

061306T4CSC

COMPUTER SCIENCE LEVEL 6

ICT/OS/CS/CR/03/6

Understand Mathematics for Computer Science

November/December 2025



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION
COUNCIL (TVET CDACC)**

WRITE NT

TIME

INSTRUCTIONS TO CANDIDATE

1. The paper consists of **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section A and any **THREE** (3) questions in section B.
3. Marks for each question are indicated in the brackets.
4. Candidates are provided with a separate answer booklet.
5. **DO NOT** write on this question paper.
6. Check your booklet to ensure it has a graph grid.

This paper consists of FOUR (4) printed pages

**Candidate should check the question paper to ascertain that all pages
are printed as indicated and that no questions are missing.**

SECTION A (40 MARKS)

Answer ALL the questions in this section

1. Find the value of n in the equation: $(4n - 3)2 + 10n = -60$ (2 marks)
2. Describe each of the following in words;
 - a) $\{x | x > 0 \text{ and } x \in \mathbb{Z}\}$; (2 marks)
 - b) $\{\text{Birds} \mid \text{the bird is a mammal}\}$. (2 marks)
3. Given matrix $N = \begin{bmatrix} 1 & 7 \\ 9 & 2 \end{bmatrix}$ and $M = \begin{bmatrix} 2 & 4 \\ 2 & 3 \end{bmatrix}$, show that $NM \neq MN$. (3 Marks)
4. A group took a trip on a bus, at Ksh.50 per trainee and Ksh.100 per guardian for a total of Ksh.3500. They took the train back at Ksh.150 per trainee and Ksh.200 per guardian for a total of Ksh.8000. Using matrix, determine how many trainees and how many guardians took the trip. (4 Marks)
5. Given the following set $U = \{1,2,3,4,5,6,7,8\}$, $B = \{1,3,4,5\}$ and $A = \{1,2,3\}$; Determine each of the following operations:
 - a) $A \cap B$; (2 marks)
 - b) $A^c \cap B$; (2 marks)
6. The sets $U = \{2, 4, 6, 8, 10\}$, $X = \{2, \quad \quad \quad \{4, 6, 10\}$. Show that that: $(X \cap Y) \cup (XY') = X$ (4 marks)
7. Draw each of the following logic gates; (2 marks)
 - a) XOR
 - b) NAND
8. In how many ways can a group of 6 members be formed by selecting 3 boys out of 7 boys and 3 girls out of 6 girls? (4 Marks)
9. If $\mathbf{p} = 4\mathbf{i} + \mathbf{j} - 2\mathbf{k}$, $\mathbf{q} = 3\mathbf{i} - 2\mathbf{j} + \mathbf{k}$, and $\mathbf{r} = \mathbf{i} - 2\mathbf{k}$, find; $(\mathbf{p} - 2\mathbf{q}) \times \mathbf{r}$ (4 Marks)
10. Given that $V = (5, -3, 2)$.
 - a) Compute the vector $-3V$. (2 marks)
 - b) Calculate its magnitude. (3 marks)
11. Find the co-ordinates of the point on the graph $y = 5x^2 - 2x + 1$ where the gradient is 2. (4 marks)

SECTION B (60 MARKS)

Answer any THREE questions in this section

12. a. The number of working days lost due to accidents for each of 12 one-monthly periods are as shown. 27, 37, 40, 28, 23, 30, 35, 24, 30, 32, 31, 28
Calculate:
- i. The median. (3 marks)
 - ii. The first quartile values. (3 marks)
 - iii. The third quartile values. (3 marks)
- b. The probability that Abel and Cain will fail an interview is 0.4 and 0.5 respectively.
Determine the probability that both of them will fail the interview. (3 marks)
- c. How many 5-letter “words” (not necessarily real words) can be formed using the letters of the word STATISTICS if:
- i. Repetition is not allowed. (4 marks)
 - ii. Repetition is allowed but the word must begin with S and end with T. (4 marks)
13. a. A college is preparing to hold student elections. 40% of the population support Candidate A, 35% support Candidate B, and 25% support Candidate C. A survey shows that: 70% of Candidate A supporters are male, 60% of Candidate B supporters are male, 50% of Candidate C supporters are male.
If a person is chosen at random:
- i. Calculate the probability that the person is a male. (4 marks)
 - ii. If the person chosen is male, what is the probability that he supports Party A? (3 marks)
- b. Given the matrix:
- $$A = \begin{pmatrix} 3 & 6 \\ -2 & 3 \end{pmatrix}$$
- determine $(A)^{-1}$ (3 marks)
- c. The table below shows the time taken (in minutes) by one hundred and twenty artists to practice for a competition. Use it to answer the questions that follow:

Time taken	31 - 35	36 – 40	41 – 45	46 – 50	51 – 55	56 – 60
No. of Artists	17	24	19	28	19	13
X (midpoint)	33	38	43	48	53	58

Determine each of the following measures about the time taken to practice.

- i. Mean; (4 marks)
 - ii. Standard deviation. (6 marks)
14. A farmer wants to make an open rectangular tank with square base of side x meters and height h meters. The volume must be 50 m^3 .
- a. Express h in terms of x . (3 marks)
 - b. Evaluate the surface area A . (3 marks)
 - c. Find the value of x that minimize (8 marks)
 - d. At the optimal value of x , if the side e increases at a rate of 0.02 m/s , find the rate at which the height is changing. (6 marks)
15. a. In a survey of 80 students: 30 like Mathematics (M), 25 like Physics (P), and 20 like both Mathematics and Physics.
- i. Represent this information on a Venn diagram. (5 marks)
 - ii. How many students like only Mathematics? (2 marks)
 - iii. Determine number of students who like neither subject. (3 marks)
- b. Simplify the following Boolean expression: $(AB+A'C)(A+B)$ (5 marks)
- c. Using the substitution method, solve the linear equations below: (5 marks)
- $$2x+y=11$$
- $$3x-y=4$$