456/1 MATHEMATICS PAPER 1 Nov, 2020 2¹/₂ hrs

Uganda Certificate of Education RESOURCEFUL MOCK EXAMINATIONS 2020 MATHEMATICS PAPER 1 2 HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES

- Answer **all** the questions in Section **A** and NOT more than **Five** from Section **B**.
- All necessary working **must** be shown clearly.
- Silent, non-programmable scientific calculators and mathematical tables with a list of formulae may be used.

SECTION A:(40 MARKS)

Attempt **all** questions in this section

1. Given that
$$a * b = 3a^2 - 2b$$
, evaluate $5 * (4 * 8)$. (4marks)

- 2. Make R the subject of the equation; $P = \sqrt{\frac{4A}{M+3R}}$ (4marks)
- 3. Use factorization method to solve the equation $15x^2 + x 6 = 0$. (4marks)
- 4. Find the inverse of the matrix; $A = \begin{pmatrix} -6 & 6 \\ -3 & 4 \end{pmatrix}$. (4marks)

5. In the diagram below, O is the centre of the circle and TA is a tangent to the circle. ABCD is a cyclic quadrilateral and angle $TAC = 59^{\circ}$.



Find the values of the angles marked b and d.

(4marks)

6. The table below shows the marks obtained by 40 students in a Chemistry Practical test.

Marks	10 – 19	20 – 29	30 – 39	40 - 49	50 – 59
Number of students (f)	8	10	12	8	2
Calculate the mean man	·k.				(4mark

Calculate the mean mark.

7. Solve the inequality;
$$\frac{x+1}{5} - \frac{2x-3}{3} < 4.$$
 (4marks)

8. A two digit number is written at random using the numerals 1, 3 and 4 without repeating any numeral.

a) Write down the possibility space.

b) Find the probability that the number written is a prime number. (4marks)

9. Find the coordinates of the images of the points R(3, -2) and S(2, 7) under the matrix of transformation $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$. (4marks)

10. Given that $tan\theta = \frac{5}{12}$ and $180^{\circ} < \theta < 360^{\circ}$, find without using mathematical tables or a calculator the value of $sin\theta - cos\theta$. (4marks)

SECTION B (60MARKS)

Answer any *five* questions from this Section.

11. a) Given that $x^2 - y^2 = 32$ and x - y = 2, determine the values of x and y. (5marks) b) Two taxi-minibuses a Nissan and a Fuso transported students from Luzira to Kampala. when Nissan had made 3 journeys, the Fuso had made 2, and they had transported 107 students altogether. When the Nissan had made 2 journeys and the Fuso 4, they had transported 146 students altogether. If each journey made by each taxi-minibus was at full capacity, find the capacity of each taxi-minibus. (7marks)

12. The table below shows the heights in a class of 40 senior one students of a certain school.

Height	140 – 144	145 – 149	150 – 154	155 – 159	160 – 164	165- 169	170 – 174
Number of	2	5	9	10	7	5	2
students							
(f)							

a) Use the table to calculate the;

- i) Mean height
- ii) Median height

b) Draw a histogram for the data and use your histogram to estimate the modal height of the students. (4marks)

(8marks)

13. a) Copy and complete the table below for the function $y = 26 - 2x^2$

x	-4	-3	-2	-1	0	1	2	3	4
x ²	16	9	4	1	0	1	4	9	16
$-2x^{2}$									
26	26	26	26	26	26	26	26	26	26
$y = 26 - 2x^2$									

(2marks)

b) Using a scale of 2cm to represent 1 unit on the horizontal axis and 1cm to represent 2 units on the vertical axis, draw the graph of $y = 26 - 2x^2$ for $-4 \le x \le 4$. (3marks)

c) Use your graph to solve the equation; $26 - 2x^2 = 0$. (2marks)

d) On the same axes, draw the graph of y = 4x + 18. (2marks)

e) Use your graphs to solve the equation $2x^2 + 4x - 8 = 0$. (3marks)

14. A ship leaves a port and sails for 140km on a bearing of 125°. It then changes direction to a bearing of 250° and sails for 180km to an Island. Using a scale drawing with 1cm to represent 20km, find;

a) the distance of the Island from the Port.	(8marks)
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b) the bearing of the Island from the Port. (2marks)

c) how long it would take for the ship to sail directly back to the port at a speed of 20kmh⁻¹. (2marks)

15. A triangle whose vertices $\operatorname{are} A(2,1), B(5,1)$ and C(5,3) undergoes a transformation represented by the matrix $\begin{pmatrix} 5 & -4 \\ 2 & -2 \end{pmatrix}$ to be mapped on to triangle A'B'C'. The image triangle further undergoes a transformation represented by $\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$ to be mapped on to triangle A''B''C''.

a) Find the coordinates of;

b) Determine the single matrix of transformation which would map triangle A''B''C'' back on the triangle *ABC*. (6marks)

16. a) Given that matrix $A = \begin{pmatrix} 3 & 1 & 2 \\ 0 & -4 & 5 \end{pmatrix}$, $B = \begin{pmatrix} 1 & -1 \\ 0 & 3 \\ 6 & 2 \end{pmatrix}$ and P = AB.

i) determine the order of P.

- ii) find the matrix P (6marks)
- b) Solve the following simultaneous equations using matrix method. (6marks)

2x - y = 8

y + 3x = 7

17. a) By shading the unwanted regions, show on a graph the region satisfying the inequalities below;

i) $x \ge 0$

ii) $y \ge 0$

iii) y > x

iv) $3x + 2y \le 24$

v) $3x + y \ge 15$

(8marks)

b) Use your graph to find the integral values of x and y, which give the minimum value for both 3x + 2y and 3x + y (4marks)

END