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MATHEMATICS

Paper 1

July/August 2017

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

ASSHU – RWENZORI REGION ACADEMIC BOARD (ARRAB)

Uganda Certificate of Education

MOCK EXAMINATIONS

MATHEMATICS

Paper 1

2 hours 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 answer booklet or answer sheets provided. Therefore, no paper should be given for rough work.*

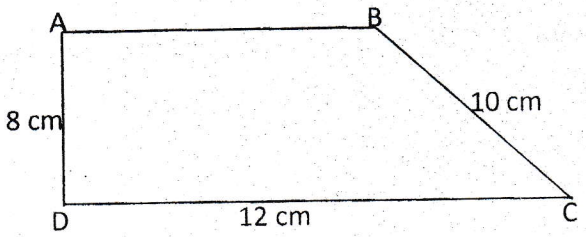
Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

Graph paper is provided.

SECTION A (40 marks)

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

1. The sum of two positive digits is 24 and the difference of their squares is zero. Find the two numbers. (04 marks)
2. Given that $a * b = a^2 + b^2 - ab$, find the values of
   i) $-2 * 3$
   ii) $1 * (-2 * 3)$ (04 marks)
3. The figure below ABCD represents a trapezium where AD = 8cm, BC = 10 and DC = 12cm.



   Find it's area. (04 marks)

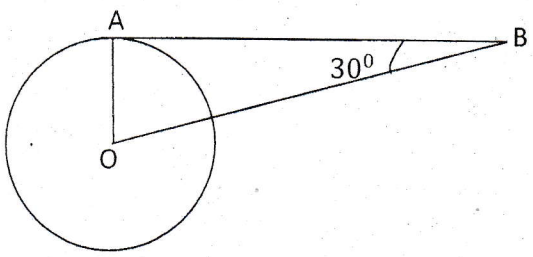
4. Solve the inequality $x + 5 \leq 4x + 2 \leq 3x + 6$ and show the solution on a number line. (04 marks)
5. Make x the subject of the formula, $R = \sqrt{\frac{bx-v}{mx}}$ (04 marks)
6. Solve the following pair of equation using matrix method.
   x – 2y = 8
   y + 4x = 5 (04 marks)
7. Town A is 6km due North of B. Josiane leaves A and moves in a certain direction at 15km/hr for 40 minutes to town C. If at C, she realizes that she is due East of B. Find the distance of B from C. (04 marks)
8. Given that the solutions to the equation $ax^2 + bx + c = 0$ are -9 and 2, state the values of a, b and c. (04 marks)
9. Study the table below.

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

   (a) Find the value of x, if mean mark is 34.6

   (b) State the mode. (04 marks)

10. In the figure below, AB = 10cm is a tangent to a circle at A. angle ABO = 30^0.



Find;

(i) length OB

(ii) radius of the circle. (04 marks)

SECTION B (60 marks)

*(Attempt any **five** questions. **All** questions carry equal marks)*

11. (a)(i)If $\boldsymbol{A} = \begin{pmatrix} 1 & -1 \\ 2 & -1 \end{pmatrix}$ and $\boldsymbol{B} = \begin{pmatrix} 1 & 1 \\ 4 & -1 \end{pmatrix}$, show that $(\boldsymbol{A} + \boldsymbol{B})^2 = \boldsymbol{A}^2 + \boldsymbol{B}^2$.

(ii) Given that $\boldsymbol{D} = \begin{pmatrix} 1 & 2 \\ 0 & 1 \end{pmatrix}$ and **I** is a 2 x 2 identify matrix, obtain the values of p and q such that $\boldsymbol{D}^2 = p\boldsymbol{D} + q\boldsymbol{I}$.

(b). The matrix below shows the quantities in kg of sugar, posho and groundnuts bought by customers A, B and C.

$$\begin{array}{c} \\ sugar \\ posho \\ G.nuts \end{array} \begin{array}{c} \begin{array}{ccc} A & B & C \end{array} \\ \begin{pmatrix} 4 & 10 & 6 \\ 5 & 4 & 3 \\ 1 & 2 & 0 \end{pmatrix} \end{array}$$

The price per kg are; sugar 4500=, posho 1800= and 5000=. Use matrix multiplication to find the total amount of money spent by each of the three customers.

(12 marks)

12. (a)The line y = 2x meets the line x = 3 at point A. find the coordinates of A.

(02 marks)

(b)(i) The x-axis is the axis of symmetry of triangle OAB, where O is the origin. What special type of triangle is OAB? (01 mark)

(ii) State the equation of line OB and the coordinates of point B. (03 marks)

(iii) Write down the restrictions on X for (x, y) to be a point inside triangle OAB. (06 marks)

13. (a) Triangle ABC with vertices A(0, 0), B(0 2) and C(3 1) is mapped onto A'B'C' by transformation matrix $N = \begin{pmatrix} 1 & 0 \\ 3 & 4 \end{pmatrix}$, find;

(i) the coordinates of vertices of triangle A'B'C'. (02 marks)

(ii) the ratio of the area of object triangle and the image triangle A'B'C'. (02 marks)

(b) A'B'C' further undergoes an enlargement with scale factor of -2 about the origin.

(i) Write down the matrix for this enlargement.
(ii) State the coordinates of the image A''B''C'' under this enlargement.
(iii) What single transformation will bring A''B''C'' back to ABC. (08 marks)

14. (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)

15. The marks below were recorded by Medius in percentage, obtained by her candidates in a mathematics exam.

62	53	43	57	72	59	48	40
64	62	54	40	55	32	70	64
35	64	59	55	48	54	55	58
50	46	83	45	55	48	74	40
70	58	68	75	54	35	71	58

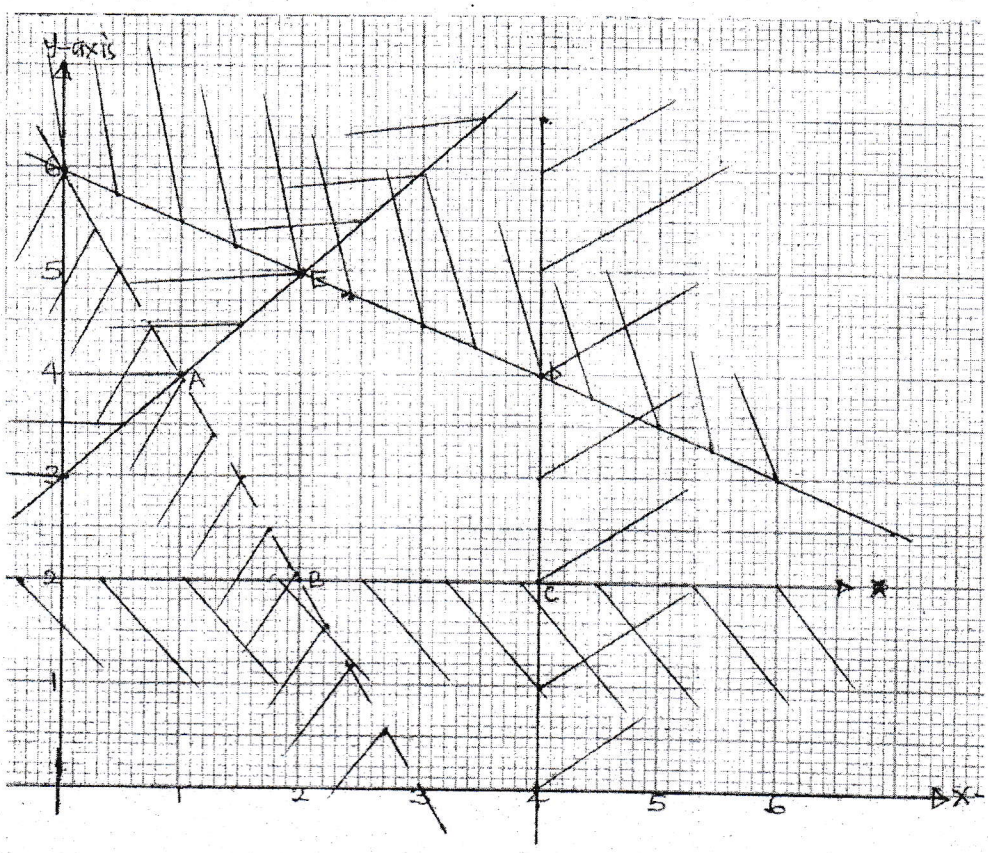
(a) Using a class interval of 5 marks, form a frequency distribution table for this data. (03 marks)

(b) Plot a cumulative frequency curve for the data. Use it to estimate

(i) Upper quartile
(ii) Median
(iii) Lower quartile
(iv) Calculate the interquartile range.

(09 marks)

16. In the figure below A,B,C,D and E are vertices of the feasible region.



(a) Find all the inequalities, which satisfy the feasible region.

(b) Use that graph to minimize $7x + 2y$.

(c) Find the area enclosed by the feasible region (12 marks)

17. (a) Using a ruler and a pair of compasses only, construct a triangle ABC such that $\overline{AC}$ = 9.6cm, $\overline{BC}$ = 4.8cm and the angles BAC = 30° and ABC = 90°, D is a point on $\overline{BC}$ produced 2.7cm away from $\overline{AB}$

(b) Construct a circle circumscribing triangle ACD such that it also passes through the point E. measure

(i) Lengths AB and BE

(ii) Angle ADC

(iii) Radius of the circle

(12 marks)

END