

UGANDA CERTIFICATE OF EDUCATION

S.4 COVID 19, 2020

MATHEMATICS

P456/1

TIME: 2HOURS 30 MINUTES

INSTRUCTIONS TO CANDIDATES:

- Answer all questions in Section **A** and any five in Section **B**
- Any additional questions answered will not be marked
- All the necessary working **MUST** be shown clearly
- Graph papers are provided
- Mathematical tables with a list of formula can be used
- Scientific non-programmable calculators may be used

SECTION A (40MARKS)

1. Factorize $m^2 - n^2$ completely. Hence evaluate $18.79^2 - 8.79^2$. **(04 marks)**
2. Make x the subject of the formula $A = (px^2 - q)^{\frac{1}{3}}$. **(04 marks)**
3. Find the integral values of x which satisfies the inequalities :
 $2x - 1 < 7 + x \leq 3x + 1$ **(04 marks)**
4. Solve for x in $(x + 3)(x - 2) = 14$ **(04 marks)**
5. Determine the value of y for which the matrix below has no inverse.
 $\begin{pmatrix} y & 2 \\ y^2 & 1 \end{pmatrix}$. **(04 marks)**

6. Given that $m * n = m^2 - 2n$

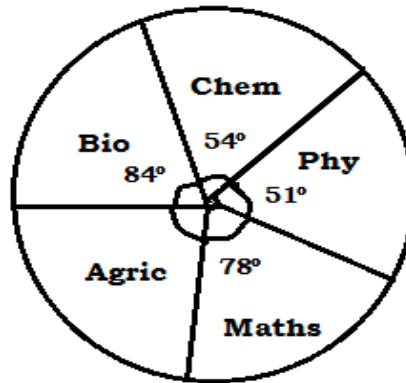
Find (i) $3 * 2$

(ii) $(3 * 2) * 5$

(04 marks)

7. The total mark scored by a student in five subjects was 240.

The pie – chart below represents the marks scored in each subjects.



What was the score in Agriculture?

(04 marks)

8. If $104_n + 43_{five} = 63_{ten}$ find what the base n represents.

(04 marks)

9. A woman has children whose ages in years are;

2, 4, 6, 6, 8, 13, 17, 20 and 23.

(a) State the;

(i) Modal age of the children

(ii) Median age of the children

(b) Determine the mean age of the children.

(04 marks)

10. Solve for t in the equation below;

$$\frac{t - 3}{2} - \frac{2t - 3}{5} = \frac{1}{4}$$

(04 marks)

SECTION B (60 MARKS)

11. The table below shows the masses to the nearest kg of 80 animals on a certain farm.

Mass (Kg)	1 – 10	11 – 20	21 – 30	31 – 40	41 – 50
No. of animals	5	13	32	27	3

(a) State the modal class

(b) Calculate the mean mass of the animals.

(c) Draw a histogram to represent the above data and use it to find the modal mass

(12 marks)

12. (a) Given that $A = \begin{pmatrix} 1 & 0 \\ -2 & 3 \end{pmatrix}$, $B = \begin{pmatrix} 3 & 0 \\ 2 & 1 \end{pmatrix}$ and $C = 2AB - A^2$.
Determine matrix C . **(4 marks)**

(b) Find the inverse of $\begin{pmatrix} 2 & 5 \\ 3 & -2 \end{pmatrix}$. Hence or otherwise.
Solve the equations; $2x + 5y = 11$ and $3x - 2y = 7$. **(4 marks)**

(c) Opio bought 5 Biology books and 6 Chemistry books for a total of shs. 2440.
Magambo bought 7 Biology books and 9 Chemistry books for a total of shs. 3560.

- (i) Form a matrix equation to represent the above information.
(ii) Use matrix method to find the price of one Biology book. **(4 marks)**

13. (a) Use the graphical method to solve the simultaneous equations,

$$y = 8 - 2x - x^2 \text{ and } y = 4 - 2x \text{ for } -5 \leq x \leq 3.$$

(b) Find also the roots of the equation $8 - 2x - x^2 = 0$ from the graph in
(a) above **(12marks)**

14. The coordinates of the vertices of rectangle $ABCD$ are $A(1,1)$, $B(6,1)$, $C(6,4)$
and $D(1,4)$.

(a) (i) Find the coordinates of the vertices of its image, $A^1B^1C^1D^1$ under
the transformation defined by the matrix $\begin{pmatrix} 1 & -2 \\ 0 & 1 \end{pmatrix}$.

(ii) Draw the object and its image on the graph paper provided.

(iii) On the same graph, draw the image, $A^{11}B^{11}C^{11}D^{11}$ of $A^1B^1C^1D^1$
under the transformation given by $\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$

(b) Find a single matrix which would map $A^{11}B^{11}C^{11}D^{11}$ onto $ABCD$.

(12 marks)

15. Nyakana makes two types of shoes A and B . He takes 3 hours to make
one shoe of type A and 4 hours to make one shoe of type B . He works for a
maximum of 120 hours to make x pairs of type A and y pairs of type B .

It costs him sh. 400 to make a pair of type A and sh. 150 to make a pair of
type B .

His total cost does not exceed shs. 9000. He must make at least 8 pairs of
type A , and more than 12 pairs of type B .

(a) Write down four inequalities representing the given information.

(b) On a graph paper, draw the inequalities and shade the unwanted regions.

(c) Nyakana makes a profit of *shs.* 40 on each pair of type *A* and *shs.* 70 on each pair of type *B* shoes.

Use your graph to determine the maximum possible profit he makes.

(12 marks)

16. Using a pencil, a ruler and a pair of compasses only:

(a) (i) Construct a triangle K L M in which $\overline{KL} = 10.8\text{cm}$, $\overline{LM} = 12.7\text{cm}$ and angle LKM = 75° .

(ii) Measure angel KML **(07 marks)**

(b) (i) Construct a circle which touches all the sides of the triangle KLM.

(ii) Measure the radius of the circle. **(05 marks)**

17. (a) Given that $b = \frac{PR^2}{19AW}$

(i) Make R the subject

(ii) Hence, find the value of R when $b = 20$, $A = 3.5$, $W = 10.5$ and $P = 285$.

(06 marks)

(b) Factorize $25t^2 - 4t^3$ completely. Hence solve the equation $25t^2 - 4t^3 = 0$.

(06 marks)

END