## Indicate the answer choice that best completes the statement or answers the question.

1. Which statement is true for the graph of  $f(x) = 2x^3 - 6x^2 - 48x + 24$ ?

- a. (4, -140) is a relative minimum; (-2, 77) is a relative maximum
- b. (4, -136) is a relative minimum; (-2, 80) is a relative maximum
- c. (-2, 80) is a relative minimum; (4, -136) is a relative maximum
- d. (-2, 77) is a relative minimum; (4, -140) is a relative maximum

### 2. Which of the following graphs is a function?



3. Which of the following graphs is a function?



4. Identify the function for which an inverse function exists.

a. 
$$f(x) = 5x^2 - 3$$
  
b.  $f(x) = |x - 1|$   
c.  $f(x) = \sqrt{x + 2}$   
d.  $f(x) = [[x + 5]]$ 

5. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



6. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



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7. Use the domain and range of each of the following relations to determine which is a function.

a. {(-4, 3), (-2, -1), (-4, 8)}
b. {(-4, 3), (-2, -1), (-7, 8)}
c. {-4, -2, -7, 7}
d. {(-4, 3), (-2, -1), (-2, -8), (-7, 8)}

Which statement best describes a method that can be used to sketch the graph.

8. y = |x + 1|

- a. Translate the graph of y = |x| one unit up.
- b. Translate the graph of y = |x| one unit down.
- c. Translate the graph of y = |x| one unit left.
- d. Translate the graph of y = |x| one unit right.

9. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



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10. The graph of the equation  $y = x^2 - 9$  is symmetric with respect to which of the following?

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- a. the line y = x b. the line y = -x + 9
- c. the *x*-axis d. the *y*-axis

11. ACME Company's expected sales can be modeled by  $g(t) = t^3 - 4t^2 + 4t - 4$ , where g(t) is measured in thousands of dollars and *t* is the number of years after 2013. Find the average rate of change in expected sales from 2014 to 2020.

a. -\$29,000 b. \$29,000 c. \$24,000 d. \$174,000

12. Use the graph of f(x) to estimate f(1).





13. Use the graph of f(x) to estimate f(-1).



a. $f(-1) = 7$	b. $f(-1) = -8$
c. $f(-1) = -7$	d. $f(-1) = -6$

14. Use the graph below to identify the *y*-intercept and zeros.



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15. The graph of a function f is illustrated below. What is the graph of the inverse function of f?



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16. Find the average rate of change of  $f(x) = \sqrt{x+6}$  on [4, 9]. Round your answer to the nearest hundredth.

a. 0.14 b. 0.71 c. -0.36 d. -0.14

17. State whether the graph of  $f(x) = \frac{x^3 + 5x^2 + 6x}{x}$  has infinite discontinuity, jump discontinuity, point discontinuity, or is continuous.

a. The function has infinite discontinuity. b. The function has point discontinuity.

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- c. The function has jump discontinuity. d. The function is continuous.
- 18. Use the graph of f(x) to estimate f(3).



a. f(3) = -9 b. f(3) = -8c. f(3) = 8 d. f(3) = -7

19. Use the graph of f(x) to estimate f(-2).

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a. f(-2) = 1 b. f(-2) = -1c. f(-2) = 2 d. f(-2) = 0

20. Use the graph below to find the domain and range.



21. State whether the graph of  $f(x) = -\frac{x^3 - 10x^2 + 9x}{9}$  has infinite discontinuity, jump discontinuity, point discontinuity, or is continuous.

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a. The function has point discontinuity. b. The function is continuous.

c. The function has infinite discontinuity. d. The function has jump discontinuity.

22. Determine whether the graph of 5xy = 9 is odd or even.

a. neither b. odd c. even d. both

23. Use the graph of f(x) to estimate f(2).

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a. f(2) = 6 b. f(2) = 7c. f(2) = 8 d. f(2) = -7



24. Describe the end behavior of the graph.



25. Describe the set of numbers using set-builder notation.

all multiples of 10

a.  $\{x \mid x = \frac{1}{10}n, n \in Z\}$ b.  $\{x \mid x = 10n, n \in Z\}$ c.  $\{x \mid x = 10n, n \in I\}$ d.  $\{x \mid x = 10 + n, n \in Z\}$ 

26. Find f(t-3) for  $f(x) = 4x^2 - 8x + 4$ .

a.  $4t^2 - 32t + 64$  b. 64 c.  $4t^2 - 32t - 64$  d.  $4t^2 + 32t + 64$ 

27. Determine between which consecutive integers the real zeros of  $f(x) = -4x^3 - 2x^2 + 5x + 7$  are located on the interval [-10, 10]. If the zero occurs at an integer, write the integer.

a. -8 < x < -7</li>
b. 1 < x < 2;</li>
c. 0 < x < 1; 2 < x < 3;</li>
d. -3 < x < -2; -2 < x < -1; -1 < x < 0; 1 < x < 2;</li>

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28. Use the graph below to identify the *y*-intercept and zeros.

29. Determine between which consecutive integers the real zeros of  $f(x) = -5x^3 + 3x^2 + 3x + 6$  are located on the interval [-10, 10]. If the zero occurs at an integer, write the integer.

a. -3 < x < -2; -2 < x < -1; -1 < x < 0; 1 < x < 2;</li>
b. 0 < x < 1; 2 < x < 3;</li>
c. 1 < x < 2;</li>
d. -8 < x < -7</li>

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30. Use the graph below to find the domain and range.

