QUALIFICATION **VARIOUS**	
QUALIFICATION CODE: **VARIOUS**	LEVEL: **4**
COURSE: **BASIC MATHEMATICS**	COURSE CODE: **BMS411S**
DATE: **NOVEMBER 2023**	SESSION: **1**
DURATION: **3 HOURS**	MARKS: **100**

FIRST OPPORTUNITY: QUESTION PAPER

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MODERATOR:	MR GABRIEL MBOKOMA

INSTRUCTIONS:

1. Answer all questions on the separate answer sheet.
2. Please write neatly and legibly.
3. Do not use the left side margin of the exam paper. This must be allowed for the examiner.
4. No books, notes and other additional aids are allowed.
5. Mark all answers clearly with their respective question numbers.
6. **QUESTION 1** of this question paper entail multiple choice questions with options **A** to **D**. Write down the letter corresponding to the best option for each question.
7. **For QUESTION 2 and 3** show clearly all the steps used in the calculations.
8. All written work must be done in blue or black ink and sketches must be done in pencil.

PERMISSIBLE MATERIALS:

1. Non-Programmable Calculator

This paper consists of 5 pages including this front page

QUESTION 1(30 marks)

Write down the letter corresponding to the best option for each question in the answer booklet/sheet provided.

1.1   If $A = \begin{pmatrix} -2 & 3 \\ -2 & 4 \end{pmatrix}$, which of the following statements is false?   (3)

     A. $|A| = -2$ B. $A^2 = \begin{pmatrix} 4 & 9 \\ 4 & 16 \end{pmatrix}$ C. $AI = A$ D. $-2A = \begin{pmatrix} 4 & -6 \\ 4 & -8 \end{pmatrix}$

1.2   The HCF of 128, 216, and 240 is   (3)

     A. 12   B. 8   C. 16   D. 6

1.3   Evaluate the following:

1.3.1 $\sqrt[4]{\dfrac{82944}{4}} \div \dfrac{4^{-2}}{2^{-4}}$ (3)

     A. 5184   B. 12   C. 3   D. 8.48

1.3.2 $[72 \div 2(-2-4)-4] + (-25) \div -(3-8)$ (3)

     A. -225   B. -15   C. -216   D. -7

1.3.3 $\sqrt[3]{\dfrac{x^{0.05}y^3}{xy}}$ given that $x = \frac{1}{2}$ and $y = \frac{1}{5}$ correct to 1 significant figure   (3)

     A. 0.6   B. 1   C. 0.2   D. 0.4

1.4   A copy machine can duplicate 2400 copies in one hour. How many copies can it make per minute (in 1 minute)?

     A. 40 copies   B. 60 copies   C. 240 copies   D. 10 copies   (3)

1.5 $\dfrac{(2a^{-5}b^4c^3)^{-2}}{(3a^3b^{-7}c^{-3})^2}$ simplifies to   (3)

     A. $\dfrac{1}{36}a^4b^6$ B. $\dfrac{4}{9}a^4b^6c^{-12}$ C. $\dfrac{1}{36}a^4b^6c^{-12}$ D. $\dfrac{4}{9}a^4b^6$

1.6   Expand and simplify $4ab^2 + (2ab - b)^2$ (3)

     A. $4a^2b^2 + b^2$ B. $4ab^2 + 4a^2b^2 - b^2$ C. $4a^2b^2$ D. $4a^2b + 8a^2b^2 - b^2$

1.7   Which of the following statements is false?   (3)

     A. $(-3)^4 = 81$ B. $3^{-2} = -9$ C. $(6^2)^5 = 6^{10}$ D. $\dfrac{n^6}{n^{-2}} = n^8$

1.8 Julia went shopping and spent half of her money on food, a third on her rent, and a tenth to pay her telephone bill. If she remained with N$200, how much did she had in the beginning? (3)

A. N$1120   B. N$3000   C. N$1200   D. N$3200

QUESTION 2(12 marks)

The answers to this question should be written in the answer booklet/sheet provided. Ensure that all your calculations are shown neatly, systematically and legibly

2.1 In a certain city, the local taxes collected in a month amounted to N$1.25 million. If the population of the city is 2×10^4, how much on average did each citizen of the city pay in taxes? (3)

2.2 Solve the following linear equations:

2.2.1 $(x - 2)^2 = (x + 2)^2 - 112$ (3)

2.2.2 $\frac{4x}{3} + 1 = 3x$ (3)

2.2.3 $3x - 2 = -5x + 8$ (3)

QUESTION 3 (58 marks)

The answers to this question should be written in the answer booklet/sheet provided. Ensure that all your calculations are shown neatly, systematically and legibly.

3.1 Evaluate the following without using a calculator

3.1.1 $-3^2 + 2[20 \div (7 - 11)] \times 5 + 27^{\frac{2}{3}}$ (5)

3.1.2 $\frac{1}{4}[(2 \times 3 + 5 \times 4) - (3 \times 2 - 2 \times 4)]$ (4)

3.1.3 $\frac{1}{5} \div \frac{2}{5}\left(\frac{1}{2} - \frac{1}{4}\right) - 2\frac{2}{3} \div \left(-\frac{2}{3}\right) \times \left(-\frac{1}{2}\right)$ (6)

3.2 A farmer buys bags of animal feed at Agra to feed his 24 goats. He expects this amount of feed to last 8 days. When he gets to the farm he discovers that the number of goats has reduced to 16 due to deaths from drought. How long will the feed last? (4)

3.3 Consider the following matrices:

$A = \begin{pmatrix} 2 & -1 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 3 \\ 1 & -2 \end{pmatrix}$

Find:

3.3.1 Matrix 3A-B (8)

3.3.2 Determinant of matrix 2A (3)

3.4 Determine the values of the variables in the following:

$$\begin{pmatrix} 2 & b \\ ck & 3 \end{pmatrix} + k \begin{pmatrix} 3 & 1 \\ 0 & -2 \end{pmatrix} = \begin{pmatrix} 8 & 6c \\ -6 & -1 \end{pmatrix}$$ (6)

3.5 Given the following sets:

$S = \{1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16\}$

$A = \{x : x \text{ is a multiple of } 3\}$
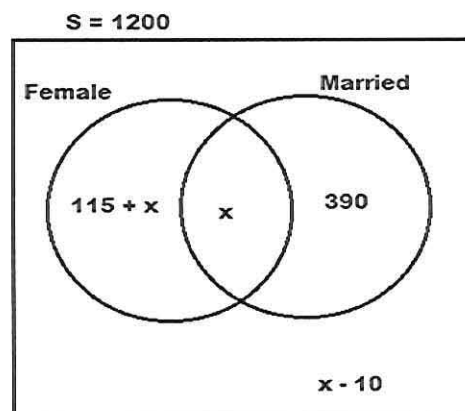
$B = \{x : x \text{ is a factor of } 24\}$

$C = \{x : x \text{ is an odd number}\}$

3.5.1 Find

3.5.1.1 n(B) (2)

2.5.1.2 $(A \cup B \cup C)^c$ (2)

3.6 Consider the Venn diagram below illustrating the marital status of female staff in an

S = 1200

Female   Married

115 + x   x   390

x - 10

organisation:

3.6.1 What is the value of x? (4)

3.6.2 How many female staff are there in this organisation? (2)

3.6.3 How many of the female staff are married? (2)

3.6.4 How many of the female staff are single? (2)

3.7 Mr Simon has received his gratuity of N$50 000 and has decided to invest it with the bank for five years in an investment account that pays interest @ 12.75% p.a. He has been given two options:

Option A: Investment at simple interest. (8)

Option B: Investment with interest compounded quarterly.

By showing full calculations, determine which interest option is better for Mr Simon.

_____**END OF EXAMINATION**_____