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CHAPTER 7

Cumulative Test

Select the best answer.

1. Identify the property demonstrated by $4 + (5 + 6) = (5 + 6) + 4$.

A Associative Property

B Commutative Property

C Distributive Property

D Additive Identity Property

2. Simplify $3\sqrt{18} + 5\sqrt{50} - 2\sqrt{12}$.

F $30\sqrt{2}$ **H** $34\sqrt{2} - 4\sqrt{3}$

G $31\sqrt{2} - 4\sqrt{3}$ **J** $34\sqrt{2} - 6\sqrt{3}$

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

A $-\frac{9y^4}{4x^2}$ **C** $-\frac{9x^2y^4}{4}$

B $\frac{9y^4}{4x^2}$ **D** $\frac{9x^2y^4}{4}$

4. Which of the following relations is **not** a function?

F From student to age

G From age to student

H From student to social security number

J From social security number to student

5. Evaluate $f(-2)$ if $f(x) = \left(\frac{1 + x}{1 - x}\right)^2$.

A $-\frac{1}{9}$ **C** 1

B -1 **D** 3

6. Which function $C(m)$ represents the cost of a phone call, in dollars, if the call costs 3 cents per minute on top of a 49 cent connection charge?

F $C(m) = \frac{49 + 3m}{100}$

G $C(m) = 49 + \frac{3m}{100}$

H $C(m) = \frac{49}{100} + 3m$

J $C(m) = 100(49 + 3m)$

7. Solve $\frac{20}{2x + 1} = \frac{24}{4x - 1}$.

A $x = 1.125$ **C** $x = 1.375$

B $x = 1.25$ **D** $x = 1.5$

8. Which set of points could NOT represent a linear function?

F $\{(1, 10), (4, 8.5), (10, 5.5), (13, 4)\}$

G $\{(-2, 5), (0, 5.1), (2, 5.2), (4, 5.3)\}$

H $\{(7, 1), (1, 3), (-5, 5), (-11, 7)\}$

J $\{(1, -3), (3, 1), (5, 7), (7, 11)\}$

9. What is the y-intercept of the line $2x - 5y = 28$?

A -5.6 **C** 5.6

B 0.4 **D** 14

10. A line has slope $-\frac{3}{5}$ and passes through $(1, 6)$. Which of these points is also on the line?

F $(0, 11)$ **H** $(-9, 12)$

G $(10, -21)$ **J** $(-5, 16)$

11. Which is the equation of the line perpendicular to $3x - 4y = 9$ and passing through $(2, -3)$?

A $4x - 3y = 17$ **C** $3x + 4y = -6$

B $4x + 3y = -1$ **D** $3x - 4y = 18$

12. Solve $|10 - 4x| \geq -6$.

F $\{x | 1 \leq x \leq 4\}$ **H** No solution

G $\{x | x \leq 1 \text{ or } x \geq 4\}$ **J** All real numbers

13. Alfred leaves a truck stop, heading east on Highway 9 at 25 miles per hour. Bianca leaves 12 minutes later and travels at 40 mph. How long does it take Bianca to overtake Alfred?

A 12 minutes **C** 20 minutes

B 15 minutes **D** 24 minutes

14. Solve $\begin{cases} 3x + 5y = 2 \\ 5x - 4y = 28 \end{cases}$.

F $(4, -2)$ **H** $(9, -5)$

G $(8, 3)$ **J** $(14, -8)$

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15. Tickets to a high school musical are \$4.50 for adults and \$2.50 for students. If a total of 230 tickets are sold for \$825, how many student tickets were sold?

A 95 **C** 125

B 105 **D** 135

16. On a feasible region whose vertices are $\{(0, 0), (1, 12), (5, 8), (8, 3), (9, 0)\}$, what is the maximum of the objective function $P = 6x + 4y$, and where does it occur?

F 54 at $(9, 0)$ **H** 62 at $(5, 8)$

G 60 at $(8, 3)$ **J** 64 at $(8, 3)$

17. Which ordered triple represents the point that is 4 units left from the origin, 3 units down from the origin, and 5 units backward along the x-axis from the origin?

A $(-5, -3, 4)$ **C** $(-5, 4, -3)$

B $(-5, -3, -4)$ **D** $(-5, -4, -3)$

18. The system $\begin{cases} x + y + z = 20 \\ 2x + 3y + 4z = 60 \\ 4x + 2y + 6z = 80 \end{cases}$ is

F inconsistent, with no solutions.

G dependent, with infinitely many solutions.

H independent, with one solution.

J dependent, with one solution.

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

A $\begin{bmatrix} -5 & 4 \\ -9 & -5 \\ 11 & -4 \end{bmatrix}$ **C** $\begin{bmatrix} 3 & -1 \\ -10 & 3 \\ 13 & 1 \end{bmatrix}$

B $\begin{bmatrix} 0 & 1 \\ -11 & 0 \\ 14 & -1 \end{bmatrix}$ **D** $\begin{bmatrix} 12 & -7 \\ -7 & 12 \\ 10 & 7 \end{bmatrix}$

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

F $\begin{bmatrix} 9 & 4 \\ 4 & 1 \end{bmatrix}$ **H** $\begin{bmatrix} 13 & 4 \\ 4 & 1 \end{bmatrix}$

G $\begin{bmatrix} 9 & 4 \\ 4 & 5 \end{bmatrix}$ **J** $\begin{bmatrix} 13 & 4 \\ 4 & 5 \end{bmatrix}$

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

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

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

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

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

22. Which matrix is the inverse of $\begin{bmatrix} 4 & -6 \\ -3 & 5 \end{bmatrix}$?

F $\begin{bmatrix} -4 & -3 \\ -6 & -5 \end{bmatrix}$ **H** $\begin{bmatrix} 2.5 & 3 \\ 1.5 & 2 \end{bmatrix}$

G $\begin{bmatrix} -2 & -1.5 \\ -3 & -2.5 \end{bmatrix}$ **J** $\begin{bmatrix} 5 & 6 \\ 3 & 4 \end{bmatrix}$

23. What is $\left[\begin{array}{cc|c} 3 & 5 & 31 \\ 7 & 2 & 53 \end{array}\right]$ in reduced row-echelon form?

A $\left[\begin{array}{cc|c} 1 & 0 & 7 \\ 0 & 1 & 2 \end{array}\right]$ **C** $\left[\begin{array}{cc|c} 7 & 0 & 1 \\ 0 & 2 & 1 \end{array}\right]$

B $\left[\begin{array}{cc|c} 1 & 0 & 8 \\ 0 & 1 & 1.5 \end{array}\right]$ **D** $\left[\begin{array}{cc|c} 8 & 0 & 1 \\ 0 & 1.5 & 1 \end{array}\right]$

24. Three friends are playing a game with red, blue, and green chips. Each color has a different value. The matrix $\left[\begin{array}{ccc|c} 2 & 4 & 5 & 37 \\ 6 & 3 & 2 & 43 \\ 4 & 2 & 3 & 32 \end{array}\right]$ represents the chip count and the total value of each player's chips. How much would a hand consisting of one of each color chip be worth?

F 8 **H** 10

G 9 **J** 11

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25. Find the minimum or maximum of $g(x) = -2x^2 + 10x - 9$.

A maximum of -9 **C** minimum of -9

B maximum of 3.5 **D** minimum of 3.5

26. Write a quadratic function in standard form having zeros of 3 and $-\frac{1}{3}$.

F $f(x) = 3x^2 - 8x - 3$

G $g(x) = 3x^2 + 8x - 3$

H $h(x) = 3x^2 - 10x + 3$

J $j(x) = 3x^2 + 10x + 3$

27. Write $f(x) = x^2 - 6x + 11$ in vertex form.

A $a(x) = (x - 3)^2 + 2$

B $b(x) = (x - 3)^2 + 11$

C $c(x) = (x - 3)^2 + 2$

D $d(x) = (x - 6)^2 - 25$

28. What are the solutions to $x^2 + 6x + 12 = 0$?

F $-3 \pm 3i$ **H** $-3 \pm 2\sqrt{3}i$

G $-3 \pm \sqrt{3}i$ **J** $-3 \pm \sqrt{12}i$

29. Henry throws a tennis ball over his house. The ball is 6 feet above the ground when he lets it go. The quadratic equation that models the path of the ball is $p(x) = -16t^2 + 46t + 6$. How long does it take for the ball to hit the ground?

A 2 seconds **C** 4.5 seconds

B 3 seconds **D** 6 seconds

30. Simplify $\frac{8 + i}{1 + 2i}$.

F $\frac{6}{5} + \frac{17}{5}i$ **H** $8 - \frac{1}{2}i$

G $2 - 3i$ **J** $8 + \frac{1}{2}i$

31. Simplify $i^5\sqrt{-24}$.

A $-2\sqrt{6}$

B $-2i\sqrt{6}$

C $2\sqrt{6}$

D $2i\sqrt{6}$

32. Solve $4x^2 + 49 = 0$.

F $-2 \pm 7i$ **H** $\pm\frac{7}{2}i$

G $\pm\frac{2}{7}i$ **J** $7 \pm 2i$

33. Which is equal to $(3r + t)^4$?

A $81r^4 + t^4$

B $81r^4 + 27r^3t + 9r^2t^2 + 3rt^3 + t^4$

C $81r^4 + 81r^3t + 54r^2t^2 + 9rt^3 + t^4$

D $81r^4 + 108r^3t + 54r^2t^2 + 12rt^3 + t^4$

34. Which is **not** a factor of $(x^4 - 3x^3 - 17x^2 + 39x - 20)$?

F $x - 1$ **H** $x + 4$

G $x + 1$ **J** $x - 5$

35. If $(3 - \sqrt{2})$ and $(2 + \sqrt{2})$ are two of the roots of a fourth-degree polynomial with integer coefficients, what is the product of the other two roots?

A $4 - \sqrt{2}$ **C** $4 + \sqrt{2}$

B $6 - \sqrt{2}$ **D** $6 + \sqrt{2}$

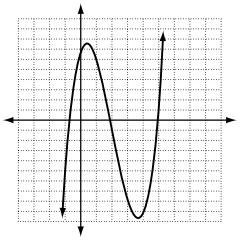
36. Which lists all the roots of $x^4 - x^2 = 6$?

F $\{\pm\sqrt{2}, \pm\sqrt{3}\}$ **H** $\{\pm\sqrt{3}, \pm\sqrt{2}i\}$

G $\{\pm\sqrt{2}, \pm\sqrt{3}i\}$ **J** $\{\pm\sqrt{2}i, \pm\sqrt{3}i\}$

37. If $A(x)$ is a cubic function with a positive leading coefficient, $B(x)$ is a linear function with a negative leading coefficient, and $C(x)$ is the product of $A(x)$ and $B(x)$, which could be the graph of $C(x)$?

A



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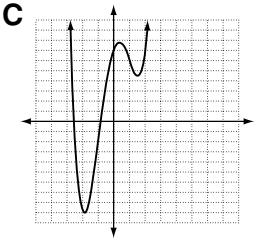
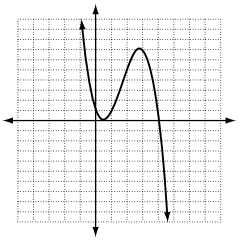
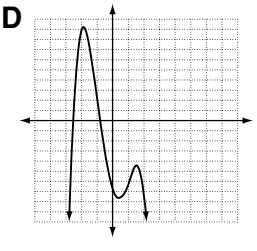


B



D



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38. If $f(x) = 2x^3 - x^2 + 3x$ and $g(x)$ is a translation of $f(x)$ one unit to the left, which of the following is equal to $g(x)$?

F $2x^3 - 7x^2 + 11x - 6$

G $2x^3 - 7x^2 + 11x - 3$

H $2x^3 + 5x^2 + 7x + 1$

J $2x^3 + 5x^2 + 7x + 4$

39. Which mononomial has the highest degree?

A $2a^2b^2c^2d^2$ **C** $9abc^7$

B $2a^5b^3c^2$ **D** $9a^9$

40. Simplify $\frac{x^3 + 4x^2 + 3x - 2}{x + 2}$.

F $(x + 1)(x - 1)$ **H** $x^2 + 4x + 3$

G $x^2 + 2x - 1$ **J** $x^3 + 4x^2 + 2x - 4$

41. The human population of Earth was approximately 6 billion in 1998. If the rate of population growth from then on was 2.3% per year, what would be the best approximation for the human population (in billions) of Earth in 2020?

A $P(t) = 6(1.023)^{23}$

B $P(t) = 6(1.23)^{23}$

C $P(t) = 6 + 6(0.023)^{23}$

D $P(t) = 6 + 6(0.23)^{23}$

42. Which is the inverse of $f(x) = 3(7^{2x-1})$?

F $f^{-1}(x) = \frac{1}{2}\log_7\left(\frac{x}{3}\right) + 1$

G $f^{-1}(x) = \frac{\log_7 x}{6} + \frac{1}{2}$

H $f^{-1}(x) = \frac{1}{2}\log_7\left(\frac{x}{3}\right) + \frac{1}{2}$

J $f^{-1}(x) = \frac{\log_7 x}{6} + 1$

43. Evaluate $\log_{\sqrt{2}} 0.5$.

A -2 **C** $-\frac{1}{2}$

B $-\frac{\sqrt{2}}{2}$ **D** $\frac{\sqrt{2}}{2}$

44. Which is equal to $\log_9 2 + \log_9 8$?

F $\frac{\log 4}{\log 9}$ **H** $\frac{\log 10}{\log 9}$

G $\frac{\log 4}{\log 3}$ **J** $\frac{\log 10}{\log 3}$

45. Solve $3^{x+2} = 10$.

A $\frac{1 - 2\log 3}{\log 3}$ **C** $\log 3 - 2$

B $\frac{1 + 2\log 3}{\log 3}$ **D** $\log 3 + 2$

46. What is the sum of the solutions of the equation $2\log_9 (3x - 1) = \log_9 (6x + 1)$?

F $\frac{4}{3}$ **H** $\frac{8}{3}$

G 2 **J** There is no solution.

47. Which of the following functions is an example of exponential growth?

A $a(x) = 0.5(1.2)^x$

B $b(x) = 0.86x^{2.4}$

C $c(x) = 1.2x + 0.5$

D $d(x) = 2.4(0.86)^x$

48. Which expression is equivalent to $\ln\left(\frac{e^{2x}}{x^3}\right)$?

F $\ln (e^{2x} - x^3)$

G $\frac{2x}{3\ln x}$

H $2x - 3$

J $2x - 3\ln x$

21. 4 and 5

22. 4×10^{-3}

Performance Assessment

1. $2P_0 = P_0\, e^{rt}$; $2P_0 = P_0\, e^{12r}$

2. $2P_0 = P_0\, e^{12r}$; $\ln 2 = \ln e^{12r}$; $r = \frac{\ln 2}{12} \approx 0.05776$

3. $3P_0 = P_0\, e^{rt}$; $3P_0 = P_0\, e^{0.05776t}$

4. $3P_0 = P_0\, e^{0.05776t}$; $\ln 3 = \ln e^{0.05776t}$; $t = \frac{\ln 3}{0.05776} \approx 19.02$

5. If it takes 12 hours to double, it would take 24 hours to quadruple, so for tripling, the answer should be somewhere between 12 and 24, and probably not too far from 18.

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1. B

2. H

3. B

4. G

5. A

6. F

7. C

8. J

9. A

10. H

11. B

12. J

13. C

14. F

15. B

16. H

17. B

18. H

19. B

20. J

21. C

22. H

23. C

24. H

25. B

26. F

27. A

28. G

29. B

30. G

31. A

32. H

33. D

34. G

35. A

36. H

37. D

38. J

39. B

40. G

41. A

42. G

43. A

44. G

45. A

46. F

47. A

48. J