PRACTICE TEST 7

Directions: Solve each problem and choose the best answer from the choices given.

1. Evaluate: $15 - 8 \div 2 + 4 \times 3$

A. 17.5

B. 19

C. 23

D. 21

2. A television is on sale for 30% off its original price of $450. What is the sale price?

A. $300

B. $315

C. $350

D. $135

3. Simplify: $5/6 + 3/8$

A. 8/14

B. 15/24

C. 1 1/24

D. 1 5/24

4. If $8x - 15 = 49$, what is the value of x?

A. 8

B. 7

C. 9

D. 6

5. Which of the following is NOT a rational number?

A. 0.333...

B. $\sqrt{25}$

C. $\sqrt{7}$

D. 5/9

6. What is the least common multiple (LCM) of 15 and 20?

A. 5

B. 60

C. 30

D. 300

7. A map scale shows that 1.5 inches represents 45 miles. How many miles does 4 inches represent?

A. 90 miles

B. 100 miles

C. 110 miles

D. 120 miles

8. Solve: $5(2x + 3) - 4 = 3x + 18$

A. x = 1

B. x = 2

C. x = 3

D. x = 4

9. What is the slope of a line passing through (-4, 6) and (2, -9)?

A. -3/2

B. -2

C. -5/2

D. -15/6

10. Simplify: $(4a^3b^2)(2a^2b^4) \div (8ab^3)$

A. ab^4

B. a^4b^3

C. $8a^4b^3$

D. a^5b^3

11. What is 22% of 350?

A. 70

B. 75

C. 72

D. 77

12. If $g(x) = 5x^2 - 3x + 2$, what is $g(-3)$?

A. 56

B. 38

C. 47

D. 52

13. Factor: x² - 13x + 42

A. (x - 6)(x - 7)

B. (x - 3)(x - 14)

C. (x - 6)(x - 7)

D. (x - 2)(x - 21)

14. What is the perimeter of a rectangle with length 15 cm and width 9 cm?

A. 135 cm

B. 48 cm

C. 24 cm

D. 30 cm

15. Solve for x: $2x + 5 \geq 17$

A. $x \geq 5$

B. $x \leq 6$

C. $x > 6$

D. $x \geq 6$

16. A number decreased by 25% equals 60. What is the original number?

A. 80

B. 75

C. 85

D. 90

17. What is the distance between points (7, -3) and (1, 5)?

A. 14

B. 8

C. 10

D. 12

18. Simplify: $\sqrt{128} + \sqrt{50}$

A. $11\sqrt{2}$

B. $13\sqrt{2}$

C. $10\sqrt{2}$

D. $12\sqrt{2}$

19. If $3^x = 243$, what is the value of x?

A. 3

B. 4

C. 6

D. 5

20. What is the mean of: 18, 24, 21, 27, 30, 18?

A. 23

B. 22.5

C. 24

D. 21

21. A store has 45 employees. If 60% are full-time, how many are part-time?

A. 27

B. 15

C. 18

D. 30

22. Solve: $|3x + 7| = 16$

A. x = 3 or x = 23/3

B. x = 3 or x = -23/3

C. x = -3 or x = 23/3

D. x = 9 or x = -3

23. What is the sum of the interior angles of a decagon?

A. 1,080°

B. 1,260°

C. 1,620°

D. 1,440°

24. A cube has edge length 6. What is its volume?

A. 216

B. 36

C. 144

D. 196

25. If $\log_4(x) = 3$, what is x?

A. 12

B. 16

C. 64

D. 81

26. What percent of 150 is 45?

A. 33%

B. 30%

C. 25%

D. 35%

27. Simplify: $(x + 7)(x - 7)$

A. $x^2 - 14$

B. $x^2 + 14$

C. $x^2 + 7x - 49$

D. $x^2 - 49$

28. A train travels 240 miles in 3.5 hours. What is its average speed?

A. 68.57 mph

B. 70 mph

C. 65 mph

D. 72 mph

29. What is the value of cos 30°?

A. 1/2

B. 1

C. √3/2

D. √2/2

30. Solve the system:

$3x + 2y = 20$

$5x - 2y = 12$

A. $x = 5, y = 2.5$

B. $x = 4, y = 4$

C. $x = 3, y = 5.5$

D. $x = 6, y = 1$

31. What is the range of $f(x) = x^2 - 4$?

A. All real numbers

B. $y \geq 0$

C. $y > -4$

D. $y \geq -4$

32. Convert 7π/6 radians to degrees.

A. 210°

B. 240°

C. 270°

D. 300°

33. A cylinder has radius 6 and height 11. What is its volume? (Use $\pi \approx 3.14$)

A. 1,130.4

B. 1,017.36

C. 1,243.44

D. 942

34. Factor completely: $5x^2 - 45$

A. $5(x^2 - 9)$

B. $5(x + 3)(x - 3)$

C. $(5x + 15)(x - 3)$

D. $5(x - 3)^2$

35. What is the greatest common factor (GCF) of 48 and 72?

A. 12

B. 8

C. 6

D. 24

36. If $f(x) = x^3 - 2x + 1$ and $g(x) = 2x + 3$, what is $f(g(1))$?

A. 116

B. 120

C. 124

D. 110

37. A triangle has sides 15, 20, and 25. Is this a right triangle?

A. No

B. Cannot determine

C. Yes

D. Only if given angles

38. What is the slope of the line $2x + 5y = 20$?

A. -5/2

B. -2/5

C. 2/5

D. 5/2

39. Simplify: $(2x + 5)^2$

A. $4x^2 + 25$

B. $4x^2 + 10x + 25$

C. $4x^2 + 20x + 10$

D. $4x^2 + 20x + 25$

40. A jar contains 8 red, 6 blue, and 4 yellow marbles. What is the probability of drawing a red marble?

A. 4/9

B. 1/3

C. 8/18

D. 1/2

41. What is the 10th term of the arithmetic sequence: 7, 12, 17, 22, ...?

A. 47

B. 50

C. 52

D. 57

42. Solve: $x^2 - 5x - 24 = 0$

A. $x = 6$ or $x = -4$

B. $x = 8$ or $x = -3$

C. $x = -8$ or $x = 3$

D. $x = 12$ or $x = -2$

43. What is the area of a circle with diameter 16? (Use $\pi \approx 3.14$)

A. 50.24

B. 100.48

C. 803.84

D. 200.96

44. A rectangle has width 7 and length three times its width. What is the perimeter?

A. 56

B. 42

C. 147

D. 28

45. What is sin 90°?

A. 0

B. 1/2

C. 1

D. $\sqrt{3}/2$

46. Simplify: $\sqrt{18x^6y^4} - \sqrt{8x^6y^4}$

A. $2x^3y^2\sqrt{2}$

B. $x^3y^2\sqrt{2}$

C. $4x^3y^2\sqrt{2}$

D. $3x^3y^2\sqrt{2}$

47. In how many ways can 3 books be selected from 8 books?

A. 24

B. 336

C. 512

D. 56

48. What is the vertex of $y = -(x + 4)^2 + 7$?

A. (-4, 7)

B. (4, 7)

C. (-4, -7)

D. (4, -7)

49. If $2^{x+4} = 128$, what is x?

A. 2

B. 4

C. 3

D. 5

50. What is the area of a parallelogram with base 14 and height 9?

A. 63

B. 126

C. 46

D. 23

51. Solve: $4x - 9 < 3x + 7$

A. $x < 7$

B. $x > 16$

C. $x < 2$

D. $x < 16$

52. What is the value of tan 30°?

A. √3/3

B. 1

C. √3

D. 1/2

53. A sphere has diameter 10. What is its volume? (Use $\pi \approx 3.14$)

A. 4,186.67

B. 418.67

C. 523.33

D. 314

54. Simplify: $(3x^2y)^3$

A. $9x^6y^3$

B. $27x^6y^3$

C. $27x^5y^3$

D. $3x^6y^3$

55. What is the domain of $f(x) = \sqrt{(2x + 10)}$?

A. $x \geq 0$

B. $x \geq 10$

C. $x \geq 2$

D. $x \geq -5$

56. A store marks items 40% above cost. If the cost is $75, what is the selling price?

A. $105

B. $115

C. $100

D. $110

57. What is the product of the solutions to $x^2 - 9x + 20 = 0$?

A. -20

B. 9

C. 20

D. -9

58. If $P(A) = 0.4$ and $P(B) = 0.6$, and events are mutually exclusive, what is $P(A \text{ or } B)$?

A. 0.24

B. 1.0

C. 0.2

D. 0.76

59. What is the measure of each interior angle of a regular pentagon?

A. 120°

B. 100°

C. 72°

D. 108°

60. Solve: $9^x = 729$

A. 3

B. 4

C. 5

D. 6

61. A cone has radius 8 and height 15. What is its volume? (Use $\pi \approx 3.14$)

A. 942

B. 753.6

C. 1,004.8

D. 1,256

62. Factor: $9x^2 - 24x + 16$

A. $(3x - 4)(3x - 4)$

B. $(3x - 4)^2$

C. $(9x - 4)(x - 4)$

D. $(3x + 4)^2$

63. What is the slope of a line perpendicular to $y = (3/4)x + 2$?

A. 3/4

B. -3/4

C. 4/3

D. -4/3

64. Simplify: $(5 - 2i)(3 + i)$

A. 17 - i

B. 15 - 2i

C. 13 + i

D. 17 + i

65. The first term of a geometric sequence is 5 and the common ratio is 3. What is the 5th term?

A. 243

B. 125

C. 405

D. 81

66. What is the distance from point (-3, 7) to the y-axis?

A. 7

B. 3

C. $\sqrt{58}$

D. 10

67. Solve: $(x - 5)^2 = 36$

A. x = 11 or x = 1

B. x = 6 or x = -6

C. x = 41 or x = -31

D. x = 11 or x = -1

68. What is the area of a trapezoid with bases 10 and 16, and height 7?

A. 91

B. 182

C. 70

D. 126

69. If $f(x) = 4x - 5$ and f^{-1} is the inverse function, what is $f^{-1}(15)$?

A. 55

B. 15/4

C. 5

D. 10

70. What is the value of $6! \div 4!$?

A. 1.5

B. 30

C. 2

D. 120

71. A number increased by 40% equals 84. What is the original number?

A. 50

B. 55

C. 70

D. 60

72. Simplify: $\sqrt{(a^{10}b^8)}$

A. a^5b^4

B. a^5b^2

C. a^2b^4

D. $a^{10}b^8$

73. What is the median of: 35, 28, 42, 31, 38, 29, 45?

A. 31

B. 38

C. 35

D. 42

74. Solve the system:

$4x + y = 18$

$2x - 3y = 4$

A. x = 5, y = -2

B. x = 29/7, y = 10/7

C. x = 3, y = 6

D. x = x = 29/7, y = 10/1

75. What is the equation of a circle with center (-5, 2) and radius 8?

A. $(x + 5)^2 + (y - 2)^2 = 8$

B. $(x - 5)^2 + (y + 2)^2 = 64$

C. $x^2 + y^2 = 64$

D. $(x + 5)^2 + (y - 2)^2 = 64$

76. In a group of 50 people, 32 are women. What percent are men?

A. 36%

B. 64%

C. 32%

D. 18%

77. What is the length of the hypotenuse of a right triangle with legs 9 and 40?

A. 49

B. $\sqrt{1{,}681}$

C. 41

D. 31

78. Simplify: $(x^4y^3) \div (x^2y)$

A. x^2y^3

B. x^2y^2

C. x^6y^4

D. xy^2

79. What is the mode of: 12, 15, 12, 18, 20, 15, 12, 22?

A. 15

B. 18

C. 20

D. 12

80. Evaluate: $\log_3(27) + \log_3(81)$

A. 7

B. 5

C. 6

D. 8

81. A ladder 30 feet long leans against a wall. If the base is 18 feet from the wall, how high does it reach?

A. 12 feet

B. 20 feet

C. 24 feet

D. 26 feet

82. What is the solution to $2x^2 = 98$?

A. $x = \pm 49$

B. $x = \pm 7$

C. $x = 7$

D. $x = \pm 14$

83. How many diagonals does an octagon have?

A. 8

B. 16

C. 28

D. 20

84. Simplify: 7/(x - 3) - 2/(x - 3)

A. 5/(x - 3)
B. 9/(x - 3)
C. 5/(2x - 6)
D. 1/(x - 3)

85. What is the x-intercept of 3x - 4y = 24?

A. -8
B. -6
C. 8
D. 6

86. A regular polygon has 12 sides. What is the sum of its interior angles?

A. 1,620°
B. 1,800°
C. 2,160°
D. 1,440°

87. If matrix A is 2 × 5 and matrix B is 5 × 3, what are the dimensions of AB?

A. 5 × 5
B. 2 × 5
C. 5 × 3

D. 2 × 3

88. What is the area of a rhombus with diagonals 18 and 24?

A. 216

B. 432

C. 108

D. 42

89. Solve: 3|x + 2| = 18

A. x = 4 or x = -8

B. x = 6 or x = -6

C. x = 4 or x = -8

D. x = 8 or x = -4

90. What is the probability of rolling a sum of 9 with two dice?

A. 1/6

B. 1/9

C. 5/36

D. 1/12

91. Simplify: (7x + 4) - (3x - 5)

A. 4x - 1

B. 10x + 9

C. 4x - 9

D. 4x + 9

92. What is the volume of a rectangular prism with length 12, width 5, and height 7?

A. 420

B. 360

C. 480

D. 840

93. If $5^{x-1} = 625$, what is x?

A. 3

B. 4

C. 5

D. 6

94. What is the surface area of a cube with edge 9?

A. 81

B. 486

C. 729

D. 54

95. Factor: $x^3 + 27$

A. $(x + 3)(x^2 + 3x + 9)$

B. $(x - 3)(x^2 - 3x + 9)$

C. $(x + 3)(x^2 - 9)$

D. $(x + 3)(x^2 - 3x + 9)$

96. What is the range of: 48, 35, 52, 41, 38, 29?

A. 23

B. 19

C. 13

D. 17

97. Solve: $x/3 - 2 = x/6 + 1$

A. $x = 9$

B. $x = 12$

C. $x = 18$

D. $x = 24$

98. What is the value of $(27)^{(2/3)}$?

A. 18

B. 9

C. 3

D. 6

99. If the ratio of a to b is 5:8 and a = 35, what is b?

A. 43.75

B. 21.88

C. 40

D. 56

100. What is the equation of a line with slope 2 passing through (-3, 4)?

A. y = 2x + 10

B. y = 2x - 2

C. y = 2x + 4

D. y = 2x – 10

Answer Key and Explanations

1. C. 23

Solution: Follow order of operations (PEMDAS). First divide: $8 \div 2 = 4$. Next multiply: $4 \times 3 = 12$. Now substitute: 15 - 4 + 12. Work left to right: 15 - 4 = 11, then 11 + 12 = 23.

2. B. $315

Solution: Calculate 30% of $450: $0.30 \times \$450 = \$135$. Subtract the discount: $450 - $135 = $315. Alternatively, the sale price is 70% of original: $0.70 \times \$450 = \$315$.

3. D. 1 5/24

Solution: Find LCD of 6 and 8, which is 24. Convert: 5/6 = 20/24 and 3/8 = 9/24. Add: 20/24 + 9/24 = 29/24 = 1 5/24.

4. A. 8

Solution: Add 15 to both sides: $8x = 64$. Divide by 8: $x = 8$.

5. C. √7

Solution: Check each: 0.333... = 1/3 (rational), $\sqrt{25} = 5$ (rational), 5/9 is a fraction (rational). However, $\sqrt{7}$ cannot be expressed as a fraction because 7 is not a perfect square, making it irrational.

6. B. 60

Solution: List multiples of 15: 15, 30, 45, 60... List multiples of 20: 20, 40, 60... The LCM is 60.

7. D. 120 miles

Solution: Set up proportion: 1.5 inches/45 miles = 4 inches/x miles. Cross multiply: $1.5x = 180$. Divide: $x = 120$ miles.

8. A. x = 1

Solution: Distribute: $10x + 15 - 4 = 3x + 18$, which simplifies to $10x + 11 = 3x + 18$. Subtract 3x: $7x + 11 = 18$. Subtract 11: $7x = 7$. Divide: $x = 1$.

9. C. -5/2

Solution: Slope = $(y_2 - y_1)/(x_2 - x_1) = (-9 - 6)/(2 - (-4)) = -15/6 = -5/2$.

10. B. a^4b^3

Solution: Multiply numerator: $(4a^3b^2)(2a^2b^4) = 8a^5b^6$. Divide by denominator: $8a^5b^6 \div 8ab^3 = a^4b^3$.

11. D. 77

Solution: Calculate: $0.22 \times 350 = 77$.

12. A. 56

Solution: Substitute -3: $g(-3) = 5(-3)^2 - 3(-3) + 2 = 5(9) + 9 + 2 = 45 + 9 + 2 = 56$.

13. C. $(x - 6)(x - 7)$

Solution: Find two numbers that multiply to 42 and add to -13. The numbers are -6 and -7: $(-6)(-7) = 42$ and $-6 + (-7) = -13$. Therefore $x^2 - 13x + 42 = (x - 6)(x - 7)$.

14. B. 48 cm

Solution: Perimeter $= 2l + 2w = 2(15) + 2(9) = 30 + 18 = 48$ cm.

15. D. $x \geq 6$

Solution: Subtract 5 from both sides: $2x \geq 12$. Divide by 2: $x \geq 6$.

16. A. 80

Solution: Let x = original number. After 25% decrease: $0.75x = 60$. Divide: $x = 60/0.75 = 80$.

17. C. 10

Solution: Distance $= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} = \sqrt{(1 - 7)^2 + (5 - (-3))^2} = \sqrt{36 + 64} = \sqrt{100} = 10$.

18. B. $13\sqrt{2}$

Solution: Simplify each: $\sqrt{128} = \sqrt{64 \times 2} = 8\sqrt{2}$ and $\sqrt{50} = \sqrt{25 \times 2} = 5\sqrt{2}$. Add: $8\sqrt{2} + 5\sqrt{2} = 13\sqrt{2}$.

19. D. 5

Solution: Rewrite 243 as 3^5. Since $3^x = 3^5$, we have $x = 5$.

20. A. 23

Solution: Sum: $18 + 24 + 21 + 27 + 30 + 18 = 138$. Count: 6. Mean: $138 \div 6 = 23$.

21. C. 18

Solution: Full-time employees: $0.60 \times 45 = 27$. Part-time: $45 - 27 = 18$.

22. B. x = 3 or x = -23/3

Solution: Split into cases: $3x + 7 = 16$ OR $3x + 7 = -16$. First case: $3x = 9$, so $x = 3$. Second case: $3x = -23$, so $x = -23/3$.

23. D. 1,440°

Solution: Sum of interior angles: $(n - 2) \times 180° = (10 - 2) \times 180° = 8 \times 180° = 1,440°$.

24. A. 216

Solution: Volume of cube: $V = s^3 = 6^3 = 216$.

25. C. 64

Solution: $\log_4(x) = 3$ means $4^3 = x$. Calculate: $4^3 = 64$.

26. B. 30%

Solution: Percent $= (45/150) \times 100 = 0.30 \times 100 = 30\%$.

27. D. x² - 49

Solution: Difference of squares: $(x + 7)(x - 7) = x^2 - 49$.

28. A. 68.57 mph

Solution: Average speed $= 240 \div 3.5 \approx 68.57$ mph.

29. C. √3/2

Solution: From the unit circle or 30-60-90 triangle, $\cos 30° = \sqrt{3}/2$.

30. B. x = 4, y = 4

Solution: Add equations to eliminate y: $(3x + 2y) + (5x - 2y) = 20 + 12$, giving $8x = 32$, so $x = 4$. Substitute: $3(4) + 2y = 20$, so $12 + 2y = 20$, giving $2y = 8$, and $y = 4$.

31. D. y ≥ -4

Solution: The function $f(x) = x^2 - 4$ is an upward-opening parabola with vertex at $(0, -4)$. The minimum value is -4, so range is $y \geq -4$.

32. A. 210°

Solution: Convert: $(7\pi/6) \times (180/\pi) = (7 \times 180)/6 = 1{,}260/6 = 210°$.

33. C. 1,243.44

Solution: Volume of cylinder: $V = \pi r^2 h = 3.14 \times 6^2 \times 11 = 3.14 \times 36 \times 11 = 1{,}243.44$.

34. B. 5(x + 3)(x - 3)

Solution: Factor out GCF: $5x^2 - 45 = 5(x^2 - 9)$. Recognize difference of squares: $5(x + 3)(x - 3)$.

35. D. 24

Solution: List factors of 48: 1, 2, 3, 4, 6, 8, 12, 16, 24, 48. List factors of 72: 1, 2, 3, 4, 6, 8, 9, 12, 18, 24, 36, 72. The GCF is 24.

36. A. 116

Solution: First find g(1): $g(1) = 2(1) + 3 = 5$. Now find f(5): $f(5) = 5^3 - 2(5) + 1 = 125 - 10 + 1 = 116$.

37. C. Yes

Solution: Check Pythagorean theorem: $15^2 + 20^2$ should equal 25^2. Calculate: $225 + 400 = 625$, and $25^2 = 625$. Since they're equal, this is a right triangle. This is the 3-4-5 triple scaled by 5.

38. B. -2/5

Solution: Rewrite in slope-intercept form: $2x + 5y = 20$ becomes $5y = -2x + 20$, so $y = (-2/5)x + 4$. The slope is -2/5.

39. D. 4x² + 20x + 25

Solution: Use $(a + b)^2 = a^2 + 2ab + b^2$: $(2x)^2 + 2(2x)(5) + 5^2 = 4x^2 + 20x + 25$.

40. A. 4/9

Solution: Total marbles $= 8 + 6 + 4 = 18$. Probability of red $= 8/18 = 4/9$.

41. C. 52

Solution: Formula: $a_n = a_1 + (n - 1)d$. Here: $a_{10} = 7 + (10 - 1)(5) = 7 + 45 = 52$.

42. B. x = 8 or x = -3

Solution: Factor: find numbers that multiply to -24 and add to -5. The numbers are -8 and 3: $(-8)(3) = -24$ and $-8 + 3 = -5$. So $x^2 - 5x - 24 = (x - 8)(x + 3) = 0$. Solutions: $x = 8$ or $x = -3$.

43. D. 200.96

Solution: Radius = diameter/2 = 8. Area = $\pi r^2 = 3.14 \times 8^2 = 3.14 \times 64 = 200.96$.

44. A. 56

Solution: Length = $3 \times 7 = 21$. Perimeter = $2(21) + 2(7) = 42 + 14 = 56$.

45. C. 1

Solution: From the unit circle, $\sin 90° = 1$.

46. B. $x^3y^2\sqrt{2}$

Solution: Simplify each: $\sqrt{(18x^6y^4)} = 3x^3y^2\sqrt{2}$ and $\sqrt{(8x^6y^4)} = 2x^3y^2\sqrt{2}$. Subtract: $3x^3y^2\sqrt{2} - 2x^3y^2\sqrt{2} = x^3y^2\sqrt{2}$.

47. D. 56

Solution: Combination formula: $C(8, 3) = 8!/(3! \times 5!) = (8 \times 7 \times 6)/(3 \times 2 \times 1) = 336/6 = 56$.

48. A. (-4, 7)

Solution: Vertex form $y = a(x - h)^2 + k$ has vertex (h, k). Here $y = -(x + 4)^2 + 7 = -(x - (-4))^2 + 7$, so vertex is $(-4, 7)$.

49. C. 3

Solution: Rewrite 128 as 2^7. So $2^{x+4} = 2^7$, meaning $x + 4 = 7$, and $x = 3$.

50. B. 126

Solution: Area of parallelogram: $A = \text{base} \times \text{height} = 14 \times 9 = 126$.

51. D. x < 16

Solution: Subtract 3x from both sides: x - 9 < 7. Add 9: x < 16.

52. A. √3/3

Solution: From the unit circle or 30-60-90 triangle, tan 30° = 1/√3 = √3/3 (rationalized).

53. C. 523.33

Solution: Radius = diameter/2 = 5. Volume of sphere: V = (4/3)πr³ = (4/3)(3.14)(5³) = (4/3)(3.14)(125) = (4/3)(392.5) ≈ 523.33.

54. B. 27x⁶y³

Solution: Apply power rule: (3x²y)³ = 3³(x²)³(y)³ = 27x⁶y³.

55. D. x ≥ -5

Solution: Expression under square root must be non-negative: 2x + 10 ≥ 0. Subtract 10: 2x ≥ -10. Divide by 2: x ≥ -5.

56. A. $105

Solution: Markup: 0.40 × $75 = $30. Selling price: $75 + $30 = $105. Alternatively: 1.40 × $75 = $105.

57. C. 20

Solution: For quadratic ax² + bx + c = 0, product of solutions = c/a. Here: 20/1 = 20.

58. B. 1.0

Solution: For mutually exclusive events: P(A or B) = P(A) + P(B) = 0.4 + 0.6 = 1.0.

59. D. 108°

Solution: Sum of interior angles: (5 - 2) × 180° = 540°. Each angle: 540° ÷ 5 = 108°.

60. A. 3

Solution: Rewrite 729 as 9³. Since 9ˣ = 9³, we have x = 3.

61. C. 1,004.8

Solution: Volume of cone: V = (1/3)πr²h = (1/3)(3.14)(8²)(15) = (1/3)(3.14)(64)(15) = (1/3)(3,014.4) = 1,004.8.

62. B. (3x - 4)²

Solution: Perfect square trinomial: $9x^2 - 24x + 16 = (3x)^2 - 2(3x)(4) + 4^2 = (3x - 4)^2$.

63. D. -4/3

Solution: Given line has slope 3/4. Perpendicular slope is negative reciprocal: -4/3.

64. A. 17 - i

Solution: Use FOIL: $5(3) + 5(i) + (-2i)(3) + (-2i)(i) = 15 + 5i - 6i - 2i^2 = 15 - i - 2(-1) = 15 - i + 2 = 17 - i$.

65. C. 405

Solution: Formula: $a_n = a_1 \times r^{(n-1)}$. Here: $a_5 = 5 \times 3^4 = 5 \times 81 = 405$.

66. B. 3

Solution: Distance from a point to the y-axis is the absolute value of the x-coordinate: $|-3| = 3$.

67. D. x = 11 or x = -1

Solution: Take square root: $x - 5 = \pm 6$. This gives x - 5 = 6 (so x = 11) or x - 5 = -6 (so x = -1).

68. A. 91

Solution: Area of trapezoid: $A = (1/2)(b_1 + b_2)h = (1/2)(10 + 16)(7) = (1/2)(26)(7) = 91$.

69. C. 5

Solution: To find $f^{-1}(15)$, solve f(x) = 15: 4x - 5 = 15. Add 5: 4x = 20. Divide: x = 5.

70. B. 30

Solution: Calculate: 6! = 720 and 4! = 24. Divide: $720 \div 24 = 30$.

71. D. 60

Solution: Let x = original number. After 40% increase: 1.4x = 84. Divide: x = 84/1.4 = 60.

72. A. a⁵b⁴

Solution: Take square root of each factor: $\sqrt{a^{10}} = a^5$ and $\sqrt{b^8} = b^4$. Result: a^5b^4.

73. C. 35

Solution: Arrange in order: 28, 29, 31, 35, 38, 42, 45. With 7 values, median is the 4th value: 35.

74. B. x = 29/7, y = 10/7

Solution: Solve using substitution. From the first equation, isolate y: $4x + y = 18$, so $y = 18 - 4x$. Substitute this expression into the second equation: $2x - 3(18 - 4x) = 4$. Distribute the -3: $2x - 54 + 12x = 4$. Combine like terms: $14x - 54 = 4$. Add 54 to both sides: $14x = 58$. Divide by 14: $x = 58/14 = 29/7$.

Now substitute $x = 29/7$ back into $y = 18 - 4x$: $y = 18 - 4(29/7) = 18 - 116/7$. Convert 18 to sevenths: $y = 126/7 - 116/7 = 10/7$.

Verify in both equations: $4(29/7) + 10/7 = 116/7 + 10/7 = 126/7 = 18$ ✓ and $2(29/7) - 3(10/7) = 58/7 - 30/7 = 28/7 = 4$ ✓

75. D. (x + 5)² + (y - 2)² = 64

Solution: Circle equation: $(x - h)^2 + (y - k)^2 = r^2$. With center (-5, 2) and radius 8: $(x - (-5))^2 + (y - 2)^2 = 8^2$, which is $(x + 5)^2 + (y - 2)^2 = 64$.

76. A. 36%

Solution: Men = 50 - 32 = 18. Percent: $(18/50) \times 100 = 36\%$.

77. C. 41

Solution: Pythagorean theorem: $c^2 = 9^2 + 40^2 = 81 + 1{,}600 = 1{,}681$, so $c = \sqrt{1{,}681} = 41$. This is the 9-40-41 Pythagorean triple.

78. B. x²y²

Solution: Divide: $x^4y^3 \div x^2y = x^{4-2}y^{3-1} = x^2y^2$.

79. D. 12

Solution: Count frequency: 12 appears three times, 15 appears twice, others once. The mode is 12.

80. A. 7

Solution: Use logarithm property: $\log_3(27) + \log_3(81) = \log_3(27 \times 81) = \log_3(2{,}187) = \log_3(3^7) = 7$.

81. C. 24 feet

Solution: Pythagorean theorem: $18^2 + h^2 = 30^2$. Calculate: $324 + h^2 = 900$, so $h^2 = 576$, and $h = 24$ feet.

82. B. x = ±7

Solution: Divide by 2: $x^2 = 49$. Take square root: $x = \pm 7$.

83. D. 20

Solution: Formula for diagonals: $n(n - 3)/2$. For octagon: $8(8 - 3)/2 = 8(5)/2 = 20$.

84. A. 5/(x - 3)

Solution: Subtract fractions with same denominator: $7/(x - 3) - 2/(x - 3) = (7 - 2)/(x - 3) = 5/(x - 3)$.

85. C. 8

Solution: The x-intercept occurs when $y = 0$: $3x - 4(0) = 24$, so $3x = 24$, and $x = 8$.

86. B. 1,800°

Solution: Sum of interior angles: $(n - 2) \times 180° = (12 - 2) \times 180° = 10 \times 180° = 1,800°$.

87. D. 2 × 3

Solution: Matrix A(2×5) times B(5×3) yields a matrix with dimensions 2×3.

88. A. 216

Solution: Area of rhombus: $A = (1/2)d_1 d_2 = (1/2)(18)(24) = (1/2)(432) = 216$.

89. C. x = 4 or x = -8

Solution: Divide by 3: $|x + 2| = 6$. Split into cases: $x + 2 = 6$ (so $x = 4$) or $x + 2 = -6$ (so $x = -8$).

90. B. 1/9

Solution: Ways to get sum of 9: (3,6), (4,5), (5,4), (6,3)—that's 4 outcomes out of 36 total. Probability: $4/36 = 1/9$.

91. D. 4x + 9

Solution: Distribute negative: $(7x + 4) - (3x - 5) = 7x + 4 - 3x + 5 = 4x + 9$.

92. A. 420

Solution: Volume = length × width × height = $12 \times 5 \times 7 = 420$.

93. C. 5

Solution: Rewrite 625 as 5^4. So $5^{x-1} = 5^4$, meaning x - 1 = 4, and x = 5.

94. B. 486

Solution: A cube has 6 faces, each with area $9^2 = 81$. Surface area: $6 \times 81 = 486$.

95. D. (x + 3)(x² - 3x + 9)

Solution: Sum of cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$. Here $x^3 + 27 = x^3 + 3^3 = (x + 3)(x^2 - 3x + 9)$.

96. A. 23

Solution: Range = maximum - minimum = 52 - 29 = 23.

97. C. 18

Solution: Multiply all terms by 6: 2x - 12 = x + 6. Subtract x: x - 12 = 6. Add 12: x = 18.

98. B. 9

Solution: Rewrite as: $(27)^{(2/3)} = (27^{(1/3)})^2 = 3^2 = 9$. The cube root of 27 is 3, and 3 squared is 9.

99. D. 56

Solution: Set up proportion: 5/8 = 35/b. Cross multiply: 5b = 280. Divide: b = 56.

100. A. y = 2x + 10

Solution: Use point-slope form: y - 4 = 2(x - (-3)). Simplify: y - 4 = 2(x + 3) = 2x + 6. Add 4: y = 2x + 10.