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CHAPTER 8

Cumulative Test

Select the best answer.

1. Simplify $\frac{3\sqrt{56}}{\sqrt{21}}$.

A $2\sqrt{6}$ **C** $9\sqrt{2}$

B $6\sqrt{2}$ **D** $\frac{3\sqrt{8}}{\sqrt{3}}$

2. Evaluate $\left(\frac{1}{2}\right)^{-3} \times (3^{-2})$.

F $\frac{1}{72}$ **H** $\frac{9}{8}$

G $\frac{8}{9}$ **J** 72

3. Simplify $\left(\frac{2x^3y}{x^2(y^2z)^4}\right)^{-1}$. Assume all variables are nonzero.

A $\frac{y^3z^4}{2x}$ **C** $\frac{y^7z^4}{2x}$

B $\frac{2x}{y^3z^4}$ **D** $\frac{2x}{y^7z^4}$

4. Evaluate $f(-3)$ if $f(x) = \frac{1 - 2x}{2 + x}$.

F -7 **H** 1

G -1 **J** 5

5. Which function $H(t)$ represents the distance between a runner and the finish line, in meters, after t seconds if he starts 10 kilometers from the finish line and runs at a rate of 5 meters per second?

A $H(t) = 10 - 5t$

B $H(t) = 5t - 10$

C $H(t) = 10{,}000 - 5t$

D $H(t) = 5t - 10{,}000$

6. Solve $\frac{20}{x + 1} = \frac{28}{x}$.

F $x = -4.5$ **H** $x = -3$

G $x = -3.5$ **J** $x = -2.5$

7. Which set of points could represent a linear function?

A $\{(1, 10), (3, 6), (5, 2), (7, -4)\}$

B $\{(-1, 1), (-2, 4), (-3, 9), (-4, 16)\}$

C $\{(1, 2), (2, 5), (4, 8), (8, 11)\}$

D $\{(1, -3), (3, 1), (5, 5), (8, 11)\}$

8. A line has slope $-\frac{3}{4}$ and passes through $(1, 3)$. Which of these points is also on the line?

F $(-2, 7)$ **H** $(4, 7)$

G $(-7, -3)$ **J** $(13, -6)$

9. Which is the equation of the line perpendicular to $2x + 3y = 10$ and passing through $(2, -3)$?

A $3x - 2y = 12$

B $y = -\frac{3}{2}x - 6$

C $y = \frac{3}{2}x + 10$

D $y = -\frac{2}{3}(x - 2) - 3$

10. Solve $\frac{1}{2}|10 - 2x| \leq 1$.

F $\left\{x \middle| -\frac{11}{2} \leq x \leq -\frac{9}{2}\right\}$

G $\left\{x \middle| x \leq -\frac{11}{2} \text{ or } x \geq -\frac{9}{2}\right\}$

H $\left\{x \middle| \frac{9}{2} \leq x \leq \frac{11}{2}\right\}$

J $\left\{x \middle| x \leq \frac{9}{2} \text{ or } x \geq \frac{11}{2}\right\}$

11. Bert's Rent-a-Car will rent you a car for \$55 per day with no mileage charge. Mavis Rent-a-Car will rent you a car for \$34 per day plus 15 cents per mile beyond the first 100 miles. For what number of miles is the total cost of a one-day rental the same for both rent-a-car companies?

A 140 **C** 240

B 210 **D** 310

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continued

12. Solve $\begin{cases} 2x + 5y = 19 \\ 7x - 3y = 46 \end{cases}$.

F $(-3, 6)$ **H** $(7, 1)$

G $(4.5, 2)$ **J** $(12, -1)$

13. The Drama Club is selling pizza for a fund-raiser. They sell slices of cheese pizza for \$1.25 and slices of pepperoni pizza for \$1.50. Altogether they sell 150 slices for \$208.50. How many slices of pepperoni pizza did they sell?

A 66 **C** 78

B 72 **D** 84

14. On a feasible region whose vertices are $\{(0, 0), (0, 10), (3, 8), (6, 5), (13, 0)\}$, what is the maximum of the objective function $R = 3x + 4y$, and where does it occur?

F 39 at $(13, 0)$ **H** 41 at $(3, 8)$

G 40 at $(0, 10)$ **J** 44 at $(6, 5)$

15. The system $\begin{cases} x + 2y + 4z = 13 \\ 2x + 3y - z = 7 \\ 3x + y + 2z = 14 \end{cases}$ is

A inconsistent, with no solutions.

B dependent, with infinitely many solutions.

C independent, with one solution.

D dependent, with one solution.

16. If $C = \begin{bmatrix} 4 & -1 \\ -1 & 2 \\ -3 & 3 \end{bmatrix}$ and $D = \begin{bmatrix} -2 & 2 \\ 3 & -3 \\ 1 & -1 \end{bmatrix}$, evaluate $C - 2D$.

F $\begin{bmatrix} 0 & 3 \\ 5 & -4 \\ -1 & 1 \end{bmatrix}$ **H** $\begin{bmatrix} 8 & -5 \\ -7 & 8 \\ -5 & 5 \end{bmatrix}$

G $\begin{bmatrix} 6 & -3 \\ -4 & 5 \\ -4 & 4 \end{bmatrix}$ **J** $\begin{bmatrix} 10 & -4 \\ -5 & 7 \\ -7 & 7 \end{bmatrix}$

17. If $A = \begin{bmatrix} 2 & -1 \\ 1 & -2 \end{bmatrix}$, evaluate A^3.

A $\begin{bmatrix} 6 & -1 \\ 1 & -6 \end{bmatrix}$ **C** $\begin{bmatrix} 8 & -1 \\ 1 & -8 \end{bmatrix}$

B $\begin{bmatrix} 6 & -3 \\ 3 & -6 \end{bmatrix}$ **D** $\begin{bmatrix} 8 & -3 \\ 3 & -8 \end{bmatrix}$

18. The triangle $\triangle ABC$ has vertices $A(3, -1)$, $B(5, 4)$, and $C(-2, 3)$. What are the coordinates of the image of $\triangle ABC$ after it has been rotated using the rotation matrix $\begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}$?

F $A'(-3, 1)$, $B'(-5, -4)$, $C'(2, -3)$

G $A'(-1, -3)$, $B'(4, -5)$, $C'(3, 2)$

H $A'(1, -3)$, $B'(-4, -5)$, $C'(-3, 2)$

J $A'(1, 3)$, $B'(-4, 5)$, $C'(-3, -2)$

19. Which matrix is the inverse of $\begin{bmatrix} 2 & 1 \\ -3 & 3 \end{bmatrix}$?

A $\begin{bmatrix} -\frac{2}{3} & -1 \\ \frac{1}{3} & -1 \end{bmatrix}$ **C** $\begin{bmatrix} \frac{1}{3} & -\frac{1}{9} \\ \frac{1}{3} & \frac{2}{9} \end{bmatrix}$

B $\begin{bmatrix} -\frac{2}{9} & -\frac{1}{3} \\ \frac{1}{9} & -\frac{1}{3} \end{bmatrix}$ **D** $\begin{bmatrix} 1 & -\frac{1}{3} \\ 1 & \frac{2}{3} \end{bmatrix}$

20. What is $\left[\begin{array}{cc|c} 5 & 2 & 46 \\ 7 & -3 & 47 \end{array}\right]$ in reduced row-echelon form?

F $\left[\begin{array}{cc|c} 1 & 0 & 8 \\ 0 & 1 & 3 \end{array}\right]$ **H** $\left[\begin{array}{cc|c} 1 & 0 & 93 \\ 0 & 1 & 1 \end{array}\right]$

G $\left[\begin{array}{cc|c} 1 & 0 & 9 \\ 0 & 1 & 5 \end{array}\right]$ **J** $\left[\begin{array}{cc|c} 12 & -1 & 93 \\ 2 & -5 & 1 \end{array}\right]$

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continued

21. The system of equations
$\begin{cases} 2x + 2y - z = 16 \\ 3x - y = 7 \\ 4y - 3z = 14 \end{cases}$ represents the number of red, green, and blue cubes you will need to help your younger sister practice her addition and subtraction. Use x as the number of red cubes, y as the number of green cubes, and z as the number of blue cubes. What is the total number of cubes you will need to gather to help your sister?

A 8 **C** 10

B 9 **D** 11

22. Find the minimum or maximum of $g(x) = 4x^2 - 12x + 7$.

F maximum of -2

G maximum of 7

H minimum of -2

J minimum of 7

23. Write a quadratic function in standard form having zeros of 4 and $-\frac{1}{2}$.

A $a(x) = 2x^2 - 7x - 4$

B $b(x) = 2x^2 - 7x + 4$

C $c(x) = 2x^2 + 7x - 4$

D $d(x) = 2x^2 + 7x + 4$

24. Write $f(x) = x^2 + 4x - 9$ in vertex form.

F $f(x) = (x + 2)^2 - 13$

G $f(x) = (x + 2)^2 - 9$

H $c(x) = (x + 4)^2 - 13$

J $c(x) = (x + 4)^2 - 9$

25. What are the solutions to $x^2 + 4x + 13 = 0$?

A $-2 \pm 3i$ **C** $-2 \pm 6i$

B $-2 \pm \sqrt{17}$ **D** $-2 \pm \sqrt{17}i$

26. Marta is standing on the roof of her apartment building when she throws a ball upward over the edge. The ball is 55 feet above the ground when she lets it go. The quadratic equation that models the path of the ball is $p(t) = -16t^2 + 24t + 55$. How long does it take for the ball to hit the ground?

F 1.25 seconds **H** 2.75 seconds

G 2.25 seconds **J** 3.25 seconds

27. Simplify $\frac{2 - 4i}{1 - i}$.

A $1 + 3i$ **C** $3 - i$

B $2 + 4i$ **D** $4 - 2i$

28. Which is equal to $(2p + r)^4$?

F $16p^4 + r^4$

G $16p^4 + 8p^3r + 4p^2r^2 + 2pr^3 + r^4$

H $16p^4 + 32p^3r + 16p^2r^2 + 4pr^3 + r^4$

J $16p^4 + 32p^3r + 24p^2r^2 + 8pr^3 + r^4$

29. Which is NOT a factor of $(x^4 - 2x^3 - 7x^2 + 8x + 12)$?

A $x - 1$ **C** $x - 2$

B $x + 1$ **D** $x + 2$

30. If 4 and $(2 + \sqrt{5})$ are two of the roots of a fourth-degree polynomial with integer coefficients, which of the following could be the set of all of the roots?

F $\{2 - \sqrt{5}, 4, 2 + \sqrt{5}\}$

G $\{2 - \sqrt{5}, \sqrt{5}, 4, 2 + \sqrt{5}\}$

H $\{3, 4, 2 + \sqrt{5}, 7\}$

J $\{2 - \sqrt{5}, 3 - \sqrt{2}, \sqrt{5}, 4, 3 + \sqrt{2}, 2 + \sqrt{5}\}$

31. Lists all the roots of $x^4 + x^2 = 2$.

A $\{\pm 1, \pm i\}$

B $\{\pm 1, \pm\sqrt{2}\}$

C $\{\pm 1, \pm\sqrt{2}i\}$

D $\{\pm 1, \sqrt{2} \pm i\}$

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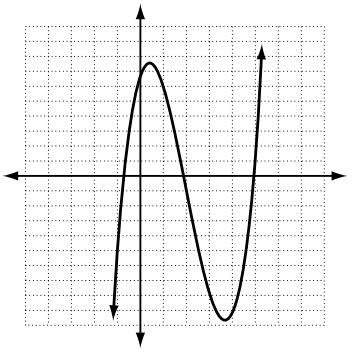
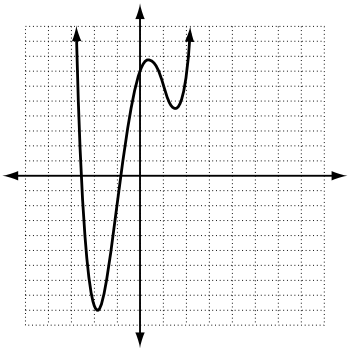
32. If $A(x)$ and $B(x)$ are both quadratic functions with negative leading coefficients, and $C(x)$ is the product of $A(x)$ and $B(x)$, which of the following could be the graph of $C(x)$?

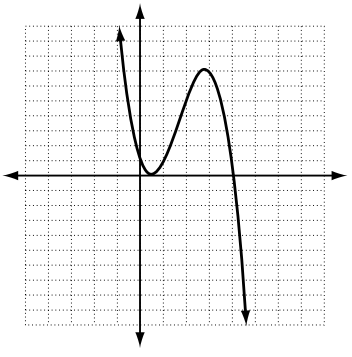
F



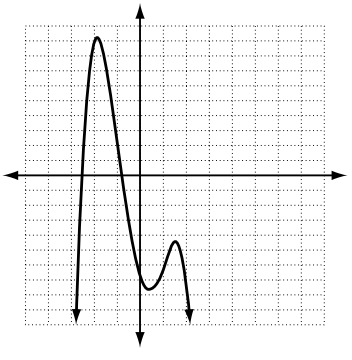
G



H



J



33. If $f(x) = -x^3 + 2x^2 - 3x + 4$, and $g(x)$ is a translation of $f(x)$ two units to the right, which of the following is equal to $g(x)$?

A $-x^3 - 4x^2 - 23x + 26$

B $-x^3 - 4x^2 - 7x - 2$

C $-x^3 + 8x^2 - 23x + 26$

D $-x^3 + 8x^2 - 7x - 2$

34. The city of Easton had a population of 45,000 in 1997 and then began to decrease in population at a rate of 1.5% per year. Which function expresses the population of Easton in the year t?

F $P(t) = 45{,}000(.015)^t$

G $P(t) = 45{,}000(.015)^{t-1997}$

H $P(t) = 45{,}000(.985)^t$

J $P(t) = 45{,}000(.985)^{t-1997}$

35. Which of the following is the inverse of $f(x) = 3(5^x)$?

A $f^{-1}(x) = \log_5 \frac{x}{3}$

B $f^{-1}(x) = \frac{\log_5 x}{3}$

C $f^{-1}(x) = 3\log_5 x$

D $f^{-1}(x) = \log_{15} x$

36. Evaluate $\log_8 0.25$.

F $-\frac{2}{3}$

G $-\frac{1}{32}$

H $\frac{1}{32}$

J $\frac{2}{3}$

37. Simplify $\log_4 3 + \log_4 12$.

A $\frac{2\ln 6}{\ln 4}$

B $\log_4 15$

C $\log 36$

D $\log_3 12$

Chapter Test Form C

1. $Q = \frac{kPT}{R}$; Q varies jointly with P and T and inversely with R.
2. $\frac{9}{20}$ or 0.45
3. $A = \frac{k}{BC}$; A varies inversely with the product of B and C.
4. $2x^2 - 4x - 30$
5. $\{-4\}$
6. $\frac{2x}{1 - x^2}$
7. $\frac{x - 1}{x + 1}$
8. 7.5 mph
9. $a < -5$
10. HA at $y = \frac{9}{4}$; VA at $x = \pm\frac{3}{2}$
11. $(2, -6)$
12. $f(x) = \frac{2x^2 - 4x - 48}{x^2 - 7x + 6}$
13. $\left\{\frac{24}{23}, 4\right\}$
14. 6 hours
15. $x^{-\frac{1}{6}} y^{\frac{7}{6}}$
16. 4
17. $g(x) = \sqrt{-\frac{1}{2}x - 2} - 1$
18. $a = 2, b = -\frac{3}{4}$
19. $\left\{-\frac{4}{3}\right\}$
20. $\{-1, 4\}$

Performance Assessment

1. $R(x) = \frac{}{(x - 3)}$
2. $R(x) = \frac{(x - 2)}{(x - 3)(x - 2)}$
3. The numerator and denominator must have the same degree, and the leading coefficient of the numerator must be two times the leading coefficient of the denominator.
4. $R(x) = \frac{2(x - a)(x - 2)}{(x - 3)(x - 2)}$
5. For the function $R'(x) = \frac{2(x - a)}{(x - 3)}$, $R'(2) = -2$.
6. $\frac{2(2 - a)}{(2 - 3)} = -2$; $\frac{4 - 2a}{-1} = -2$; $4 - 2a = 2$; $a = 1$.
7. $R(x) = \frac{2(x - 1)(x - 2)}{(x - 3)(x - 2)} = \frac{2x^2 - 6x + 4}{x^2 - 5x + 6}$

Cumulative Test

1. A
2. G
3. C
4. F
5. C
6. G
7. D
8. J
9. A
10. H
11. C
12. H
13. D
14. H
15. C
16. H
17. B
18. G
19. C
20. F

21. D
22. H
23. A
24. F
25. A
26. H
27. C
28. J
29. A
30. F
31. C
32. G
33. C
34. J
35. A
36. F
37. A

CHAPTER 9

Section Quiz: Section A

1. C
2. H
3. B
4. H
5. B
6. J

Section Quiz: Section B

1. D
2. J
3. D
4. F
5. D
6. F
7. A
8. H
9. B
10. J

Chapter Test Form A

1. A
2. B
3. C
4. B
5. D
6. C
7. A
8. C
9. A
10. C
11. B
12. B
13. D
14. A
15. B
16. C

Chapter Test Form B

1. D
2. H
3. C
4. J
5. D
6. H
7. A
8. G
9. B
10. H