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

041 **BASIC MATHEMATICS**

(For Both School and Private Candidates)

Duration: 3 Hours **Year: 2025**

Instructions

1. This paper consists of sections A and B with a total of **fourteen (14)** questions.
2. Answer **all** questions in each section.
3. Section A carries **sixty (60)** marks and section B carries **forty (40)** marks.
4. All writing must be in **blue** or **black** ink **except** drawing which must be in pencil.
5. All necessary working and answers for each question must be shown clearly.
6. NECTA mathematical tables and non-programmable calculators may be used.
7. Communication devices and any unauthorised materials are **not** allowed in the examination room.
8. Write your **Examination Number** on every page of your answer booklet(s).

SECTION A (60 Marks)

Answer **all** questions in this section.

1. (a) Express $0.1\dot{1}3\dot{6}$ in a simple fraction.

   (b) Round off:

   (i) 0.00070482 to 3 significant figures.

   (ii) 1233388 to the nearest ten thousands.

   (c) Three fifths of the pupils in a certain school come from the city centre. What is the percentage of pupils who do not come from the city centre?

2. (a) Write the expression $27^{n} \times 9^{2n} \times 3$ as a single exponent.

   (b) Rationalize the denominator of $\frac{\sqrt{2}+1}{\sqrt{2}-\sqrt{5}}$.

   (c) By using $\log 2 = 0.3010$ and $\log 3 = 0.4771$, find $\log 72$.

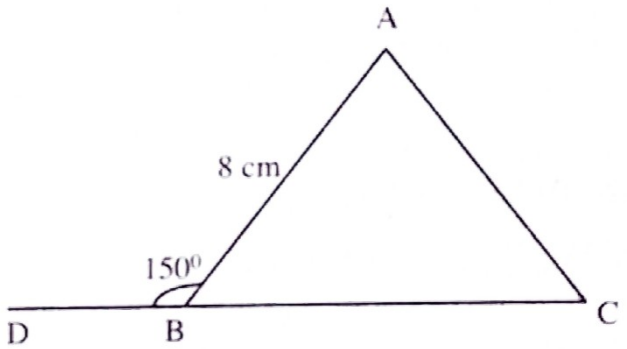
3. (a) A certain school has 260 students. Out of these students, 130 study Physics, 150 study Chemistry and 40 study both Physics and Chemistry. By using formula, find the number of students who study;

   (i) Physics only.

   (ii) neither Physics nor Chemistry.

   (b) In a sample of 35 animal keepers, 18 keep goats, 20 keep cows and 3 keep both goats and cows. By using a Venn diagram, find the probability of getting a person who keeps goats only.

4. (a) In the following figure, $\overline{AB} = 8$ cm, $A\hat{B}D = 150^{0}$. If the area of triangle ABC is $22.6\,\text{cm}^2$, find the length of $\overline{BC}$.



   (b) Find the perimeter of a regular pentagon inscribed in a circle whose radius is 10 m.

5. (a) If the exchange rate between Tanzanian shillings and the US dollar is 2,300 Tanzanian shillings to 1 US dollar, convert 27,600,000 Tanzanian shillings into US dollars.

(b) The height h of a cylinder is directly proportional to its volume V and inversely proportional to the square of its radius r. Given that, $h = 3\text{ cm}$ when $V = 900\text{ cm}^3$ and $r = 10\text{ cm}$, find h when $V = 1{,}200\text{ cm}^3$ and $r = 5\text{ cm}$.

6. (a) Given that $\underset{\sim}{a} = 2\underset{\sim}{i} - \underset{\sim}{j}$, $\underset{\sim}{b} = -\underset{\sim}{i} + 3\underset{\sim}{j}$ and $\underset{\sim}{c} = 3\underset{\sim}{i} - 4\underset{\sim}{j}$, determine the magnitude of $\underset{\sim}{a} + \underset{\sim}{b} + \underset{\sim}{c}$ in the form $n\sqrt{m}$.

(b) The mid-point of a line segment is $(3,\ 5)$. If one of the end points is $(6,\ 7)$, find the other end point.

7. (a) In making a concrete wall, a builder decides to mix gravel, sand and cement in the ratio of their minimum amounts of 500 kg, 600 kg and 200 kg, respectively. If the concrete wall of mass of 39,000 kg is to be made, how many kilograms of cement will be needed?

(b) Find the net profit using the following information:

Opening stock	2,000/=
Sales	30,000/=
Purchases	13,000/=
Expenses	6,500/=
Closing stock	500/=

8. (a) Joshua deposited Tshs 10,000 in a bank which pays 5% interest compounded annually. How much money did he accumulate after 3 years?

(b) If 3, $x-1$ and 27 are three consecutive terms of a geometric progression, find the possible values of x.

9. (a) Find the largest angle of a triangle whose sides are 7 cm, 6 cm and 8 cm.

(b) In triangle ABC, angle ABC is a right angle. If $\overline{CA} = 6\text{ cm}$ and $\overline{AB} = 3\text{ cm}$, find the length of $\overline{BC}$ and $\tan C$.

10. (a) If $x = \frac{1}{t^5}$, express the equation $\frac{2}{t^{10}} - \frac{3}{t^5} + 1 = 0$ in the quadratic form $ax^2 + bx + c = 0$.

(b) Solve for x in the quadratic equation obtained in part (a).

SECTION B (40 Marks)

Answer **all** questions in this section.

11. In a Biology examination done by 100 students in a certain school, the marks scored were grouped in the following distribution table:

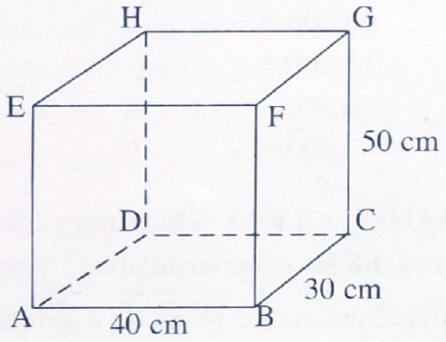
Marks	65 – 69	70 – 74	75 – 79	80 – 84	85 – 89	90 – 94
Number of Students	10	12	55	10	5	8

(a) How many students scored marks ranging from 75 to 79?

(b) Find the median of the distribution to the nearest whole number.

12. (a) Calculate the distance in kilometres along the circle of latitude between the places located at $X(60^o\,\text{N}, 30^o E)$ and $Y(60^o\,\text{N}, 40^o E)$. Use the substitution $\frac{2\pi R}{360^o} = 111.6$, where R is the radius of the Earth.

(b) Given a closed rectangular box ABCDHGFE as shown in the following figure;



(i) Calculate the length of $\overline{AG}$, leaving your answer in surd form.

(ii) If the faces of the sides are to be painted with colour on the outer surfaces, what is the total area that is to be painted?

13. (a) If $G = \begin{pmatrix} -1 & 11 \\ a & 3 \end{pmatrix}$ is a singular matrix, then find the value of a.

(b) By using the matrix method, solve the following system of simultaneous equations:

$$\begin{cases} 5x + 3y = 9 \\ 10x + 7y = 11 \end{cases}$$

14. (a) If $f(x)=x+2$ and $g(x)=3x-2$, find the product of $f^{-1}(x)$ and $g^{-1}(x)$.

(b) A tailor has $150\ m^2$ of cotton material and $90\ m^2$ of wool material. He wants to make two types of clothes. A suit requires $1\ m^2$ of cotton and $2\ m^2$ of wool while a gown requires $3\ m^2$ of cotton and $1\ m^2$ of wool. If a suit is sold at Tsh 40,000 and a gown at Tsh 60,000; formulate the objective function and the linear inequalities representing this information.