

PRESIDENT'S OFFICE
REGIONAL ADMINISTRATION AND LOCAL GOVERNMENT
KIBAHHA TC, BAGAMOYO DC AND KINONDONI MC
(KIBAKI)



FORM FOUR JOINT PRE-NATIONAL EXAMINATION, 2023

CODE:041

BASIC MATHEMATICS

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 in sections A and B.
3. Each question in section A carries six (06) marks while each question in section B carries ten (10) marks.
4. **NECTA** mathematical tables and non-programmable calculator may be used.
5. All communication devices and unauthorized materials are **NOT** allowed in the examination room.
6. Write your **Examination number** on every page of your answer booklet (s).

SECTION A

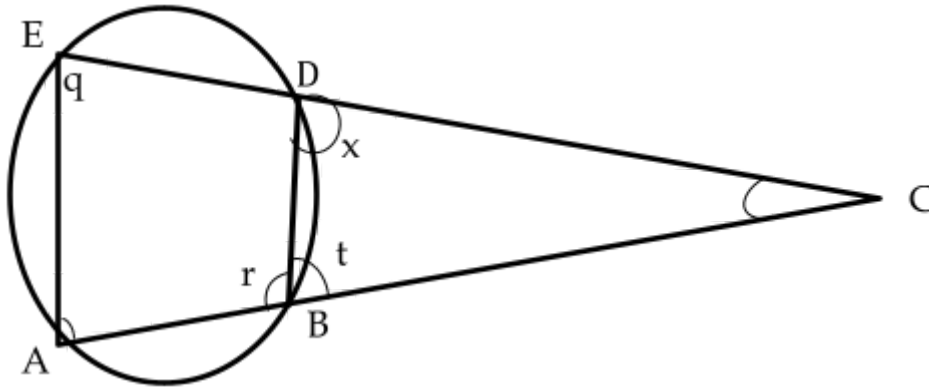
Answer **ALL** questions in this section

1. (a) Given the following digits in a number 298413576 if every digit is used once, write in numeral
 - (i) The largest possible number formed
 - (ii) The lowest possible number formed
- (b) Convert $10.00\dot{1}$ in the form of $\frac{a}{b}$ where a and b are real numbers and $b \neq 0$
- (c) Mr Kajuba want to plant trees along both sides of a road of 0.78km, each tree is planted every 30m. How many tree Mr Kajuba will plant both sides of the road?
2. (a) Find the value of x if $x(-3 + x) = 4$
- (b) If the operation of x and y is defined as $x * y$ where “ x is cubed plus y ” find the value of $4 * (3 * 2)$.
3. In a college of 90, 60 take electrical engineering, 40 take automobile mechanics and 10 take neither of the above programme.
 - (a) Put the information in well labeled Venn diagram
 - (b) What is the number of students taking both programmes
 - (c) Find the probability that student selected at random will be taking automobile mechanics only.
4. (a) Show that the point $(5, -2)$, $(0, 0)$ and $(-5, 2)$ are collinear
- (b) The point $(5, -7)$ is the vertex of a right tangle of a right angled triangle whose hypotenuse lie along the line $6x - 13y - 39 = 0$. A second vertex of the triangle is $(0, 3)$. Find the remaining vertex.
5. (a) Give a square of side 14cm. By how much does its area exceed the area of the inscribed circle?
- (b) If $\triangle PQR \sim \triangle LMN$ and given that $\overline{RP} = 20cm$, $\overline{NL} = 10cm$; $\overline{NM} = 12cm$ and $\overline{LM} = 9cm$; find the length of the other sides of the triangle PQR .
6. (a) The distance of the horizon d km varies directly as the square root of the height $h(m)$ of the observers above the sea level. As an observer at height of 100m sea level seen the horizon at a distance of 35.7km. find
 - i) The distance of the horizon from an observer 70m above sea level
 - ii) An equation connecting d and h
- (b) Water is pumped through the pipe at the rate of 5 litres per second. How long does it take to fill a tank of volume $6m^3$? (Note 1 litres = $1000cm^3$).

7. (a) John and Peter invested in fruits business; every one contributed the capital as follow: - John 110250/= and Peter 220500/=, after six months they made profit of 50970/=. How much did Peter get if they agreed to share according to their investment
- (b) From the following information below determine the gross profit. Sales 380,000/=: opening stock 80,000/=: purchases 250,000/=: electricity 40,000/=: discount allowed 20,000/=: closing stock 50,000/=. Note all transaction are in Tanzania shillings.
8. (a) The fifth term of an arithmetic progression is six times the second term; and the sum of the second and third terms is eleven; find
- The first term
 - The common difference
- (b) A man buys a house for 30,000,000/= Tshs. He pays 20% of its value of purchase and then pays the reminder three years later. If the simple interest is charged at 12% per annum; how much did the man pays altogether?
9. (a) In a triangle DEF, $\overline{DE} = 5.75\text{cm}$ and the size of angles $\hat{EDF}$ and $\hat{DEF}$ are 53° and 76° respectively. Calculate the length of side $\overline{DF}$
- (b) The angle elevation of the top of a building 24m high is observed from the top and from the bottom of a vertical ladder; and found to be 45° and 60° respectively. Determine the height of the ladder
10. (a) A bus travels 288km at a certain speed. If the speed were increased by 4km/h, the journey would be completed in one hour less. Find the speed at which the bus travels.
- (b) When a number is multiplied by 8 and 9 is subtracted the result is 45 more than twice the number. Find the number
11. (a) The following are basic mathematics score of pupils in a test
48, 50, 53, 46, 38, 49, 58, 60, 55, 53, 37, 58, 80, 59, 45, 65, 61, 70, 65, 72, 55, 58, 39, 40, 48, 70, 73, 51, 40, 63
- Draw a frequency distribution table for these scores with a class real intervals 30 – 40, 40 – 50
 - Find the score obtained by many pupils

iii) Find the mean by using assumed mean of 65

(b) Determine the size of angles lettered in the diagram below



- 12.(a) An air craft took off town A ($0^{\circ}, 10^{\circ}\text{W}$) moving eastwards along the equator for a distance of 1900km to town B. write down the position of town B.
- (b) A right rectangular pyramid is such that the rectangle is 12 cm by 8cm and each slant is 12cm. calculate the total surface of the pyramid
- 13.(a) Find the equation of the image of the line $y - 2x - 5 = 0$ after a reflection in the line $y + x = 0$, in the.....?
- (b) Given matrix $A = \begin{bmatrix} 3 & 5 & 4 & -2 \end{bmatrix}$, $B = \begin{bmatrix} 3 & -1 & -3 & 2 \end{bmatrix}$ and $C = \begin{bmatrix} k & -4 & 3 & -2 \end{bmatrix}$
- Find $A^2 + 2A$
 - Find t and y such that $B^2 = tB + Iy$ where I is an identity matrix
 - Find the value of k if the determinant of C is 5
- 14.(a) (i) If F is a function $f: x \rightarrow 4x + 3$; for what value of x is $f^{-1}(x) = 2$?
- (ii) Explain why $f: x \rightarrow x^2$ is a function and why its inverse is not a function
- (b) With only 20,000/= Tshs; to spend on fish Mr. Ally had the choice of buying two types fish. The price of a single fish of type 1 was 2500/=Tshs and each of fish type 2 was sold at 2000/= Tshs. He wanted to buy at least four fish of type 1. What was the greatest number of fish of Mr. Ally bought? How many of each type could he buy?