

073105T4PLM

PLUMBER LEVEL 5

CON /OS/PL/CC/01/5/A

APPLY BASIC MATHEMATICS

July/August 2024



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

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper consists of two sections; **A** and **B**
2. Answer **ALL** the question as guided in each section
3. Marks for each question are as indicated in the brackets
4. You are provided with a separate answer booklet to answer the questions
5. Do not write in this question paper

This paper consists of FOUR (4) 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. (40 MARKS)*Answer ALL questions in this section*

1. Determine the value for x in the equation: $\frac{x+2}{2} - \frac{x+5}{3} = \frac{2x-5}{4} + \frac{x+3}{6}$. (4 Marks)
2. In a certain week, a contractor bought 36 spades and 32 wheelbarrows for a total of Kshs 227,280. In the following week he bought 28 spades and 24 wheelbarrows for a total of Kshs 174,960. Using substitution method, find the price of each spade and wheelbarrow. (5 Marks)
3. A piece of timber of length 2.5 meters is cut into three smaller pieces in the ratio 1:3:4. Determine the length of each piece. (4 Marks)
4. A ladder 20 meters long leans against a building and reaches a point on the building that is 14 meters above the ground. How far from the bottom of the building is the foot of the ladder? (2 Marks)
5. A 24-hectare farm is divided as follows:
 - Coffee - 4 ha
 - Grass - 3 ha
 - Maize - 7 ha
 - Bananas - 5 ha
 - Homestead - 0.5 ha
 - Vegetables and paths - 4.5 ha

Draw a pie chart to represent this information. (5 Marks)

6. An electric pole is supported to stand vertically on a level ground by a tight wire. The wire is pegged at a distance of 6 meters from the foot of the pole. The angle the wire makes with the ground is twice the angle it makes with the pole. Calculate the length of the wire. (3 Marks)
7. Determine the value of x which satisfies the equation: $16^{x^2} = 8^{4x-3}$. (5 Marks)
8. The diagonal of a rectangular sheet of metal measures 11.25metres while its width measures 6.75m. Calculate the perimeter of the sheet of metal. (3 Marks)
9. Given that $\sin\theta = \frac{3}{5}$ where θ is an acute angle, find $\tan\theta$. (3 Marks)
10. If $\sin\theta = \frac{1}{\sqrt{2}}$, find $\operatorname{cosec}^2\theta$. (3 Marks)

11. Convert 101.0101_2 to a decimal number.

(3 Marks)

SECTION B. (60 MARKS)

Answer any **THREE** questions in this section.

12.

a. Given the data; 5, 1, 7, 9, 4, 8, 4, 3, 4, 2, 2, 6, 8, 7, 5, 6, 4, 9, 1, 3. Determine the:

i. Mean. (3 Marks)

ii. Mode. (1 Mark)

iii. Median. (2 Marks)

b. The table below shows the number of customers visiting a plumbing shop in 43 working days.

Number of customers	0-9	10-19	20-29	30-39	40-49	50-59
frequency	2	5	10	15	9	2

i. determine the mean number of customers visiting the shop. (2 Marks)

ii. calculate the standard deviation. (3 Marks)

iii. determine the class which the median lies. (9 Marks)

13.

a. Using the trapezoidal rule, find the area between the curve $y = 2x^2 + 4x + 4$, the axis and ordinates $x = 1$ and $x = -2$. Take the values of x at intervals of $\frac{1}{2}$ units.

(8 Marks)

b. An automatic garden spray produces a spray to a distance of 1.8 m and revolves through an angle α . If the desired spray catchment area is 2.5 m^2 , find angle α to be set, correct to the nearest degree. (4 Marks)

c. A boiler consists of a cylindrical section of length 8 m and diameter 6 m, on one end of which is surmounted a hemispherical section of diameter 6 m, and on the other end a conical section of height 4 m and base diameter 6 m. Calculate the volume of the boiler.

(8 marks)

14.

- a. The taxable income for Mr Muya is £7000. Use the graduated tax rate table below to calculate his gross tax. (personal relief =£63.6). (6 Marks)

Income slab (£)	Rate (%)
1 – 2100	10
2101 – 4200	15
4201 – 6300	25
6301 – 7000	35

- b. Mr. Kalulu runs a small hardware business. His accounts for the year ending 31st December 2023 showed the following records in shillings:

-Stock as at 31 st December 2022	20,000
-Stock as at 31 st December 2023	40,000
-Net purchases for the year	200,000
-Gross profit mark up	50%
-Expenses for the year	60,000
-Capital	150,000

Calculate:

- average stock. (2 Marks)
- rate of stock turned over. (3 Marks)
- gross profit margin. (5 Marks)
- return on capital. (4 Marks)

15.

- a. Solve the equations:

- $\log_2(5x + 2) - 1 = \log_2(x + 4)$ (5 Marks)
- $\frac{1}{2} \log_4 36 \times \log_6 64$ (4 Marks)
- $7^x = (216^{2x-3})$ (4 Marks)

- b. Determine the value of m in the equation:

$$\left(\frac{1}{27}\right)^m \times (81)^{-1} = 243 \quad (4 \text{ Marks})$$

- c. Simplify the expression $\frac{2^{-4} \times 3^2 \times 5^{-3}}{2^3 \times 3^4 \times 5^{-2}}$ leaving the answer with positive index. (3 Marks)

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