

2024 END-OF-SEMESTER EXAMS – MATHEMATICS (ELECTIVE) 1
MATHEMATICS (ELECTIVE)
SHS ONE
PAPER 1

Answer all the questions.

1. Which of the following binary operations is not commutative?

A. $x \theta y = x + y - xy$ B. $x \theta y = x^2 - y^2$
 C. $x \theta y = x^2 + y^2$ D. $x \theta y = \frac{1}{2}xy - 3$

The operation Δ is defined on the set R of real numbers by $a \Delta b = \frac{2}{5}ab$.

Use this information to answer Questions 2 and 3

2. Find the identity element of the operation Δ

A. $-\frac{2}{5}$ B. -1 C. 1 D. $\frac{5}{2}$

3. Find the inverse of 5

A. $\frac{125}{4}$ B. $\frac{25}{4}$ C. $\frac{5}{4}$ D. $\frac{1}{4}$

4. Find the number of elements if a set has 32 subsets.

A. 32 B. 16 C. 5 D. 6

5. Given that $M = \{x: 1 \leq x \leq 6\}$ and $N = \{x: 2 < x < 10\}$, where x are integers, find $n(M \cap N)$.

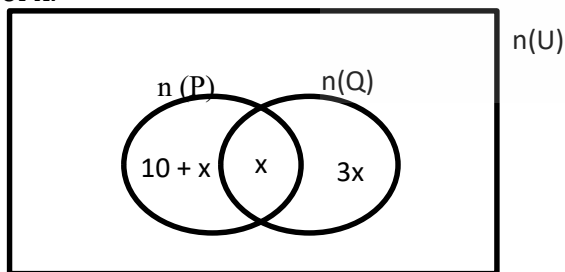
A. 10 B. 8 C. 6 D. 4

6. In a class of 25 students, 6 only French (F), 14 study Physics (P) and 3 study both French and Physics.

Find $n(F^c \cap P^c)$.

A. 2 B. 3 C. 5 D. 8

7. In the Venn diagram, $n(P) = n(Q)$. Find the values of x .



A. 0 B. 2 C. 5 D. 10

8. Expand $(2x - y)(2x + y)$

A. $4x^2 + 4xy - y^2$ B. $4x^2 + y^2$
 C. $2x^2 + 4xy - y$ D. $4x^2 - y^2$

9. Subtract $12\sqrt{45}$ from $25\sqrt{20}$.

A. $-14\sqrt{5}$ B. $14\sqrt{5}$ C. $-13\sqrt{15}$ D. $13\sqrt{15}$

10. If $X = \{1, 2, 3, 4, 5, 6\}$ and $Y = \{2, 4, 6, 8\}$.

Find $X - Y$

A. $\{1, 3, 5\}$ B. $\{1, 2, 5\}$ C. $\{2, 4, 6\}$ D. $\{1, 8\}$

11. Given that $n(U)=12$, $n(F)=8$, $n(V)=7$ and

$n(F \cap V)=5$, find $n(F' \cap V')$

A. 2 B. 7 C. 3 D. 4

12. If A is a subset of B and B is a Subset of C, what property of set operation exist?

A. Commutative B. Associative
 C. Transitivity D. Distributive

13. Simplify $(3\sqrt{5} + 2\sqrt{6})(3\sqrt{5} - 2\sqrt{6})$.

A. 19. B. 20. C. 21. D. 22

14. If $U = \{0, 1, 2\}$, how many subsets can be formed from U?

A. 2 B. 8. C. 4 D. 3

15. If $m = 2 + \sqrt{5}$, find the value of $m - \frac{1}{m}$,

A. 4 B. -2 C. 2 D. 3

16. Which of the following statements is false about the set $P = \{-1, 0, 1\}$?

A. P is closed under multiplication
 B. The number of subsets of set p is 8
 C. $n(p) = 2$
 D. $\{0, 1\} \subset P$

17. Solve $\sqrt{2x^2 - 9} = x$.

A. $x = -3, 3$ B. $x = -3, 2$
 C. $x = -2, 2$ D. $x = -2, 3$

18. Which of the following points does not satisfy $3x - y \geq 1$?

A. (2, 1) B. (1, 2) C. (-1, 1) D. (1, -1)

19. If x is prime number, which of the following is a null set?

A. $\{x: 9 \leq x \leq 13\}$ B. $\{x: 14 \leq x \leq 18\}$
 C. $\{x: 19 \leq x \leq 23\}$ D. $\{x: 24 \leq x \leq 28\}$

20. If x is an integer such that $2048 < 4x^3 < 6912$, find x .

A. $x=10$ B. $x<10$ C. $10 < x < 12$ D. $11 < x < 12$