

2024 SHS2 END OF SEMESTER EXAMS – MATHEMATICS [ELECTIVE] 1

ELECTIVE MATHEMATICS

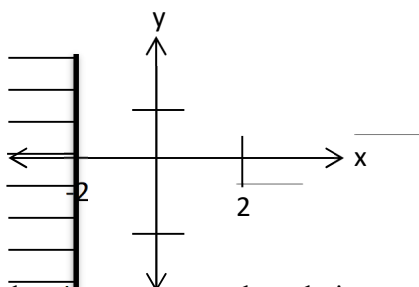
PAPER 1

SECTION A [40 marks]

Instruction: This paper consists of two sections, section A and B, choose the right option in section A and answer all questions in section B

- If $\frac{3}{2-\sqrt{5}}$ is expressed in the form $a + b\sqrt{5}$, find the value of b .
A. -6 B. 6 C. -3 D. 3
- Find the positive value of $\sqrt{x^2 + 7} = 4$
A. -6 B. 6 C. -3 D. 3
- The range of the function $f: x \rightarrow 3 - 5x$ defined on a set R of real numbers is.....
A. $f = \{y: y \in R\}$ B. $f = \{y: y \in R, y < 3\}$
C. $f = \{y: y \in R, y \geq 3\}$ D. $f = \{y: y \in R, y > 3\}$
- The coefficient of x^3 in the binomial expansion of $(3 - 2x)^6$ is
A. 4860 B. -4860
C. 4320 D. -4320
- Given that $P = \{x: 1 \leq x \leq 6\}$
 $Q = \{x: 2 < x < 10\}$, find $n(P \cap Q)$
A. 10 B. 8 C. 4 D. 6
- Factorize $(x + y - 1)^2 - (x - y + 1)^2$
A. $2x(2y - 1)$ B. $2y(2x - 1)$
C. $4y(x - 1)$ D. $4x(y - 1)$
- If $\log_{10} 1.8^{2x} = 5$, evaluate $\log_4 x^{27}$
A. 41.11 B. 42.22
C. 43.33 D. 44.44

8.



The shaded region represents the solution set of the inequality.....

- A. $x < -2$ B. $x > 2$
C. $x \leq -2$ D. $x \geq -2$
- In linear programming, the area bounded by the graphical representation of the constraints is known as
A. Objective function B. Set
C. Feasible region D. Maximum function
- Solve $\sqrt{y-3} - \sqrt{y} = -3$
A. 2 B. 4 C. 6 D. 8
- The equation $5x^2 - 3x + 1 = 0$ has
A. equal roots B. distinct real roots
C. repeated real roots D. complex roots
- Find the domain of the function $g(x) = 3x^2 + 2$
A. $g = \{x: x \in R\}$ B. $g = \{x: x \in R, x < 3\}$
C. $g = \{x: x \in R, x > 3\}$ D. $g = \{x: x \in R, x \leq 3\}$
- Divide $2x^2 - 3x + 1$ by $x - 1$
A. $2x - 1$ B. $2x + 1$
C. $3x - 1$ D. $3x + 1$
- Find the remainder when $x^3 - x^2 + x - 1$ is divided by $3x + 2$
A. $\frac{65}{27}$ B. $-\frac{65}{27}$ C. $\frac{2}{3}$ D. $-\frac{2}{3}$
A binary operation $*$ is defined on the set of real numbers by $a * b = 3ab$.
Use this information to answer questions 15 and 16
- Find the identity element
A. -2 B. -1/3 C. 1/3 D. 2
- Find the inverse of 3 under $*$.
A. 3 B. 1/3 C. 1/9 D. 1/27

The functions f and g are defined by $f: x \rightarrow x^2 - 1$ and $g: x \rightarrow \frac{x-1}{x}$ respectively.

Use the above information to answer question 17 and 18

17. Find $fog(x)$.

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

18. Find $gof(2)$

A. $\frac{1}{2}$ B. $-\frac{1}{2}$ C. $\frac{2}{3}$ D. $-\frac{2}{3}$

19. If α and β are the roots $3x^2 - 2x - 1 = 0$

where $\alpha > \beta$, find the value of $\frac{1}{\alpha} + \frac{1}{\beta}$

A. $\frac{2}{3}$ B. $-\frac{1}{3}$ C. 2 D. -2

20. Find the value of x given that $2^{2(x-3)} = 1$

A. 3 B. 2 C. 1 D. 0

21. If $2^{3x} = 4^x \sqrt{2}$

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

22. State the domain of the function $h(x) = \frac{3x-2}{x+4}$

A. $\{x: x \in R, x \neq -4\}$
B. $\{x: x \in R, x \neq 1/4\}$
C. $\{x: x \in R, x \neq 2/3\}$
D. $\{x: x \in R\}$

23. Given that $f(x) = \frac{2x+1}{x-1}, x \neq 1$, find $f^{-1}(x)$

A. $\frac{2x+1}{x-2}$ B. $\frac{x+1}{x-2}$ C. $\frac{1-x}{x+2}$ D. $\frac{x+1}{3}$

24. If $32^x = 0.0625$ find the value of x

A. $-\frac{1}{5}$ B. $-\frac{2}{5}$ C. $-\frac{3}{5}$ D. $-\frac{4}{5}$

25. Given that $f(x) = \frac{x+1}{2}$, find $f^{-1}(-2)$

A. -5 B. -3 C. 3 D. 5

26. Find the value of a if $x^2 - 10x + a$ is a perfect square

A. -5 B. 5 C. -25 D. 25

27. The binomial expansion of $(a+x)^n$ has number of terms

A. $n-1$ B. $n+1$
C. n D. $1-n$

28. Which of the following is the test for a function.

- A. The vertical line cuts two points of the curve
B. The vertical line cuts one point of the curve
C. The horizontal line cuts two points of the curve

D. The horizontal line cuts one point of the curve

29. From the Pascal's triangle, the coefficient of $a^4 x^2$ of the expansion $(a-x)^6$

A. 10 B. -10 C. 15 D. -15

30. Which of the following values of x makes the

function $h(x) = \frac{2x^2+3}{3x-9}$ undefined

A. 3 B. -3 C. 9 D. -9

31. A binary operation $\emptyset$ defined on a closed set R is said to be if for every $a, b, c \in R$, $(a\emptyset b)\emptyset c = a\emptyset(b\emptyset c)$

- A. commutative B. associative
C. distributive D. inverse

32. A binary operation ∇ is defined on the set of real numbers by $m\Delta n = \frac{m+n}{1-mn}$, find $-2\Delta 3$

A. $\frac{1}{5}$ B. $-\frac{1}{5}$ C. $-\frac{1}{7}$ D. $\frac{1}{7}$

33. The binomial expansion of $(1-2x)^{-2}$ has number of terms.

A. infinite B. finite C. -2 D. 3

34. Find the value of n if $4^n = 128\sqrt{2}$

A. $3\frac{5}{4}$ B. $3\frac{1}{4}$ C. $3\frac{6}{4}$ D. $3\frac{3}{4}$

35. Given that $A = \{x: 0 \leq x \leq 3\}$ and $B = \{x: -3 < x < 2\}$. Find $A \cup B$

A. $-3 < x < 3$ B. $-3 < x \leq 3$
C. $0 \leq x < 3$ D. $0 \leq x < 2$

36. In a class of 25 students, 6 study mathematics (M), 14 study Economics(E) and 3 students study both subjects. Find $n(M' \cap E')$

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

37. In the test for many-to-one function, the horizontal line cuts two points of the curve

- A. True B. False C. all of the above,
D. none of the above

38. Find the roots of the equation

$$2x^2 + 3x - 2 = 0$$

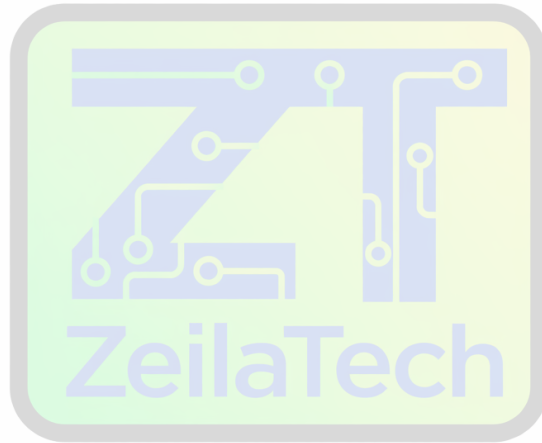
- A. 1 and 2 B. -1 and -2
C. $\frac{1}{2}$ and 2 D. $\frac{1}{2}$ and -2

39. Find the roots of the equation $2x^2 + 3x - 2 = 0$

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

40. Solve $\sqrt{y-3} - \sqrt{y} = -3$

- A. 2 B. 4 C. 6 D. 8



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