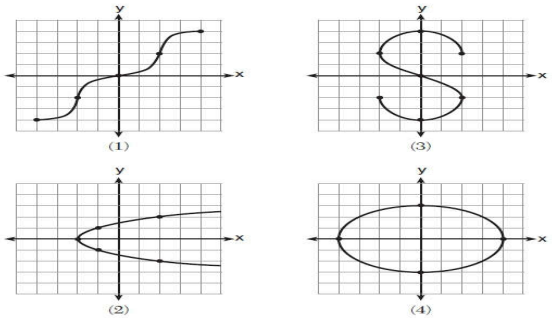
2025 SHS1 END OF SEMESTER EXAM ADDITIONAL MATHEMATICS 2
DURATION: 45 MINUTES
OBJECTIVES [30 marks]

1. What kind of sequence is the following: $1, \frac{1}{10}, \frac{1}{100}, \frac{1}{1000}$ ...?
   a. Neither geometric nor arithmetic
   b. Geometric and arithmetic
   c. Geometric only
   d. Arithmetic only
2. Solve 3log2 + 2log3 - 2log6
   a. $\log 5$
   b. $\log 3$
   c. $\log 4$
   d. $\log 2$
3. Given that $y = 5x$ and $3^{x+y} = 81$. Find x.
   a. $x = \frac{2}{3}, y = \frac{10}{3}$
   b. $x = \frac{10}{3}, y = \frac{2}{3}$
   c. $x = \frac{3}{10}, y = \frac{3}{2}$
   d. $x = 10, y = 2$
4. Given the arithmetic sequence: 3, 7, 11, 15, ... Find the express for the nth term of this sequence.
   a. $U_n = 3n - 3$
   b. $U_n = 4n - 3$
   c. $U_n = 4n - 1$
   d. $U_n = 3n - 3$
5. For the geometric sequence: 4, 12, 36, 108, ... Find the formula for the nth term of the sequence.
   a. $4(3)^{n-1}$
   b. 12^{n-1}
   c. $3(4)^{n-1}$
   d. $4(3)^{1-n}$
6. Find the remainder when $2x^2 - 5x - 1$ is divided by $x - 5$
   a. 25
   b. 24
   c. 23
   d. -1
7. Find the domain of $2x2+9x+10\frac{2x2+9x+10}{X^2-4}$
   a. $x \in R, x \neq -2$
   b. $x \in R, x \neq 4$
   c. $x \in R, x \neq 2$
   d. $x \in R, x \neq -4$
8. If $f(x) = 2x^2$ and $g(x) = \frac{1}{3x}$, find fog.
   a. $\frac{3}{2x^2}$
   b. $\frac{2}{3x^2}$
   c. $\frac{2}{9x^2}$
   d. $\frac{1}{6x^2}$
9. Which of the following represent functions from their domain into R?



   a. 1
   b. 2
   c. 3
   d. 4

Two functions f and g are defined on the set R, of real numbers by $f: x \to \frac{2x-3}{x}, x \neq 0, g: x \to 1 - \frac{3}{2}x$ Use the above information to answer **Questions 10 and 11.**

10. Find f^{-1}, the inverse of f.
    a. $f^{-1}: x \to \frac{3}{x-2}, x \neq 2$
    b. $f^{-1}: x \to \frac{3}{2-x}, x \neq 2$
    c. $f^{-1}: x \to \frac{2}{3-x}, x \neq 3$
    d. $f^{-1}: x \to \frac{2}{x-3}, x \neq 3$
11. Find the largest possible domain of gof.
    a. $\{x: x = R, x \neq 2\}$
    b. $\left\{x: x = R, x \neq \frac{9}{4}\right\}$
    c. $\{x: x = R, x \neq 0\}$
    d. $\left\{x: x = R, x \neq -\frac{9}{4}\right\}$
12. Given that $h(x) = 5x^3 + 2x^2 + x + 5$ and $g(x) = 2x^3 + 5x + 7$, find $h(x) - g(x)$
    a. $3x^3 + 2x^2 - 4x - 2$
    b. $3x^3 - 2x^2 + 6x - 2$
    c. $3x^3 + 2x^2 - 6x - 12$
    d. $7x^3 + 2x^2 - 4x - 2$
13. The general form of a parabolic function is given by;
    a. $ax + by + c = 0$
    b. $f(x) = ax^2 + bx + c, where\ a = 0$
    c. $f(x) = ax^2 + bx + c, where\ a \neq 0$
    d. $x^2 + y^2 = c$
14. In the quadratic formula, $b^2 - 4ac$, is called……., which determines the nature of the roots of the function.
    a. Divisor
    b. Remainder
    c. Dividend
    d. Discriminant

15. If the $b^2 - 4ac > 0$, then function has;
a. real roots
b. real and different/ discrete roots
c. real and equal roots
d. Complex and imaginary roots

16. What are the zeros of the function $h(x) = (x + 2)(x - 5)$?
a. $x = -2, x = 5$
b. $x = 2, x = -5$
c. $x = -2, x = -5$
d. $x = 2, x = 5$

17. The first and second term of a linear sequence are 15 and 12 respectively. Find the nth term.
a. $18 - 3n$
b. $12 + 3n$
c. $12n + 3$
d. $12 - 2n$

18. An exponential sequence is given by $\frac{3}{4}, \frac{9}{2}, 27, \ldots$. Find the common ratio.
a. $\frac{1}{6}$
b. $\frac{2}{3}$
c. $\frac{3}{2}$
d. 6

19. Divide $3x^3 - x^2 - 4x + 1$ by $x^2 - 2$.
a. $3x + 1 + \frac{2x+1}{x^2-2}$
b. $3x + 1 + \frac{2x-1}{x^2-2}$
c. $3x - 1 + \frac{2x-1}{x^2-2}$
d. $3x - 1 + \frac{2x+1}{x^2-2}$

20. The second term of a geometric sequence is 9. If its fifth term is $\frac{1}{3}$, find the common ration.
a. $\frac{1}{3}$
b. $\frac{1}{9}$
c. 1
d. 3

21. Given that $f: x \to x^4 - 3x^2 - 7x + 11$, find $f(-1)$.
a. 2
b. 8
c. 14
d. 16

22. If $\boldsymbol{g(x) = 2x + 1}$ and $\boldsymbol{h(x) = 3x - 2}$, find $\boldsymbol{h \circ g}$
a. $6x + 1$
b. $6x + 3$
c. $6x + 4$
d. $6x + 5$

23. Given that $\frac{\log(3x+1)^{2x-1}}{\log(3x+1)} = 5$, find the value of x
a.-2
b. 2
c. 3
d. 4

24. If the domain of $f(x) = x^2 + 1$ is $\{-2, -1, 0, 1, 2\}$, find the image of -2
a. -3
b. 5
c. 3
d. 4

25. If $f(x - 1) = 3x^2 - 2x - 1$, find $f(3)$
a. 19
b. 74
c. 185
d. 189

26. Find the values of x for which $\frac{x^2-2x-35}{(x+2)(2x+1)} = 0$.
a. $\{7, -5\}$
b. $\{7, 5\}$
c. $\{5, -7\}$
d. $\{-2, -\frac{1}{2}\}$

27. Find the maximum value of the function $f(x) = 10 + 3x - x^2$.
a. $\frac{49}{4}$
b. $\frac{15}{4}$
c. 16
d. $\frac{65}{4}$

28. State the domain of the function $\frac{3x-2}{x+4}$.
a. $\{x: x \in R, x \neq -4\}$
b. $\{x: x \in R, x \neq -\frac{1}{4}\}$
c. $\{x: x \in R, x \neq \frac{2}{3}\}$
d. $\{x: x \in R\}$

29. The inverse of a function f is given by $f^{-/}: x \to \frac{2x+1}{3}$, find f.
a. $f: x \to 3x - 1$
b. $f: x \to \frac{3x-1}{2}$
c. $f: x \to \frac{3}{2x+1}$
d. $f: x \to \frac{1}{2x+1}$

30. Given that $2\log_y x = 3$, find the relation involving x and y
a. $y^3 = x^2$
b. $y^3 = x$
c. $y^2 = x^3$
d. $y = x^3$

END OF PAPER