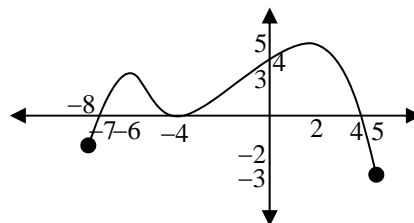


Show ALL work in the space provided on the answer sheet.

Functions and their Graphs

1. Sketch a graph of the parent function for each type: Constant, Linear, Cubic, Square root, Cube Root, Rational, , Exponential, Logarithmic, Absolute Value, Step

2. For the graph at the right, state the domain, range zeroes, continuity, where increasing and decreasing. Is it a function?



3. Write the equation of the line through the points $(-2, 0)$ and $(1, -3)$.
4. Write the equation of the line perpendicular to the line $x = 6$ and passing through the point $(-4, 5)$.
5. Write the equation of a line through the point $(-2, 6)$ with no slope.
6. Graph the equation $3x + 4y - 16 = 0$
7. Write the equation of the line parallel to $2x - 7y = 0$ and passing through the point $(8, 0)$
8. Solve this system of equations:
$$\begin{aligned} 3x + 5y &= 7 \\ 2x - 6y &= 11 \end{aligned}$$
9. Are the lines whose equations are $y = 2x + 4$ and $x + 2y = 10$ parallel, perpendicular, or neither?
10. For what value of k is the graph of $kx - 7y + 10 = 0$ parallel to the graph of $8x - 14y + 3 = 0$? For what value of k will the graphs of the lines be perpendicular?
11. Find the distance from the point $(2, 8)$ to $(-3, 16)$.
12. Find the midpoint of the segment from $(4, -8)$ to $(3, -16)$.
13. Describe the transformations that have been done to $f(x) = \sqrt{x}$ to get $g(x)$.

$$g(x) = 4\sqrt{x-2}$$

For each problem 14-16 below:

- Graph the equation.
 - Are the functions One-to-One?
 - If One-to-One, find the equation of the inverse.
 - If not One-to-One, can you restrict the domain of the original function to make it so? How?
 - List the domain and range.
14. $y = 4x - 3$ 15. $y = x^2 + 2$

16. If $f(x) = x^2 - 4x + 2$, evaluate $f(4 - y)$.
17. Given $h(x) = \sqrt{2x - 1}$ and $g(x) = \frac{1}{x}$ determine (A) $h \circ g$ (B) $g \circ h$.
18. Determine whether $f(x) = \frac{x - 1}{2}$ and $g(x) = 2x + 1$ are inverses by means of composition.

Polynomial and Rational Functions

19. Convert $f(x) = 2x^2 + 8x + 7$ to Vertex Form.
20. For $f(x) = -\frac{1}{2}(x + 3)^2 - 5$, sketch the graph of f and describe the transformations of f as it compares to $y = x^2$.
21. Sketch the Long-run behavior (as $x \rightarrow \pm\infty$) of ...
 a) $f(x) = -3x^3 + 5x - 6$
 b) $g(x) = \frac{1}{2}x(x + 5)^2(x - 9)$
22. State the roots and their multiplicity for $g(x) = \frac{1}{2}x(x + 5)^2(x - 9)$.
23. Write the complex conjugate of $4 - 3i$.
24. Write $\frac{2 + 3i}{4 - 2i}$ in standard form (simplified).
25. Find all (real and complex) zeroes of $f(x) = x^5 + x^3 + 2x^2 - 12x + 8$.
26. Find a fourth-degree polynomial that has -1 , -1 , and $3i$ as zeroes.
27. Sketch the graph of each function, showing algebraic work to find the x - and y -intercepts, all VA, any HA, and any "holes".
 a) $f(x) = \frac{2x^2}{x^2 - 9}$
 b) $f(x) = \frac{x^2 + x - 2}{x^2 - x - 6}$

Simplify.

28. $x^3 \cdot 2x^4 \cdot 8x$

29. $\frac{36x^4y^3}{12x^7y}$

30. Sketch the graph of each function, labeling any intercepts.

a) $f(x) = 4^x$ b) $f(x) = 3(4)^x$

31. Describe the transformations of f as it compares to $y = e^x$

$f(x) = 3e^{x+5}$

32. What is the approximate value (to 3 places) of the natural number, e ?

33. What is the “definition” (in words) of a logarithm?

34. Convert to log form: $4^x = 1024$

35. Convert to exponential form: $\log 1000 = 4$

36. Sketch the graph of each function, labeling any intercepts.

a) $f(x) = \log x$ b) $f(x) = \ln x$

37. Describe the transformations of f as it compares to $y = \log x$

$f(x) = 4 + 3\log x$

38. Express as a single logarithm: $\ln 2 + \ln 6 - \frac{1}{2}\ln 9$

39. Expand: $\log_3 \frac{2x^3y}{z}$

Simplify.

40. $\ln e^7$ 41. $e^{\ln 3}$ 42. $10^{2\log 6}$

43. Change $\log_5 17$ to a common log (base 10).

Solve.

44. $\log_4(x-4) + \log_4 x = \log_4 5$

45. $2^{6-x} = 4^{2+x}$

