

073204T4PLM

PLUMBER LEVEL 4

CON/OS/PL/CC/01/4/A

APPLY ENGINEERING MATHEMATICS

July/August 2024



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

CANDIDATE WRITTEN ASSESSMENT

2 HOURS

INSTRUCTIONS TO CANDIDATE

1. This assessment has **TWO** sections; **A** and **B**
2. Answer all questions in section A and B in the answer booklet provided.
3. Marks for each question are indicated in the brackets
4. Do not write on the question paper

This paper consists of SIX (6) printed pages. Candidates should check the question paper to ascertain that all pages are printed as indicated and that no questions are missing

SECTION A: (10 MARKS)

Answer all questions in this section. Each question carries one mark.

1. The perimeter of a square garden is 40 meters. What is the length of one side of the square?

A. 5 meters
B. 8 meters
C. 10 meters
D. 20 meters
2. The temperature of water in a tank is recorded every hour. The table below shows the temperature readings over a 5-hour period:

Time (hours)	Temperature (°C)
1	20
2	22
3	24
4	26
5	28

What is the rate of change of temperature per hour?

- A. 2°C
B. 4°C
C. 6°C
D. 8°C
3. Consider the matrix $A = \begin{bmatrix} 3 & 4 \\ 2 & 5 \end{bmatrix}$, what is the determinant of matrix A?

A. 11
B. 13
C. 7
D. 9
4. What is the value of $\frac{3^4}{3^2} \times 2$ when simplified using a scientific calculator?

A. 6

- B. 9
- C. 27
- D. 81
5. In a survey of 50 households, the following data was collected on the number of bathrooms:

Number of Bathrooms	Frequency
1	15
2	20
3	10
4	5

- What is the modal number of bathrooms in the households surveyed?
- A. 1
- B. 2
- C. 3
- D. 4
6. Which of the following is the polar form of the Cartesian point (3,3)?
- A. $(3, \frac{\pi}{4})$
- B. $(3, \frac{\pi}{2})$
- C. $(3, \frac{\pi}{3})$
- D. $(3, \frac{\pi}{6})$
7. Solve the equation: $\log_2 x = 5$
- A. 7
- B. 10
- C. 25
- D. 32

8. What is the circumference of a circle with a diameter of 14 centimeters? (Take π as 3.14)
- A. 17.14
 - B. 50.15
 - C. 43.96
 - D. 47.75
9. Solve for x in the equation: $4(x + 2) = 16$
- A. $x = 2$
 - B. $x = 4$
 - C. $x = 6$
 - D. $x = 8$
10. What is the volume of a cube with edges measuring 2 meters each?
- A. 4 cubic meters
 - B. 6 cubic meters
 - C. 8 cubic meters
 - D. 10 cubic meters

SECTION B (40 MARKS)

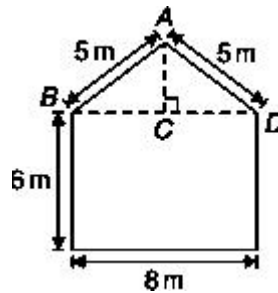
Answer all the questions in this section.

11. Plot the graph $y = 4x + 3$ in the range $x = -3$ to $x = +4$. (4 marks)
12. The number of issues of tools or materials from a store in a factory is observed for seven, one-hour periods in a day, and the results of the survey are as follows

Period	1	2	3	4	5	6	7
Number of issues	34	17	9	5	27	13	6

Present these data on a vertical bar chart. (4 marks)

13. The figure below shows the gable end of a building. Determine the area of brickwork in the gable end. (4 marks)



14. Solve the following simultaneous equations for x and y . (4 marks)
- $$\begin{aligned} 3x + 2y &= 14 \\ 2x - y &= 1 \end{aligned}$$
15. A rectangular water tank measures 3 meters by 4 meters by 2 meters. Calculate the total volume of the tank in cubic meters. (3 marks)
16. A plumbing company charges \$50 per hour for labor, plus a \$100 service fee for each job. If a job takes x hours to complete and the total cost is \$300, write a quadratic equation to represent the situation and solve for x . (4 marks)
17. The retail price of a product costing Kshs. 200 p is made up as follows: materials 10 p, labor 20 p, research and development 40 p, overheads 70 p, profit 60 p. Present this data on a pie diagram. (4 marks)
18. Calculate the volume of a triangular prism with a base area of 48 square units and a height of

6 units. (3 marks)

19. The pictograph below shows the data on the number of vehicles parked in a parking lot throughout the week.

Days of week	Number of vehicles  = 5 vehicles
Monday	    
Tuesday	   
Wednesday	   
Thursday	     
Friday	  
Saturday	   
Sunday	 

Answer the following questions:

- i. On which day was the maximum number of vehicles parked? (1 mark)
- ii. On which days had the same number of vehicles parked? (1 mark)
- iii. How many total vehicles were parked throughout the week? (2 marks)

20. The following table gives the frequency distribution of the number of orders received each day during the past 50 days at the office of a mail-order company. Calculate the mean.

(4 marks)

Number of order	<i>f</i>
10 – 12	4
13 – 15	12
16 – 18	20
19 – 21	14
	<i>n</i> = 50

21. Graph the curve $r = 2$, for θ in the interval $[0, 2\pi]$ (2 marks)

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