



AKENTEN APPIAH-MENKA UNIVERSITY OF SKILLS TRAINING  
AND ENTREPRENEURIAL DEVELOPMENT  
INSTITUTE FOR TEACHER PROFESSIONAL DEVELOPMENT AND  
LIFELONG LEARNING (ITPDLL)

END OF FIRST SEMESTER EXAMINATION 2024/2025

COURSE CODE	LEARNING, TEACHING AND APPLYING NUMBER AND ALGEBRA
COURSE TITLE	ECM 114

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SECTION A: MULTIPLE-CHOICE QUESTIONS (25 MARKS)

Each of the questions below is followed by four options, lettered A, B, C, and D. Choose the option that best completes each statement and write the letter A, B, C, or D of the option you have chosen in your Answer Booklet.

- Express 0.275 as a fraction in the lowest term.
  - $\frac{11}{80}$
  - $\frac{1}{4}$
  - $\frac{53}{200}$
  - $\frac{11}{40}$
- What property is shown by  $X \cup (Y \cap Z) = (X \cup Y) \cap (X \cup Z)$ , where  $X, Y$  and  $Z$  are sets?
  - The associative property
  - The commutative property
  - The distributive property
  - The equivalence property
- If the number of subsets of a set  $P$  is 64, what is the cardinality of the set  $P$ ?
  - 4
  - 5
  - 6
  - 7
- What is the place-value of 7 in the number 149.3672?
  - Tens
  - Hundredth
  - Hundreds
  - Thousandth
- Given that  $\{x: 4.5 < x \leq 12\}$ , where  $x$  is an even integer, list the values of  $x$ .
  - $\{6, 8, 10, 12\}$
  - $\{4, 6, 8, 10\}$
  - $\{6, 8, 12\}$
  - $\{4, 10, 12\}$

6. After a discount of 20%, the new price of a commodity is GHs 650.00. What was the original price?
- GHs 520
  - GHs 780.00
  - GHs 812.50
  - GHs 950
7. Express as a decimal number,  $1\frac{1}{2}\left(\frac{2}{3} - \frac{1}{6}\right)$ .
- 0.125
  - 0.5
  - 0.75
  - 1.5
8. Convert  $1011001_{two}$  to a numeral in base ten.
- 98
  - 97
  - 89
  - 79
9. The value of the Roman numeral **MCCXLVII** in Hindu Arabic is
- 1277
  - 1267
  - 1257
  - 1247
10. Arrange the fractions  $\frac{1}{2}, \frac{4}{5}, \frac{3}{8}$  in ascending order of magnitude.
- $\frac{3}{8}, \frac{1}{2}, \frac{4}{5}$
  - $\frac{4}{5}, \frac{3}{8}, \frac{1}{2}$
  - $\frac{4}{5}, \frac{1}{2}, \frac{3}{8}$
  - $\frac{1}{2}, \frac{3}{8}, \frac{4}{5}$
11. If  $26 \bmod x = 2$ , Which of the following is the value of  $x$ ?
- 7
  - 5
  - 6
  - 13
12. A man bought a car for GH¢1500.00. He later sold it at a profit of 20%. What was his selling price?
- GH¢1800.00
  - GH¢1250.00
  - GH¢300.00
  - GH¢3000.00
13. If a car travels 240 miles on 8 gallons of gas, what is the mileage per gallon?
- 35
  - 32
  - 30
  - 28

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14. Simplify:  $(3x + 2y) - (x - 4y)$ .  
A.  $(4x - 6y)$   
B.  $(2x - 2y)$   
C.  $(2x + 6y)$   
D.  $(4x + 6y)$
15. Expand and simplify  $(y - 4)(y + 6)$ .  
A.  $y^2 - 2y + 24$   
B.  $y^2 + 2y + 24$   
C.  $y^2 - 2y - 24$   
D.  $y^2 + 2y - 24$
16. If a shirt originally costs C 40 and is discounted by 20%, what is the discounted price?  
A. C 32  
B. C 36  
C. C 42  
D. C 45
17. Solve the inequality  $-2x + 3 < -7$ .  
A.  $x > -5$   
B.  $x < -5$   
C.  $x > 5$   
D.  $x < 5$
18. Two numbers are in the ratio 3:5 if one of them is greater than the other by 10. Find the smaller number.  
A. 10  
B. 15  
C. 20  
D. 25
19. If  $U = \{0 < x \leq 11\}$  and  $Q = \{4 \leq x \leq 9\}$ , what is  $Q'$ ?  
A.  $\{0, 1, 2, 3, 10, 11\}$   
B.  $\{0, 1, 2, 3, 10\}$   
C.  $\{1, 2, 3, 10, 11\}$   
D.  $\{1, 2, 3, 10\}$
20. Convert 1203<sub>five</sub> to a decimal numeral  
A. 38  
B. 102  
C. 107  
D. 178
21. The ratio of cows to goats on a farm is 5:7. If there are 650 cows, how many goats are on the farm?  
A. 657  
B. 910  
C. 1,114  
D. 1,560

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22. Round off 259832 to the nearest hundred.
- 259800
  - 259700
  - 259300
  - 259200
23. What property of set operations is illustrated in the statement  $P \cup (Q \cap R) = (P \cup Q) \cap R$ ?
- Associative
  - Commutative
  - Distributive
  - Equivalence
24. Which of the following is a solution to the inequality  $2x - 5 > 3$ ?
- $x = 1$
  - $x = 2$
  - $x = 4$
  - $x = 5$
25. The sum of two numbers is 30. One number is 4 more than the other. What are the numbers?
- 12 and 18
  - 13 and 17
  - 16 and 14
  - 11 and 19

### SECTION B (5 MARKS)

This section contains statements. Write true or false for each of the following statements

- The union of two sets (A) and (B) contains all elements that are in (A) or (B) or both.
- The sum of two integers is a positive integer.
- The zero is the multiplicative identity for integers.
- If a function is both one-to-one and onto, then it is invertible.
- Rational numbers also include fractions whose divisibility is recurring or terminating.

### SECTION C: SUPPLY/ COMPLETION OR FILL-IN QUESTIONS (10 MARKS)

*Provide short answers to the following questions*

- List all the subsets in the set  $\{9, 10, 13\}$
- Find the value of  $x$  in the equation  $45_x = 105_6$
- What is the domain of the function  $f(x) = \sqrt{4 - 5x}$
- Without using a calculator, evaluate  $\frac{4.8 \times 10^3}{1.6 \times 10^1}$
- Write the Roman numeral for 1498

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## SECTION D (20 MARKS)

Please answer only one question from this section

### Question 1

- A. The Housemaster of Anokye House surveyed the games played by the boys in his house. He found that;

- 60% play football
- 45% play hockey
- 40% play basketball
- 30% play football and hockey
- 20% play football and basketball
- 15% play hockey and basketball
- 10% play all three games.

What percentage of the house;

- I. Play only football [2 marks]
  - II. Play only one of the three games [2 marks]
  - III. Play football and hockey but not basketball [2 marks]
  - IV. Play exactly two of the three games [2 marks]
  - V. Do not play any of the games? [2 marks]
- B. A rectangle has a length of  $(x + 5)$  cm and a width of  $(x - 2)$  cm. If the perimeter of the rectangle is 24cm, what is the value of  $x$ . [3 Marks]
- C. Copy and complete the following table for multiplication modulo 12 [2 marks]

$\times$	1	5	9	10
1				
5				
9				
10				

Use the table to:

- (i) Evaluate  $(9 \times 5) \times (10 \times 10)$  [1mark]
- (ii) Find the truth set of
  - a.  $10 \times m = 2$  [2 marks]
  - b.  $n \times n = 4$  [2 marks]

### Question 2

- a. A person invested \$2000 in two different accounts. One account earns 5% interest per year, and the other earns 7% interest per year. If the total interest earned in one year is \$120, how much was invested in each account? [5 marks]
- b. The functions  $f$  and  $g$  are defined by;  $f: x \rightarrow 2x^2$  and  $g(x) = \frac{3x-2}{x+1}$ , find  $f \circ g^{-1}$ . [5 marks]
- c. A bookshop reduced the price of its books by 15%. Kofi bought a book for GH¢ 27 200.00 during the reduction sale. What was the original price of the book? [3 marks]
- d. Solve the simultaneous equations:

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$$\frac{1}{x} + \frac{1}{y} = 5$$

$$\frac{1}{y} - \frac{1}{x} = 1$$

[3 marks]

- e. Solve for  $x$  if  $233_x = 125_{\text{Seven}}$  [4 marks]

### Question 3

- A. A man has a wife and five children, and his total income in 2013 was GH¢ 850,00.00. he was allowed the following free of tax.

Personal	GH¢ 120,000.00
Wife	GH¢ 30,000.00
Each child	GH¢ 25,000.00 for a maximum of 3 children.
Dependent relatives	GH¢ 40,000.00
Insurance	GH¢ 25,000.00

The rest was taxed as follows:

Amount	Rate of tax
First GH¢200,000.00	10%
Next GH¢200,000.00	15%
Next GH¢200,000.00	20%
Next GH¢200,000.00	25%

Calculate:

- his tax-free pay; (3 marks)
- his taxable income; (3 marks)
- his monthly tax; (3 marks)
- his net monthly pay. (3 marks)

- B. A function  $f$  is defined on the set of real numbers by  $f(x) = \frac{2x+3}{x+2}$ , where  $x \neq -2$ .  
Examine whether or not  $f$  is a one-to-one function. (5 marks)

- C. The sum of the ages of a mother and her daughter is 46 years. In four years, the ratio of their ages will be 7: 2. Find their present ages. (3 marks)

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