STUDENT'S ID NO:..... IGNATURE:.....

UNIVERSITY OF GHANA

DEPARTMENT OF TEACHER EDUCATION
SCHOOL OF EDUCATION AND LEADERSHIP
COLLEGES OF EDUCATION
END OF SEMESTER ONE EXAMINATION FOR LEVEL 100, 2023
B.ED. PROGRAMME
COURSE CODE: TEEG/TEUP/TEJS 107
COURSE TITLE: INTRODUCTION TO LEARNING TEACHING AND APPLYING NUMBER AND ALGEBRA

Instruction: Answer **all** questions in Section A and any **three** questions in Section B.

Time: 2 hours

SECTION A

|25 Marks|

Answer all the questions in this section.

1. Which of the following does **NOT** constitute a barrier to teaching and learning Numbers and Algebra?
   A. Gender
   B. Socioeconomic status of parents
   C. Lack of unqualified teachers
   D. Classroom atmosphere

2. Which of the following is **NOT** a feature of a good mathematics teacher? He/She _____
   A. distributes questions evenly
   B. dominates in class discussions
   C. gives immediate feedback
   D. uses concrete materials in teaching

3. While solving the equation $4(x+2) = 28$, Becca wrote $4x + 8 = 28$. Which property did she use?
   A. associative
   B. commutative
   C. distributive
   D. identity

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4. Which of these numbers shows five thousandths?
   A. 5000
   B. 0.5
   C. 0.05
   D. 0.005

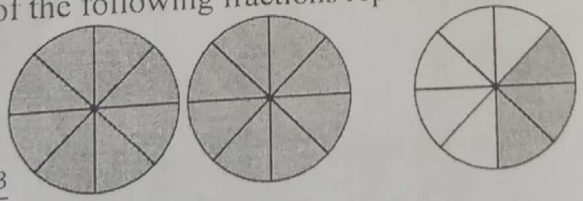
5. A set of integers is closed under all the following operations EXCEPT_____
   A. addition
   B. division
   C. multiplication
   D. subtraction

6. It is a wide range of life – long learning disabilities involving mathematics. It varies from person to person and affects learners differently in school and throughout life. This is referred to as
   A. Dyscalculia
   B. Dyslexia
   C. Dysgraphia
   D. Aphasia

7. If U = {1, 3, 5, 7, 9, 11, 13}, then which of the following is **NOT** a subset of U.
   A. {1, 9, 5, 13}
   B. {5, 11, 1}
   C. {13, 7, 9, 11, 5, 3, 1}
   D. {2, 3, 4, 5}

8. The difference between two numbers is 48. The ratio of the two numbers is 7:3. What are the two numbers?
   A. (84, 36)
   B. (48, 63)
   C. (12,7)
   D. (8, 7)

9. Which of the following fractions represents the shaded portion of the figures below?



   A. $\frac{3}{8}$
   B. $\frac{16}{8}$
   C. $\frac{19}{8}$
   D. $\frac{24}{8}$

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10. A basic school learner was asked to rewrite 98674321 in four significant figures. What answer do you expect from the pupil?
    A. 5321
    B. 9867
    C. 9876
    D. 98670000

11. It is a specific case of surface understanding, where learners just remember rules such as negative and negative become positive and apply it indiscriminately. Which of the following best describes this error or misconception in operation involving integers?
    A. Poor knowledge
    B. Surface understanding
    C. Rule mix–up
    D. Lack of multiple representations

12. The function h is defined on the set of real numbers by $h: x \rightarrow \frac{2}{x-3}$ what is h^{-1}
    A. $\frac{3}{x-2}$
    B. $\frac{1}{x}(3x+2)$
    C. $\frac{3+2x}{x}$
    D. $\frac{3x-2}{x}$

13. A number is written as 37 in base n. Twice the number is written as 75 in base n.what is n?
    A. 15
    B. 6
    C. 9
    D. 7

14. A farmer sold foodgrains for Gh₵9200.00 through an agent. The rate of commission was 2%. How much amount did the agent get?
    A. Gh₵160.00
    B. Gh₵184.00
    C. Gh₵45.00
    D. Gh₵12.00

15. If $B = \{2 < x \leq 8, x \text{ are whole numbers}\}$. How many subsets can be derived from Set B?
    A. 6
    B. 7
    C. 64
    D. 128

16. There are 100 students in a hostel. Food provision for them is for 20 days. How long will these provisions last, if 25 more students join the group?
    A. 5 days
    B. 16 days
    C. 25 days
    D. 80 days

17. How would you expect your learners to write the number 0.00045938 in scientific notation?
    A. 4.594×10^{4}
    B. 4.5938×10^{4}
    C. 4.5938×10^{-4}
    D. 4.5934×10^{-4}

18. Evaluate $b - (b^2 - 5ac)$ when $a = 4, b = 7$ and $c = 2$
    A. 16
    B. -16
    C. 2
    D. -2

19. Find the rule for the mapping

x	-10	-9	-8	-7	-6
↓	↓	↓	↓	↓	↓
y	8	6	4	2	0

    A. The rule for the mapping is $y = 12 + 2x$
    B. The rule for the mapping is $y = -12 - 2x$
    C. The rule for the mapping is $y = -12 + 2x$
    D. The rule for the mapping is $y = 12 - 2x$

20. In a class of 120 students numbered 1 to 120, all even numbered students opted for Physics, those whose numbers are divisible by 5 opted for Chemistry and those whose numbers are divisible by 7 opted for Mathematics. How many opted for none of the three subjects?
    A. 19
    B. 41
    C. 21
    D. 57

21. Solve for the value of x in this quadratic equation $x^2 + 4x + 1 = 0$
    A. $-2 \pm \sqrt{3}$
    B. $-4 \pm \sqrt{5}$
    C. 1 and -1
    D. $\frac{-4 \pm \sqrt{12}}{2}$

22. The sum of $7xy + 5yz - 3zx$, $4yz + 9zx - 4y$ and $-3xz + 5x - 2xy$, is:
    A. $5xy + 9yz + 3zx + 5x - 4y$
    B. $5xy - 9yz + 3zx - 5x - 4y$
    C. $5xy + 10yz + 3zx + 15x - 4y$
    D. $5xy + 10yz + 3zx + 5x - 6y$

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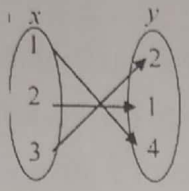
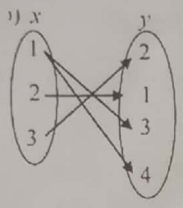
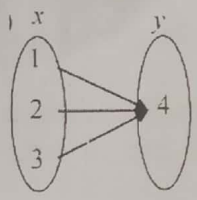
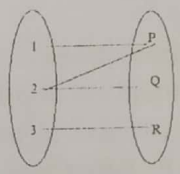
23. The product of m^2, $(-m)^3$ and $(-m)^4$ is
    A. m^{24}
    B. $-m^9$
    C. m^7
    D. m^9

24. Which of these relations defines a function?
    A.
    

    B.
    

    C.
    

    D.
    

25. A survey of 64 informed students revealed that 45 believe that Mathematics is difficult, 49 believe that Science is difficult and 42 believe both are difficult. How many believe neither of these subjects are difficult?
    A. 12
    B. 30
    C. 72
    D. 136

SECTION B

[75 Marks]

Answer any three questions in this section.

1a In a survey of 200 students of University of Ghana, it was found that 120 study Mathematics, 90 study Physics and 70 study Chemistry, 40 study Mathematics and Physics, 30 study Physics and Chemistry, 50 study Chemistry and Mathematics and 20 study none of these subjects.

∝. Represent the above information on a Venn diagram. 5marks

β. From the Venn diagram, find the number of students who study. 15marks

i. all three subjects

ii. only physics

iii. exactly two subjects

1b. A basic school learner says 1/8 is greater than 1/6 because 8 is greater than 6. Describe an activity you will use to help him discover that 1/6 is greater than 1/8. 5marks

2a. i. Briefly differentiate between an error and misconception. 5marks

ii. Explain four reasons why learners have misconception about Number and Algebra. 5marks

iii. State five common misconceptions in learning Number and Algebra. 5marks

2b. Use the Prime Factorization method to find the Greatest Common Factor for 90 and 180 5marks

2c. A map of a school is drawn to the scale of 1:6000000. Find the actual distance in kilometers (km) represented by a line segment of length 3.2cm on the map. 5marks

3a. A man has GH₵3200.00 to exchange for US dollars. He first exchanged GH₵600.00 at a rate of GH₵14.00 per dollar. Next, he exchanged GH₵700.00 at a rate of GH₵14.15 per dollar. Next, he exchanged GH₵800.00 at the rate of GH₵14.20 per dollar and the rest at GH₵14.30 per dollar.

i. How many dollars did he get at the first exchange? 5marks

ii. How many dollars did he get altogether? 5marks

iii. How many dollars would he have saved if he had exchanged all his money at the 14.30 per dollar? 5marks

3b. 16 men working $7\frac{1}{2}$ hours a day can do a piece of work in 6 days. How long will 9 men work at 8 hours a day at the same rate to do the same piece of work? 10marks

4a. How will you guide a pupil to solve the simultaneous equation $\begin{cases} x + 2y = 4 \\ 2x - y = 3 \end{cases}$ using substitution method? 9marks

4b. Below are steps a Primary 6 pupil used to multiply 14 and 8 mentally. Use it to answer the following questions.

$4 \times 8 = 8 \times 14$ .....(I)
$8 \times (10 + 4)$ .....(II)
$(8 \times 10) + 4$ .....(III)
$80 + 32$ .....(IV)
$80 + (30 + 2)$.....(V)
$(80 + 30) + 2$ .....(VI)
$110 + 2$ ..... (VII)
112 .....(VIII)

i. In which steps did the pupil use the concept of place value? 3marks
ii. Which property of operation did the pupil use in step (I)? 3marks
iii. Which property operation is the pupil's step (II) and (III)? 3marks
iv. Which property of operation is the pupil's steps (V) and (VI) showing? 3marks

4c. Re-write the following Roman numerals as Hindu-Arabic numerals. 4marks
i. CMLXXXI
ii. MCMLXXV

5a. Construct addition table in modulo arithmetic five on the set $\{0, 1, 2, 3, 4\}$. 5marks
Use your table to find the truth set of
i. $n \oplus n = 3$ 5marks
ii. $m \oplus m = 1$ 5marks

5b. Your pupil is facing challenge in understanding why if a negative number is multiplied by another negative number the product is positive. As a teacher, with the help of number line model, describe how you will help this pupil to overcome that challenge with the example $(-3) \times (-4)$. 10marks