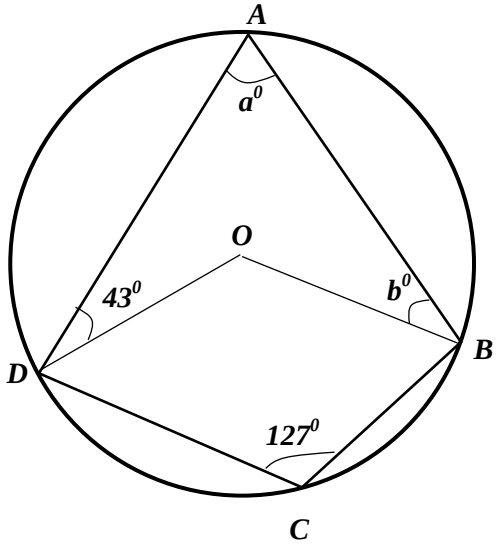
SECTION A (40 marks)

Answer ALL questions in this section.

1. Given that $p * q = p^3 - q^2$, find the value of $4 * (3 * 5)$. *(04 marks)*

2. Factorize $25a^3 - ab^2 - b^3 + 25a^2b$ completely. *(04 marks)*

3. In the figure below, O is the centre of the circle. ABCD is a cyclic quadrilateral. Angle ADO = 43^0 and angle BCD = 127^0.



Find the values of the angles marked a and b. *(04 marks)*

4. Use factorization method to solve the equation $2x^2 + 3x - 27 = 0$. *(04 marks)*

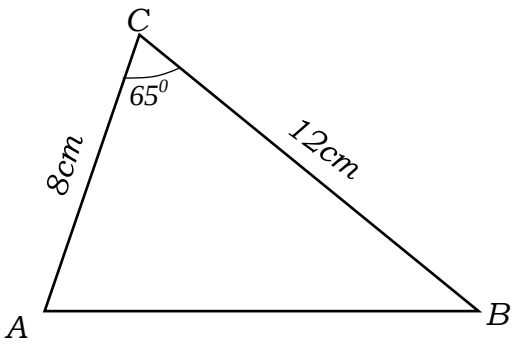
5. A bag contains blue, green and red balls. The probability of picking a blue ball is ¼ and the probability of picking a green ball is $\frac{7}{12}$. If the bag contains 84 balls, find the number red balls in the bag. *(04 marks)*

6. Given that tan A = $\frac{8}{15}$ and $180^0 < A < 360^0$, find without using mathematical tables or a calculator the value of Sin A. *(04 marks)*

7. Solve the equation $\frac{(x+1)}{3} - \frac{(2-x)}{2} = \frac{x}{4}$. *(04 marks)*

8. A man of height 1.6 m is 15m from the foot of a tree. When he looks at the top of the tree, the angle of elevation is 50^0. Determine the height of the tree. *(04 marks)*

9. Find the area of the triangle shown below; *(04 marks)*



10. A translation ***T***, maps (4, 10) onto (−2, 2). Determine the coordinates of the image of (0,1) under ***T***. *(04 marks)*

SECTION B (60 marks)

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

11. (a) Given that $y = \frac{WL^3}{15EF}$;
    i) Make L the subject.
    ii) Find the value of L when $y = 423$, $E = 2$, $F = 10$ and W = 600. *(06 marks)*

    (b) Factorize $4n - 9n^3$ completely. Hence solve $4n - 9n^3 = 0$. *(06 marks)*

12. (a) If A = $\begin{pmatrix} 2 & 4 \\ 1 & 3 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 5 \\ 6 & -6 \end{pmatrix}$, find $2A - BA$. *(04 marks)*

    (b) Determine the inverse of matrix P = $\begin{pmatrix} 3 & 2 \\ -1 & 2 \end{pmatrix}$. *(04 marks)*

    (c) Given that matrix A = $(2 \quad 5)$, matrix B = $\begin{pmatrix} 4 \\ 6 \end{pmatrix}$ and matrix C = $\begin{pmatrix} 2 \\ -3 \end{pmatrix}$. Find ***AB + AC***. *(04 marks)*

13. Using a ruler, pencil and a pair of compasses only;

(a) Construct a triangle DEF in which $\overline{DE}$=9.6 cm, angle FDE = 75^0 and angle DEF = 60^0. Measure the lengths of $\overline{EF}$ and $\overline{DF}$.
(07 marks)

(b) Draw the mediators of $\overline{DF}$ and $\overline{EF}$ to meet at a point M. *(03 marks)*

(c) Draw a circle which passes through all the vertices of the triangle DEF and measure the radius of the circle. *(02 marks)*

14. (a) (i) Draw a table for values of y and x for the curve y = x^2. Use values of x from -4 to 4.
(ii) Use your table to draw a graph of $y = x^2$. *(06 marks)*

(b) On the same axes, draw the graph of the line $y = 5x - 6$.
(02 marks)

(c) Use your graphs to solve the equation; $x^2 - 5x + 6 = 0$.
(04 marks)

15. The table below shows the weights of 100 boys in a certain village.

Weights	**Number of Boys**
10 - 19	3
20 - 29	8
30 - 39	12
40 - 49	8
50 - 59	15
60 - 69	20
70 - 79	15
80 - 89	10
90- 99	9

(a) Using an assumed mean of 54.5, calculate the mean weight.
(06 marks)

(b) (i) Draw a histogram for the data.
(ii) Use the histogram to estimate the mode. *(06 marks)*

16. A transformation represented by the matrix $\begin{pmatrix} 6 & 10 \\ 1 & 2 \end{pmatrix}$ maps the vertices *A, B, C* and *D* of a rectangle onto the points *A′* (22,4), *B′* (62,12), *C′* (80,15) and *D′* (40,7) respectively.

(a) Find the;
(i) inverse of the matrix.
(ii) coordinates of *A, B, C* and *D* using the inverse matrix.
(07 marks)

(b) (i) Plot the points *A, B, C* and *D* on a squared paper.
(ii) Find the area of rectangle *ABCD.*
(iii) Use the area of rectangle *ABCD* to determine the area of *A′B′C′D′.* *(05 marks)*

17. A farmer wishes to spray weeds in a coffee plantation, using type X and type Y of weedkillers. Type X costs shs4,000 per litre. Type *Y* costs shs6,000 per litre. The farmer has shs40,000 available for buying the weedkillers. Each litre of type *X can* spray 3 hectares of the plantation. Each litre of type *Y* can spray 4 hectares of the plantation. The plantation is 15 hectares. Three times the quantity of type X weedkiller used should exceed two times the quantity of type Y by less or equal to four. If he uses x litres of type *X* and *y* litres of type *Y,*

(a) Write five inequalities representing this information. *(05 marks)*

(b) (i) Show on a graph the region satisfying the five inequalities by shading the unwanted regions.
(ii) Use the graph to find the number of litres of each type of weed killer that minimizes the cost of spraying the plantation.
(07 marks)

END