

456/1  
Mathematics  
Paper 1  
July 2016  
2 ½ hrs

**Uganda Certificate of Education**

**Mathematics**

**Paper 1**

**2hours 30minutes**

**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.*
- *Begin each section B question on a fresh page.*
- *Graph papers are provided*
- *Silent non-programmable calculators and mathematical tables with a list of formulae may be used.*

**SECTION A(40MARKS)**

1. Simplify;  $\frac{2x+4}{x^2+3x+2}$ . (4marks)

2. Solve the equation;  $x^2 = \frac{3-2x}{8}$ . (4marks)

3. Given that  $\sin\theta = \frac{-5}{13}$  and  $90^\circ \leq \theta \leq 270^\circ$  find the value of  $\tan\theta$ . (4marks)

4. If  $A = \begin{pmatrix} 4 & 2 \\ 6 & 8 \end{pmatrix}$  and  $B = \begin{pmatrix} 1 & 3 \\ 0 & 4 \end{pmatrix}$ , find the value of  $\frac{3}{2}A + B$ . (4marks)

5. The table below represents the marks scored by 60 students in Mathematics Test.

Mark	1 – 25	26 – 50	51 – 75	76 – 100
Frequency	6	15	32	7

Draw a histogram to represent the information above. (4marks)

6. Solve for  $w$  in the equation  $\frac{3w+2}{5} - \frac{2w-4}{3} = 1$ .

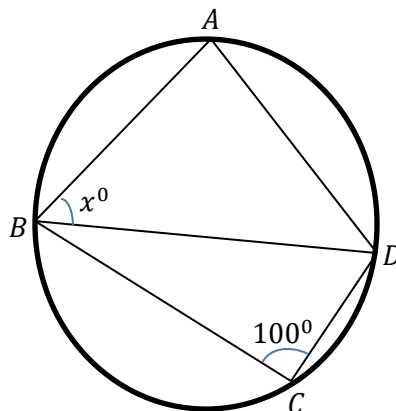
7. ABCD is a rhombus.  $AC = 8cm$  and  $BD = 6cm$ . Calculate;

i) the area of the rhombus (2marks)

ii) the length  $\overline{AB}$  (2marks)

8. Make  $d$  the subject in the formula,  $= \frac{1}{2}mn^2 - \frac{qd}{n}$ . (4marks)

9.



Find the value of  $x$  given that  $AD = AB$  and  $\angle BCD = 100^\circ$  (4Marks)

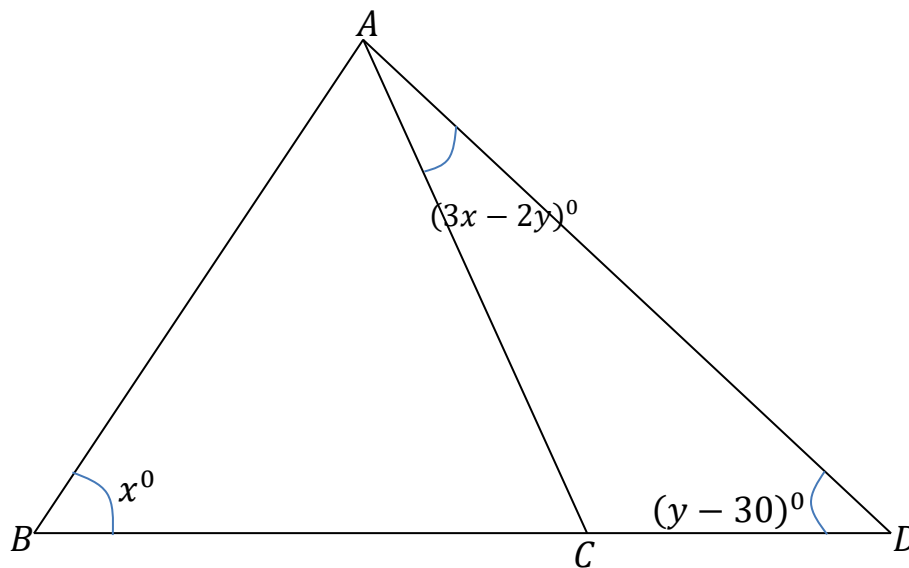
10. In a transformation, an object with an area of  $5\text{cm}^2$  is mapped onto an image whose area is  $30\text{cm}^2$ . Given that the matrix of the transformation is  $\begin{pmatrix} x & x-1 \\ 2 & 4 \end{pmatrix}$ , find the value of  $x$ . (4marks)

**SECTION B (60MARKS)**

11. a) A two-digit number is such that the one's digit is four more than the ten's digit, and the sum of the digits is 14. Find the number. (6marks)

b) The length of a rectangular room is 3m longer than the breadth. If the perimeter is 38m. Find its breadth and area. (6marks)

12. a)



In the figure shown above  $\angle ABC = x$ ,  $\angle ADC = (y - 30)^\circ$  and  $\angle CAD = (3x - 2y)^\circ$ . Given that  $AC = BC = CD$ , find  $x$  and  $y$  and hence the size of  $\angle ACB$ . (8marks)

b) Given that  $\frac{x}{x+2y} = \frac{3}{8}$ . Find the ratio  $x:y$ . (4marks)



13. The table below shows marks scored by 42 students in a test.

35	49	69	57	58	75	48
40	46	86	47	81	67	63
56	80	36	62	49	46	26
41	58	68	73	65	59	72
64	70	64	54	74	33	51
73	25	41	61	56	57	28

- a) Starting with the mark of 25 and using equal class intervals of 10, make a frequency distribution table and calculate the mean. (7marks)
- b) Draw the ogive for the data and use it to estimate the median. (5marks)

14. On the graph provided, plot trapezium ABCD where ABCD has coordinates  $A(2, 0)$ ,  $B(6, 0)$ ,  $C(6, 5)$  and  $D(2, 2)$ .

- a) ABCD is mapped onto  $A'B'C'D'$  by a positive quarter turn about the origin  $O(0, 0)$ . Draw the image  $A'B'C'D'$  on the graph. (5marks)
- b) A transformation  $\begin{pmatrix} 2 & 1 \\ 1 & 1 \end{pmatrix}$  maps  $A'B'C'D'$  onto  $A''B''C''D''$ .
- i) Obtain the coordinates of  $A''B''C''$  and  $D''$ . (2marks)
- ii) Plot the image  $A''B''C''D''$  on the graph. (1mark)
- c) Determine a single matrix that maps  $A''B''C''D''$  onto ABCD (4marks)

15. Draw the graph of  $y = x^2 + x - 2$  for  $-3 \leq x \leq 2$ .

- i) Use your graph to solve the equation  $x^2 + x - 2 = 0$ .
- ii) By drawing a suitable line on the same axes solve;  $x^2 + 3x - 5 = 0$ . (Use a scale of 2cm to represent 1 unit on both axes) (12marks)

16. Using ruler and compasses only construct an acute angled triangle ABC such that  $\angle ABC = 45^\circ$ ,  $BC = 9\text{cm}$  and  $AC = 7\text{cm}$ . (4marks)

Locate a point X in triangle ABC such that X is equidistant from A, B and C and use it to draw a circle touching A, B and C. (5marks)

Measure AX, AB and  $\angle AXC$ . (3marks)

17. A company was contracted to transport 1200 tonnes of sand. The company used type A and type B trucks to do the job. Each type A truck carries 10 tonnes of sand per trip while each type B truck carries 15 tonnes per trip. The total number of trips must not be less than 70 and type B trucks must make at least twice as many trips as type A trucks while the latter must make not less than 10 trips.

a) Taking x to represent the number of trips made by type A trucks and y to represent the number of trips made by type B trucks, write down all the inequalities representing the above information.

b) Represent the inequalities in (a) graphically.

c) The company makes a profit of Shs 2,000 per trip made by each type A truck and Shs 3,000 per trip made by each type B truck.

i) Write down the objective function for profit

ii) Determine the number of trips each type of truck must make to maximize the profit. Hence calculate the maximum profit. (12marks)

**\*\*END\*\***