THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
CERTIFICATE OF SECONDARY EDUCATION EXAMINATION

041

BASIC MATHEMATICS

(For Both School and Private Candidates)

Time: 3 Hours **Year: 2023**

Instructions

1. This paper consists of sections A and B with a total of **fourteen (14)** questions.
2. Answer **all** questions.
3. Each question in section A carries **six (06)** marks while each question in section B carries **ten (10)** marks.
4. All necessary working and answers for each question must be shown clearly.
5. NECTA mathematical tables and non-programmable calculator may be used.
6. All communication devices and any unauthorised materials are **not** allowed in the examination room.
7. Write your **Examination Number** on every page of your answer booklet(s).

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SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) (i) Arrange the given numbers in ascending order of magnitude:

$0.\dot{6}$, $\frac{3}{5}$ and 20% of $\frac{13}{4}$.

(ii) Evaluate the expression $13-2\times3+14\div(2+5)$.

(b) By listing the multiples of 2, 3 and 5, find the L.C.M of these numbers.

2. (a) Find the values of x and y that satisfy the equations $\begin{cases} 5^{(x-2y)}=25 \\ 3^{2x}\div3^{y}=3^{4} \end{cases}$

(b) Solve the equation $4+3\log_3 x=\log_3 24$.

3. (a) Given the universal set $\xi=\{15,30,45,60,75\}$ and the subsets $A=\{15,45\}$ and B $=\{30, 60\}$, find $(A\cup B)'$ and hence represent this information by using a Venn diagram.

(b) (i) In a class of 50 students, 35 are boys and 15 are girls. If a student is chosen at random, what is the probability that he is a boy?

(ii) Jonika has two shirts, blue and red. He also has three trousers, black, green and yellow. By using a tree diagram, find the probability that he will put on a blue shirt and black trouser.

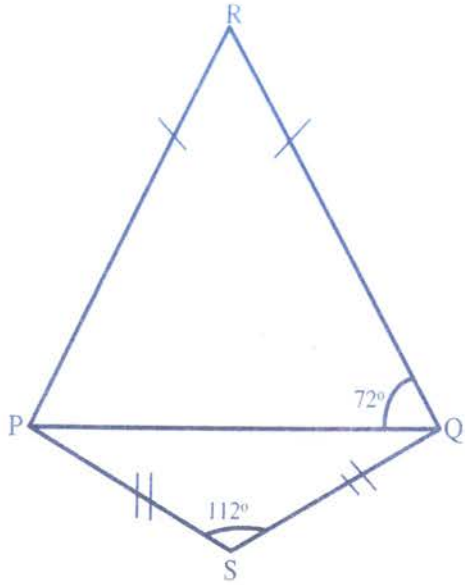
4. (a) Show that the triangle whose vertices are $A(4,-4), B(-6,-2)$ and $C(2,6)$ is an isosceles.

(b) A man walks 4 km from village P to village Q and then 3 km to village R. If village Q is N60°E of village P; and village R is N30°W of village Q,

(i) represent this information on a well labeled diagram.

(ii) find the resultant displacement of the man from P to R.

5. (a) In the following figure, $R\hat{P}Q = P\hat{Q}R$ and $S\hat{P}Q = S\hat{Q}P$. Find the size of the angle RPS.



(b) A rectangular field is 72 m long and 40 m wide. If a triangular field with a base of 60 m has an area which is equal to the area of the rectangular field, find the height of the triangular field.

6. (a) Anna walks 24 km every day. Compute in metres, the distance she walks in 2 days.

(b) A dealer sells mattresses whose buying price is directly proportional to the selling price. If the selling price and the buying price of one mattress are Tshs 20,000 and Tshs 18,000, respectively, find;

(i) the equation that relates the buying price and the selling price.

(ii) the new selling price when the buying price is increased by 15%.

7. (a) Ally and Jane shared 64,000 shillings in the ratio 3:5 respectively. Find the difference between their shares.

(b) Mr. Mrisho recorded the transactions of his business in February, 2022 in a cash account as follows:

CASH ACCOUNT

DR							CR
Date	**Particular**	**Folio**	**Amount**	**Date**	**Particular**	**Folio**	**Amount**
February 1	Capital		1,500,000	February 2	Purchases		1,000,000
February 2	Sales		1,200,000	February 6	Transport		200,000
February 3	Sales		800,000	February 27	Purchases		1,400,000
				February 28	Balance	c/d	900,000
			3,500,000				3,500,000
March 1	Balance	b/d	900,000				

Using the given cash account, extract the trial balance as at 28th February, 2022.

8. (a) Write down the first four terms of a sequence whose general term is $n(2n-1)$. Briefly explain whether it is an arithmetic progression or a geometric progression.

(b) The sum of the first eleven terms of an arithmetic progression is 517. If its first term is 7, find the sum of the fourth and ninth terms.

9. (a) A rectangular plot of land is 40 metres long. If the length of its diagonal is 50 metres, how wide is the plot?

(b) (i) Given that A is an acute angle for which $13\cos A - 5 = 0$, find the value of $\tan A$ without using mathematical table.

(ii) A triangular pond ABC is such that $\overline{AB} = 8$ m, $\overline{AC} = 5$ m and $BAC = 60^\circ$. Determine the length of $\overline{BC}$.

10. (a) If $x = -3$ and $x = \frac{1}{3}$ are solutions of the equation $ax^2 + bx + c = 0$ where a, b and c are integers, determine the values of a, b and c.

(b) Solve the inequality $10 - x \leq 3(x+10)$, where x is an integer. Hence, state the first four values of x that satisfy the given inequality.

SECTION B (40 Marks)

Answer **all** questions in this section.

11. The given frequency distribution table shows the scores of 30 students in a Mathematics test.

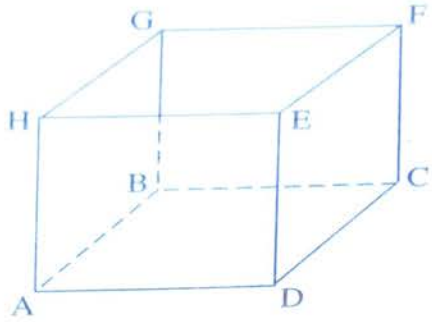
Class interval	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89	90 – 99
Frequency	2	4	7	9	5	3

(a) Calculate the median score, correct to two decimal places.

(b) Find the mean score, correct to four significant figures.

(c) Draw a histogram and use it to estimate the mode.

12. (a) The following figure represents a square box ABCDEFGH whose sides are 8 cm each.



(i) Determine the total surface area of the box.

(ii) Calculate the angle between the line segment $\overline{AF}$ and the plane $ABCD$, giving your answer to the nearest degree.

(b) Boeing 787 Dream Liner flying at 500 km/h leaves Julius Nyerere International Airport in Tanzania (7^o S, 45^o E) at 8:00 am. When will it arrive at Addis Ababa in Ethiopia (9^o N, 45^o E) ? (Use the substitution $\frac{2\pi R}{360^\circ} = 112$).

13. (a) Find the values of x and y given that $\begin{bmatrix} x & 4 \\ 3 & y \end{bmatrix} + \begin{bmatrix} 3x & 5 \\ -3 & 7 \end{bmatrix} = \begin{bmatrix} 8 & 9 \\ 0 & 9 \end{bmatrix}$.

(b) In a multiple choice test, 2 marks were awarded for each correct answer, 1 mark was deducted from each incorrect answer and 0 for not writing an answer. Anna answered 49 questions and scored 62 marks out of 100.

(i) Represent this information in a matrix form; letting x be the number of correct answers and y be the number of incorrect answers.

(ii) Using the inverse matrix method, determine the number of questions that Anna answered correctly.

(c) A triangle has its vertices at the points $A(1,3), B(2,5)$ and $C(4,1)$. If the triangle is rotated through 180^o anticlockwise about the origin;

(i) find the coordinates of the points A', B' and C' which are the images of A, B and C respectively.

(ii) draw the triangles ABC and $A'B'C'$ on the same set of axes.

14. (a) A function is defined on the set of integers as $f(x)=\begin{cases} -2 \text{ if } 0<x\leq 5 \\ x+1 \text{ if } -6\leq x<0 \end{cases}$

(i) Find the values of $f(4)$ and $f(-5)$.

(iii) State the domain and range of $f(x)$.

(b) The Air Tanzania Company wants to buy two types of airplanes, A and B. Type A requires $6\,\text{dam}^2$ of parking space, type B requires $2\,\text{dam}^2$ of parking space while the company has $60\,\text{dam}^2$ of parking space available. Also the company has 480 billion shillings and the cost for buying airplanes of type A and type B are 20 billion shillings and 30 billion shillings respectively. Find the greatest number of airplanes the company can buy.