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MATHEMATICS
Paper 1
April 2020
2½ hours

MWALIMU EXAMINATIONS BUREAU

UCE END OF TERM I RESOURCE EXAMINATIONS 2020

MATHEMATICS

Paper 1

2 hours 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.*

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)

1. Given that a*b = $2a^2 + b$, evaluate -3 * (-1 * 2). **4mks**

2. Given that matrix P = $\begin{pmatrix} 7 & 2 \\ 5 & 3 \end{pmatrix}$, find P^{-1}. **4mks**

3. Solve the inequality $x^2 + x \leq 6$ **4mks**

4. Given that r = $\frac{yt + 2x}{x}$, make x the subject of the formula. **4mks**

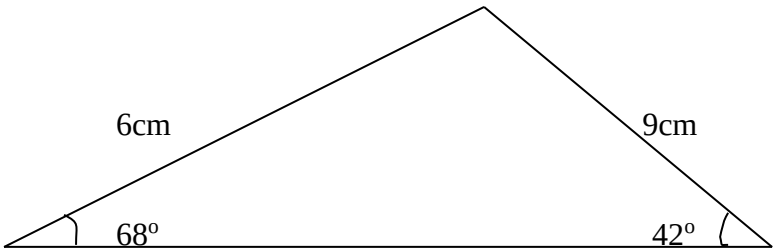
5. By a method of completing squares, solve $2x^2 - x - 3 = 0$. **4mks**

6. Given that $8\tan\theta = 15$ and that $0^o \leq \theta \leq 90^o$.
Calculate without using tables or calculators the value of $4\cos\theta - \sin\theta$. **4mks**

7. A bag contains red beads, blue beads and green beads. The probability that a red is $\frac{3}{5}$, and that it will be blue is $\frac{3}{10}$. What is the probability that the first bead drawn at random will be green? **4mks**

8. In a class of 56 students, the average mean of 30 boys is 54 while that of girls is 48. Find the average mark of the whole class. **4mks**

9. Find the area of the triangle below;



10. In a certain school, 120 senior five students browsed the following websites during their ICT lesson: Facebook, Twitter and YouTube in the ratio of 5:2:3 respectively. How many more students browsed Facebook than YouTube? **4mks**

SECTION B (60 marks)

11. a) Given that $y = 3x^2 - 5x - 7$, Copy and complete the table below for values of x in the range $-3 \leq x \leq 4$.

x	-3	-2	-1	0	1	2	3	4
y	35			-7				

b) Using the table in (a) above, draw a graph of $y = 3x^2 - 5x - 7$ for $-3 \leq x \leq 4$.

c) Use your graph above to solve the following equations;
   i) $3x^2 - 5x - 7 = 0$
   ii) $x^2 - 2x - 1 = 0$ **12mks**

12. The table below represents the times (in seconds) recorded by students in the heats of a 100m race during a inter-house athletics competition;

14.7	13.8	14.6	15.2	15.0	14.5	15.0	14.9	14.7	12.2
11.8	14.0	12.7	13.2	15.0	15.0	15.2	15.7	14.7	15.2
14.5	15.5	11.9	12.5	15.1	15.2	15.4	12.1	11.9	14.7
14.8	14.9	15.6	15.0	13.2	13.4	14.5	15.0	15.1	15.4
12.0	14.7	12.4	13.4	13.6	12.8	13.3	11.8	11.5	12.0

a) Draw the frequency distribution table for the data starting with the class 11.0 -11.4.
b) State the;
   i) class width
   ii) modal class
c) Using 13.2 as the working mean, calculate the mean time.
d) Construct the cumulative frequency curve and use it to estimate the median mark. **12mks**

13. Triangle PQR with vertices (P(1, 1), Q(5, 1) and R(1, 4) is mapped onto P1Q1R1 by the matrix $\begin{pmatrix} 3 & 2 \\ 1 & 1 \end{pmatrix}$. Then $P^1Q^1R^1$ mapped onto $P^{11}Q^{11}R^{11}$ by the matrix $\begin{pmatrix} -1 & 1 \\ 0 & 2 \end{pmatrix}$.

a) Find the coordinates of;
   i) $P^1Q^1R^1$
   ii) $P^{11}Q^{11}R^{11}$
b) Find the single matrix that would map $P^{11}Q^{11}R^{11}$ back onto PQR.
c) Find the area of $P^{11}Q^{11}R^{11}$. **12mks**

14. Using a ruler, pencil and a pair of co mpass only, construct;
a) Construct a triangle XYZ in which $\overline{XY}$ = 8cm, $\overline{XZ}$ = 10.0cm and angle XYZ = 45°.
b) Draw the circumcircle of triangle XYZ and measure and record its radius.
c) Draw a perpendicular from Z to meet line XY produced at point N. Measure and record ZN.
d) Measure and record YZ. **12mks**

15. Given the matrices;
$A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix}$, $B = \begin{pmatrix} 4 & -2 \\ 5 & 4 \end{pmatrix}$ and $C = \begin{pmatrix} 1 & 1 \\ 0 & 2 \end{pmatrix}$
a) Find AC – 3B.

b) Given the matrices $P = \begin{pmatrix} 4 & -2 \\ 5 & 4 \end{pmatrix}$ and $R = \begin{pmatrix} 5 & 0 & 2 \\ & & \\ -1 & 4 & 4 \end{pmatrix}$

Find and state the order of PR.

c) Use the matrix method to solve the simultaneous equations;

$5x - 2y = -2$
$y - x = -15$ **12mks**

16. a) A straight road runs uphill 400m inclined at 13^o to the horizontal. Calculate the height of the hill.
b) The hill is shown on a map of scale 1:100,000. Calculate the length in cm of the line on the map representing the road.
c) If a number x is doubled, the result is twenty four less than its square. Write the information as an equation in terms of x and hence find the possible value of x. **12mks**

17. A factory is to buy two types of machine A and B each costing Shs. 200,000 and Shs. 100,000 respectively. At least one of each of the types of machines A and B is to be bought. Each of machines A and B require floor space of $3m^2$ and $4m^2$ respectively. If a mimumum of Shs. 600,000 is to be spent on these machines and space available is $24m^2$.
a) Write down all the inequalities representing the information.
b) Draw on the same axes the graphs of the inequalities and shade the unwanted region.
c) List all the possible corresponding number of each of the types A and B that can be bought.
d) If types A and B can bring weekly profits to the company at rates of Shs. 15,000 and Shs. 18,000 respectively, find the corresponding number of type A and type B that would bring maximum weekly profits. **12mks**

End