PRACTICE TEST 9

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

1. Evaluate: 18 + 9 ÷ 3 - 4 × 2

A. 13

B. 15

C. 17

D. 11

2. A laptop originally costs $650 and is discounted by 28%. What is the sale price?

A. $450

B. $460

C. $468

D. $478

3. Simplify: 7/12 - 1/4

A. 6/8

B. 1/3

C. 5/12

D. 1/2

4. If 7x + 18 = 67, what is the value of x?

A. 5

B. 6

C. 8

D. 7

5. Which of the following is a rational number?

A. 0.777...

B. $\sqrt{19}$

C. $\sqrt{23}$

D. π

6. What is the greatest common factor (GCF) of 54 and 90?

A. 6

B. 9

C. 18

D. 27

7. A store sells apples at a rate of 5 pounds for $3.75. How much do 13 pounds cost?

A. $9.00

B. $9.75

C. $10.25

D. $8.75

8. Solve: $6(x - 3) + 8 = 4x + 2$

A. $x = 4$

B. $x = 5$

C. $x = 7$

D. $x = 6$

9. What is the slope of the line through (7, -5) and (-1, 11)?

A. -2

B. 2

C. -1/2

D. 1/2

10. Simplify: $(6x^4y^3)(3x^2y^5)$

A. $18x^6y^7$

B. $9x^6y^8$

C. $18x^6y^8$

D. $18x^8y^8$

11. What is 26% of 450?

A. 108

B. 117

C. 126

D. 135

12. If $k(x) = 3x^3 - 4x + 6$, what is $k(-2)$?

A. -18

B. -10

C. -6

D. -10

13. Factor: $x^2 - 17x + 72$

A. $(x - 8)(x - 9)$

B. $(x - 6)(x - 12)$

C. $(x - 4)(x - 18)$

D. $(x - 3)(x - 24)$

14. What is the volume of a sphere with radius 7? (Use $\pi \approx 3.14$)

A. 615.44

B. 1,076.32

C. 1,436.03

D. 904.32

15. Solve for x: $5x - 9 \leq 31$

A. $x \leq 7$

B. $x \leq 8$

C. $x \geq 8$

D. $x < 8$

16. A number increased by 35% equals 108. What is the original number?

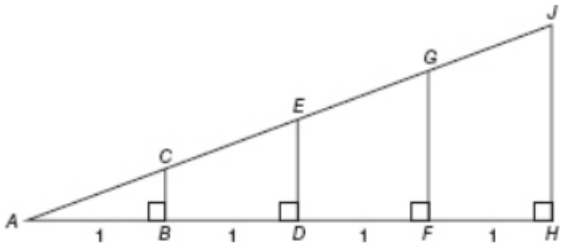
A. 70

B. 75

C. 85

D. 80

17. In the figure above, what is the ratio of the area of △AHJ to the area of △ABC?



A. 4:1

B. 8:1

C. 12:1

D. 16:1

18. What is the distance between points (9, -4) and (-3, 5)?

A. 13

B. 17

C. 15

D. 19

19. Simplify: √200 + √72

A. 16√2

B. 16√2

C. $14\sqrt{2}$

D. $18\sqrt{2}$

20. If $5^x = 3{,}125$, what is the value of x?

A. 4

B. 6

C. 7

D. 5

21. What is the median of: 32, 28, 45, 31, 38, 29, 42?

A. 32

B. 31

C. 38

D. 35

22. A tank holds 480 gallons when full. If it's currently 65% full, how many gallons does it contain?

A. 300

B. 315

C. 312

D. 325

23. Solve: $|5x - 12| = 23$

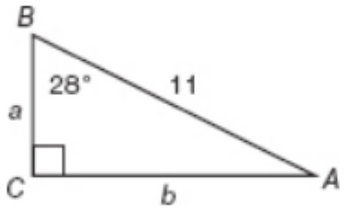
A. $x = 7$ or $x = -2.2$

B. $x = 7$ or $x = -2.2$

C. x = 5 or x = -5

D. x = 11 or x = -11

24. In the figure above, what is the value of b/a?



A. 0.47

B. 0.53

C. 0.67

D. 0.88

25. What is the sum of the interior angles of a nonagon (9 sides)?

A. 1,260°

B. 1,440°

C. 1,620°

D. 1,080°

26. A rectangular prism has length 11, width 8, and height 9. What is its volume?

A. 720

B. 756

C. 792

D. 864

27. If $\log_6(x) = 3$, what is x?

A. 18

B. 216

C. 108

D. 648

28. What percent is 56 out of 280?

A. 15%

B. 18%

C. 25%

D. 20%

29. Simplify: $(x + 11)(x - 11)$

A. $x^2 - 121$

B. $x^2 + 121$

C. $x^2 - 22x - 121$

D. $x^2 + 22$

30. A cyclist travels 84 miles in 3.5 hours. What is the average speed?

A. 22 mph

B. 20 mph

C. 24 mph

D. 26 mph

31. What is the value of $\sin 45°$?

A. 1/2

B. $\sqrt{2}/2$

C. $\sqrt{3}/2$

D. 1

32. Solve the system:

$6x + 5y = 47$

$4x - 5y = 13$

A. $x = 5, y = 3.4$

B. $x = 7, y = 1$

C. $x = 4, y = 4.6$

D. $x = 6, y = 2.2$

33. What is the range of $f(x) = (x - 3)^2 + 2$?

A. $y \geq 2$

B. $y \leq 2$

C. $y \geq 3$

D. All real numbers

34. Convert $13\pi/4$ radians to degrees.

A. 540°

B. 630°

C. 585°

D. 495°

35. A cone has radius 9 and height 20. What is its volume? (Use $\pi \approx 3.14$)

A. 1,695.6

B. 1,695.6

C. 2,260.8

D. 5,652

36. Factor completely: $4x^2 - 100$

A. $4(x^2 - 25)$

B. $(2x - 10)(2x + 10)$

C. $4(x - 5)^2$

D. $4(x + 5)(x - 5)$

37. What is the least common multiple (LCM) of 16 and 28?

A. 112

B. 4

C. 56

D. 224

38. If $f(x) = x^2 - 6x + 5$ and $g(x) = 3x - 2$, what is $f(g(2))$?

A. 21

B. 9

C. 5

D. -3

39. A triangle has sides 13, 84, and 85. Is this a right triangle?

A. No

B. Yes

C. Cannot determine

D. Only if angles given

40. What is the slope of the line $5x + 8y = 40$?

A. 5/8

B. 8/5

C. -8/5

D. -5/8

41. Simplify: $(3x - 7)^2$

A. $9x^2 - 42x + 49$

B. $9x^2 - 21x + 49$

C. $9x^2 - 42x + 14$

D. $9x^2 + 49$

42. A box contains 12 red, 8 blue, and 5 green balls. What is the probability of drawing a blue ball?

A. 8/25

B. 12/25

C. 8/25

D. 1/3

43. What is the 12th term of the arithmetic sequence: 5, 11, 17, 23, ...?

A. 59

B. 71

C. 65

D. 77

44. Solve: $x^2 - 8x + 15 = 0$

A. $x = 5$ or $x = 3$

B. $x = -5$ or $x = -3$

C. $x = 15$ or $x = 1$

D. $x = 5$ or $x = 3$

45. What is the area of a circle with diameter 20? (Use $\pi \approx 3.14$)

A. 314

B. 62.8

C. 1,256

D. 628

46. A rectangle has length 18 and width 7. What is its perimeter?

A. 126

B. 32

C. 50

D. 25

47. What is cos 90°?

A. 1

B. 0

C. $\sqrt{2}/2$

D. Undefined

48. Simplify: $\sqrt{(75x^{10}y^6)} - \sqrt{(27x^{10}y^6)}$

A. $3x^5y^3\sqrt{3}$

B. $2x^5y^3\sqrt{3}$

C. $4x^5y^3\sqrt{3}$

D. $2x^5y^3\sqrt{3}$

49. In how many ways can 4 books be selected from 11 books?

A. 330

B. 44

C. 7,920

D. 14,641

50. What is the vertex of $y = -3(x + 2)^2 + 5$?

A. (2, 5)

B. (-2, -5)

C. (-2, 5)

D. (2, -5)

51. If $4^{x+3} = 1{,}024$, what is x?

A. 4

B. 2

C. 5

D. 3

52. What is the area of a trapezoid with bases 16 and 24, and height 10?

A. 160

B. 240

C. 400

D. 200

53. Solve: $8x + 5 < 6x + 23$

A. $x < 9$

B. $x > 9$

C. $x < 18$

D. $x < 14$

54. What is tan 60°?

A. 1

B. $\sqrt{3}/2$

C. $\sqrt{3}$

D. 1/2

55. A cylinder has radius 8 and height 12. What is its volume? (Use $\pi \approx 3.14$)

A. 2,009.6

B. 2,411.52

C. 1,205.76

D. 3,014.4

56. Simplify: $(5a^2b^3)^3$

A. $15a^6b^9$

B. $125a^5b^6$

C. $15a^5b^9$

D. $125a^6b^9$

57. What is the domain of $f(x) = \sqrt{(3x - 15)}$?

A. $x \geq 5$

B. $x \geq 15$

C. $x \geq 3$

D. $x > 5$

58. A store marks items 65% above cost. If the cost is $90, what is the selling price?

A. $135

B. $145.50

C. $148.50

D. $155

59. What is the product of the solutions to $x^2 + 12x + 35 = 0$?

A. -35

B. 35

C. -12

D. 12

60. If P(A) = 0.25 and P(B) = 0.60, and events are independent, what is P(A and B)?

A. 0.85

B. 0.35

C. 0.10

D. 0.15

61. What is the measure of each interior angle of a regular decagon?

A. 144°

B. 135°

C. 150°

D. 120°

62. Solve: $27^x = 2{,}187$

A. 2

B. 4

C. 3

D. 5

63. A sphere has diameter 14. What is its surface area? (Use $\pi \approx 3.14$)

A. 153.86

B. 615.44

C. 1,384.74

D. 307.72

64. Factor: $25x^2 + 60x + 36$

A. $(5x + 6)(5x + 6)$

B. $(5x - 6)^2$

C. $(25x + 6)(x + 6)$

D. $(5x + 6)^2$

65. What is the slope of a line perpendicular to $y = (4/7)x - 3$?

A. -7/4

B. 4/7

C. 7/4

D. -4/7

66. Simplify: $(7 - 3i)(4 + 2i)$

A. $28 - 12i$

B. $22 + 2i$

C. $34 + 2i$

D. $28 + 6i$

67. The first term of a geometric sequence is 6 and the common ratio is 2. What is the 7th term?

A. 192

B. 384

C. 768

D. 96

68. What is the distance from point (12, -8) to the y-axis?

A. 8

B. $\sqrt{208}$

C. 20

D. 12

69. Solve: $(x - 8)^2 = 81$

A. $x = 17$ or $x = -1$

B. $x = 9$ or $x = -9$

C. $x = 73$ or $x = -57$

D. $x = 8$ or $x = -8$

70. What is the area of a triangle with base 22 and height 14?

A. 308

B. 36

C. 154

D. 77

71. If $f(x) = 6x + 9$ and f^{-1} is the inverse function, what is $f^{-1}(27)$?

A. 171

B. 3

C. 4.5

D. 6

72. What is the value of $8! \div 6!$?

A. 1.33

B. 8

C. 48

D. 56

73. A number increased by 20% equals 96. What is the original number?

A. 80

B. 75

C. 85

D. 90

74. Simplify: $\sqrt{(x^{14}y^{12})}$

A. $x^{14}y^{12}$

B. $x^{7}y^{12}$

C. $x^{7}y^{6}$

D. $x^{12}y^{7}$

75. What is the range of: 67, 52, 74, 48, 61, 55?

A. 19

B. 26

C. 22

D. 15

76. Solve the system:

$7x - 3y = 25$

$5x + 3y = 35$

A. $x = 4, y = 1$

B. $x = 6, y = 5.67$

C. $x = 3, y = -4/3$

D. $x = 5, y = 10/3$

77. What is the equation of a circle with center (-4, 9) and radius 10?

A. $(x + 4)^2 + (y - 9)^2 = 100$

B. $(x - 4)^2 + (y + 9)^2 = 100$

C. $(x + 4)^2 + (y + 9)^2 = 10$

D. $x^2 + y^2 = 100$

78. In a group of 75 people, 48 are adults. What percent are children?

A. 64%

B. 48%

C. 36%

D. 27%

79. What is the length of the hypotenuse of a right triangle with legs 16 and 63?

A. 79

B. 65

C. $\sqrt{4,225}$

D. 47

80. Simplify: $(x^7y^5) \div (x^4y^2)$

A. $x^{11}y^7$

B. x^3y^2

C. x^4y^3

D. x^3y^3

81. What is the mode of: 18, 22, 18, 25, 30, 22, 18, 27?

A. 18

B. 22

C. 25

D. 23

82. Evaluate: $\log_4(64) + \log_4(256)$

A. 320

B. 6

C. 7

D. 8

83. A ladder 40 feet long leans against a wall. If the base is 24 feet from the wall, how high does it reach?

A. 16 feet

B. 32 feet

C. 28 feet

D. 36 feet

84. What is the solution to $3x^2 = 147$?

A. $x = \pm 49$

B. $x = 7$

C. $x = \pm 21$

D. $x = \pm 7$

85. How many diagonals does a dodecagon (12 sides) have?

A. 54

B. 36

C. 72

D. 108

86. Simplify: $11/(x - 6) - 4/(x - 6)$

A. $15/(x - 6)$

B. $15/(2x - 12)$

C. $7/(x - 6)$

D. $1/(x - 6)$

87. What is the x-intercept of $6x - 5y = 30$?

A. -5

B. 5

C. 6

D. -6

88. A regular polygon has 18 sides. What is the sum of its interior angles?

A. 3,240°

B. 2,520°

C. 2,880°

D. 3,600°

89. If matrix A is 3×6 and matrix B is 6×4, what are the dimensions of AB?

A. 3×4

B. 6×6

C. 3×6

D. Cannot multiply

90. What is the area of a rhombus with diagonals 26 and 40?

A. 1,040

B. 2,080

C. 520

D. 66

91. Solve: $5|x + 3| = 35$

A. $x = 10$ or $x = -4$

B. $x = 4$ or $x = -10$

C. $x = 7$ or $x = -7$

D. $x = 38$ or $x = -32$

92. What is the probability of rolling a sum of 7 with two dice?

A. 1/9

B. 5/36

C. 1/12

D. 1/6

93. Simplify: $(9x + 7) - (5x - 4)$

A. $4x + 11$

B. $14x + 3$

C. $4x - 3$

D. $4x + 3$

94. What is the volume of a rectangular prism with length 14, width 9, and height 8?

A. 756

B. 896

C. 1,008

D. 1,120

95. If $8^{x-1} = 4{,}096$, what is x?

A. 3

B. 5

C. 6

D. 4

96. What is the surface area of a cube with edge 13?

A. 169

B. 2,197

C. 1,014

D. 1,014

97. Factor: $x^3 + 125$

A. $(x + 5)(x^2 - 5x + 25)$

B. $(x - 5)(x^2 + 5x + 25)$

C. $(x + 5)(x^2 - 25)$

D. $(x + 5)^3$

98. What is the mean of: 24, 32, 28, 36, 40, 30?

A. 28

B. 31

C. 31.67

D. 32

99. Solve: x/4 - 3 = x/6 + 1

A. x = 18

B. x = 48

C. x = 72

D. x = 24

100. What is the value of (216)^(2/3)?

A. 72

B. 6

C. 12

D. 36

Answer Key and Explanations

1. A. 13

Solution: Follow order of operations (PEMDAS). First divide: $9 \div 3 = 3$. Next multiply: $4 \times 2 = 8$. Now substitute: $18 + 3 - 8$. Work left to right: $18 + 3 = 21$, then $21 - 8 = 13$.

2. C. $468

Solution: Calculate 28% of $650: $0.28 \times \$650 = \$182$. Subtract the discount: $\$650 - \$182 = \$468$. Alternatively, the sale price is 72% of original: $0.72 \times \$650 = \$468$.

3. B. 1/3

Solution: Find LCD of 12 and 4, which is 12. Convert: $1/4 = 3/12$. Subtract: $7/12 - 3/12 = 4/12 = 1/3$.

4. D. 7

Solution: Subtract 18 from both sides: $7x = 49$. Divide by 7: $x = 7$.

5. A. 0.777...

Solution: Check each: 0.777... = 7/9 (rational repeating decimal), $\sqrt{19}$ is irrational (19 is not a perfect square), $\sqrt{23}$ is irrational (23 is not a perfect square), and π is irrational. The answer is 0.777...

6. C. 18

Solution: List factors of 54: 1, 2, 3, 6, 9, 18, 27, 54. List factors of 90: 1, 2, 3, 5, 6, 9, 10, 15, 18, 30, 45, 90. The GCF is 18.

7. B. $9.75

Solution: Set up proportion: 5 pounds/$3.75 = 13 pounds/x dollars. Cross multiply: $5x = 13 \times 3.75 = 48.75$. Divide: $x = \$9.75$.

8. D. x = 6

Solution: Distribute: $6x - 18 + 8 = 4x + 2$, which simplifies to $6x - 10 = 4x + 2$. Subtract 4x: $2x - 10 = 2$. Add 10: $2x = 12$. Divide: $x = 6$.

9. A. -2

Solution: Slope = $(y_2 - y_1)/(x_2 - x_1) = (11 - (-5))/(-1 - 7) = 16/(-8) = -2$.

10. C. $18x^6y^8$

Solution: Multiply coefficients: $6 \times 3 = 18$. For x: $x^4 \times x^2 = x^6$. For y: $y^3 \times y^5 = y^8$. Result: $18x^6y^8$.

11. B. 117

Solution: Calculate: $0.26 \times 450 = 117$.

12. D. -10

Solution: Substitute -2: $k(-2) = 3(-2)^3 - 4(-2) + 6 = 3(-8) + 8 + 6 = -24 + 8 + 6 = -10$.

13. A. (x - 8)(x - 9)

Solution: Find two numbers that multiply to 72 and add to -17. The numbers are -8 and -9: $(-8)(-9) = 72$ and $-8 + (-9) = -17$. Therefore $x^2 - 17x + 72 = (x - 8)(x - 9)$.

14. C. 1,436.03

Solution: Volume of sphere: $V = (4/3)\pi r^3 = (4/3)(3.14)(7^3) = (4/3)(3.14)(343) = (4/3)(1,077.02) \approx 1,436.03$.

15. B. $x \leq 8$

Solution: Add 9 to both sides: $5x \leq 40$. Divide by 5: $x \leq 8$.

16. D. 80

Solution: Let x = original number. After 35% increase: $1.35x = 108$. Divide: $x = 108/1.35 = 80$.

17. A. 4:1

Solution: Looking at the diagram, the base segments are each 1 unit. The entire base AB has segments totaling 4 units (from A to B is 1+1+1+1=4). Triangle AHJ has base AH = 4 units. Triangle ABC has base AC = 1 unit (from A to B is 1 unit to C).

18. C. 15

Solution: Distance $= \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]} = \sqrt{[(-3 - 9)^2 + (5 - (-4))^2]} = \sqrt{[144 + 81]} = \sqrt{225} = 15$.

19. B. $16\sqrt{2}$

Solution: Simplify each: $\sqrt{200} = \sqrt{(100 \times 2)} = 10\sqrt{2}$ and $\sqrt{72} = \sqrt{(36 \times 2)} = 6\sqrt{2}$. Add: $10\sqrt{2} + 6\sqrt{2} = 16\sqrt{2}$.

20. D. 5

Solution: Rewrite 3,125 as 5^5. Since $5^x = 5^5$, we have $x = 5$.

21. A. 32

Solution: Arrange in order: 28, 29, 31, 32, 38, 42, 45. With 7 values, median is the 4th value: 32.

22. C. 312

Solution: Calculate: $0.65 \times 480 = 312$ gallons.

23. B. x = 7 or x = -2.2

Solution: Split into cases: $5x - 12 = 23$ OR $5x - 12 = -23$. First case: $5x = 35$, so $x = 7$. Second case: $5x = -11$, so $x = -2.2$.

24. B. 0.53

Solution: In the right triangle ABC with the right angle at C, we have:

- Angle B = 28°
- Hypotenuse BA = 11
- Side a = BC (vertical side, adjacent to the 28° angle at B)
- Side b = CA (horizontal side, opposite to the 28° angle at B)

Using trigonometric ratios from angle B:

Find side a (adjacent to 28°): $\cos(28°) = a/11$ So $a = 11 \cdot \cos(28°)$

Find side b (opposite to 28°): $\sin(28°) = b/11$ So $b = 11 \cdot \sin(28°)$

Calculate b/a: $b/a = (11 \cdot \sin(28°))/(11 \cdot \cos(28°)) = \sin(28°)/\cos(28°) = \tan(28°)$

Evaluate: $\tan(28°) \approx 0.5317 \approx 0.53$

Key concept: The ratio of the opposite side to the adjacent side (from a given acute angle in a right triangle) equals the tangent of that angle.

25. A. 1,260°

Solution: Sum of interior angles: $(n - 2) \times 180° = (9 - 2) \times 180° = 7 \times 180° = 1{,}260°$.

26. C. 792

Solution: Volume = length × width × height = $11 \times 8 \times 9 = 792$.

27. B. 216

Solution: $\log_6(x) = 3$ means $6^3 = x$. Calculate: $6^3 = 216$.

28. D. 20%

Solution: Percent = $(56/280) \times 100 = 0.20 \times 100 = 20\%$.

29. A. $x^2 - 121$

Solution: Difference of squares: $(x + 11)(x - 11) = x^2 - 121$.

30. C. 24 mph

Solution: Average speed = $84 \div 3.5 = 24$ mph.

31. B. $\sqrt{2}/2$

Solution: From the unit circle or 45-45-90 triangle, $\sin 45° = \sqrt{2}/2$.

32. D. x = 6, y = 2.2

Solution: Add equations to eliminate y: $(6x + 5y) + (4x - 5y) = 47 + 13$, giving $10x = 60$, so $x = 6$. Substitute: $6(6) + 5y = 47$, so $36 + 5y = 47$, giving $5y = 11$, and $y = 2.2$.

33. A. $y \geq 2$

Solution: The function $f(x) = (x - 3)^2 + 2$ is an upward-opening parabola with vertex at (3, 2). The minimum value is 2, so range is $y \geq 2$.

34. C. 585°

Solution: Convert: $(13\pi/4) \times (180/\pi) = (13 \times 180)/4 = 2,340/4 = 585°$.

35. B. 1,695.6

Solution: Volume of cone: $V = (1/3)\pi r^2 h = (1/3)(3.14)(9^2)(20) = (1/3)(3.14)(81)(20) = (1/3)(5,086.8) = 1,695.6$.

36. D. 4(x + 5)(x - 5)

Solution: Factor out GCF: $4x^2 - 100 = 4(x^2 - 25)$. Recognize difference of squares: $4(x + 5)(x - 5)$.

37. A. 112

Solution: List multiples of 16: 16, 32, 48, 64, 80, 96, 112... List multiples of 28: 28, 56, 84, 112... The LCM is 112.

38. D. -3

Solution: First find g(2): $g(2) = 3(2) - 2 = 4$. Now find f(4): $f(4) = 4^2 - 6(4) + 5 = 16 - 24 + 5 = -3$.

39. B. Yes

Solution: Check Pythagorean theorem: $13^2 + 84^2$ should equal 85^2. Calculate: 169 + 7,056 = 7,225, and $85^2 = 7{,}225$. Since they're equal, this is a right triangle. This is the 13-84-85 Pythagorean triple.

40. D. -5/8

Solution: Rewrite in slope-intercept form: $5x + 8y = 40$ becomes $8y = -5x + 40$, so $y = (-5/8)x + 5$. The slope is -5/8.

41. A. $9x^2 - 42x + 49$

Solution: Use $(a - b)^2 = a^2 - 2ab + b^2$: $(3x)^2 - 2(3x)(7) + 7^2 = 9x^2 - 42x + 49$.

42. C. 8/25

Solution: Total balls = 12 + 8 + 5 = 25. Probability of blue = 8/25.

43. B. 71

Solution: Formula: $a_n = a_1 + (n - 1)d$. Here: $a_{12} = 5 + (12 - 1)(6) = 5 + 66 = 71$.

44. D. x = 5 or x = 3

Solution: Factor: find numbers that multiply to 15 and add to -8. The numbers are -5 and -3: $(-5)(-3) = 15$ and $-5 + (-3) = -8$. So $x^2 - 8x + 15 = (x - 5)(x - 3) = 0$. Solutions: x = 5 or x = 3.

45. A. 314

Solution: Radius = diameter/2 = 10. Area = $\pi r^2 = 3.14 \times 10^2 = 3.14 \times 100 = 314$.

46. C. 50

Solution: Perimeter = $2l + 2w = 2(18) + 2(7) = 36 + 14 = 50$.

47. B. 0

Solution: From the unit circle, $\cos 90° = 0$.

48. D. $2x^5y^3\sqrt{3}$

Solution: Simplify each: $\sqrt{(75x^{10}y^6)} = 5x^5y^3\sqrt{3}$ and $\sqrt{(27x^{10}y^6)} = 3x^5y^3\sqrt{3}$. Subtract: $5x^5y^3\sqrt{3} - 3x^5y^3\sqrt{3} = 2x^5y^3\sqrt{3}$.

49. A. 330

Solution: Combination formula: $C(11, 4) = 11!/(4! \times 7!) = (11 \times 10 \times 9 \times 8)/(4 \times 3 \times 2 \times 1) = 7{,}920/24 = 330$.

50. C. (-2, 5)

Solution: Vertex form $y = a(x - h)^2 + k$ has vertex (h, k). Here $y = -3(x + 2)^2 + 5 = -3(x - (-2))^2 + 5$, so vertex is $(-2, 5)$.

51. B. 2

Solution: Rewrite 1,024 as 4^5. Since $4^{x+3} = 4^5$, we have $x + 3 = 5$, so $x = 2$.

52. D. 200

Solution: Area of trapezoid: $A = (1/2)(b_1 + b_2)h = (1/2)(16 + 24)(10) = (1/2)(40)(10) = 200$.

53. A. $x < 9$

Solution: Subtract 6x from both sides: $2x + 5 < 23$. Subtract 5: $2x < 18$. Divide by 2: $x < 9$.

54. C. $\sqrt{3}$

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

55. B. 2,411.52

Solution: Volume of cylinder: $V = \pi r^2 h = 3.14 \times 8^2 \times 12 = 3.14 \times 64 \times 12 = 2{,}411.52$.

56. D. $125a^6b^9$

Solution: Apply power rule: $(5a^2b^3)^3 = 5^3(a^2)^3(b^3)^3 = 125a^6b^9$.

57. A. $x \geq 5$

Solution: Expression under square root must be non-negative: $3x - 15 \geq 0$. Add 15: $3x \geq 15$. Divide by 3: $x \geq 5$.

58. C. $148.50

Solution: Markup: 0.65 × $90 = $58.50. Selling price: $90 + $58.50 = $148.50. Alternatively: 1.65 × $90 = $148.50.

59. B. 35

Solution: For quadratic $ax^2 + bx + c = 0$, product of solutions = c/a. Here: 35/1 = 35.

60. D. 0.15

Solution: For independent events: P(A and B) = P(A) × P(B) = 0.25 × 0.60 = 0.15.

61. A. 144°

Solution: Sum of interior angles: (10 - 2) × 180° = 1,440°. Each angle: 1,440° ÷ 10 = 144°.

62. C. 3

Solution: Rewrite 2,187 as $27^3 = (27)^3$. Since $27^x = 27^3$, we have x = 3.

63. B. 615.44

Solution: Radius = diameter/2 = 7. Surface area of sphere: $SA = 4\pi r^2 = 4(3.14)(7^2) = 4(3.14)(49) = 615.44$.

64. D. $(5x + 6)^2$

Solution: Perfect square trinomial: $25x^2 + 60x + 36 = (5x)^2 + 2(5x)(6) + 6^2 = (5x + 6)^2$.

65. A. -7/4

Solution: Given line has slope 4/7. Perpendicular slope is negative reciprocal: -7/4.

66. C. 34 + 2i

Solution: Use FOIL: $7(4) + 7(2i) + (-3i)(4) + (-3i)(2i) = 28 + 14i - 12i - 6i^2 = 28 + 2i - 6(-1) = 28 + 2i + 6 = 34 + 2i$.

67. B. 384

Solution: Formula: $a_n = a_1 \times r^{(n-1)}$. Here: $a_7 = 6 \times 2^6 = 6 \times 64 = 384$.

68. D. 12

Solution: Distance from a point to the y-axis is the absolute value of the x-coordinate: $|12| = 12$.

69. A. $x = 17$ or $x = -1$

Solution: Take square root: $x - 8 = \pm 9$. This gives $x - 8 = 9$ (so $x = 17$) or $x - 8 = -9$ (so $x = -1$).

70. C. 154

Solution: Area of triangle: $A = (1/2)bh = (1/2)(22)(14) = 154$.

71. B. 3

Solution: To find $f^{-1}(27)$, solve $f(x) = 27$: $6x + 9 = 27$. Subtract 9: $6x = 18$. Divide: $x = 3$.

72. D. 56

Solution: Calculate: $8! = 40{,}320$ and $6! = 720$. Divide: $40{,}320 \div 720 = 56$.

73. A. 80

Solution: Let x = original number. After 20% increase: $1.20x = 96$. Divide: $x = 96/1.20 = 80$.

74. C. x^7y^6

Solution: Take square root of each factor: $\sqrt{(x^{14})} = x^7$ and $\sqrt{(y^{12})} = y^6$. Result: x^7y^6.

75. B. 26

Solution: Range = maximum - minimum = 74 - 48 = 26.

76. D. $x = 5$, $y = 10/3$

Solution: Add equations to eliminate y: $(7x - 3y) + (5x + 3y) = 25 + 35$, giving $12x = 60$, so $x = 5$. Substitute: $7(5) - 3y = 25$, so $35 - 3y = 25$, giving $3y = 10$, and $y = 10/3$.

77. A. $(x + 4)^2 + (y - 9)^2 = 100$

Solution: Circle equation: $(x - h)^2 + (y - k)^2 = r^2$. With center $(-4, 9)$ and radius 10: $(x - (-4))^2 + (y - 9)^2 = 10^2$, which is $(x + 4)^2 + (y - 9)^2 = 100$.

78. C. 36%

Solution: Children = 75 - 48 = 27. Percent: $(27/75) \times 100 = 0.36 \times 100 = 36\%$.

79. B. 65

Solution: Pythagorean theorem: $c^2 = 16^2 + 63^2 = 256 + 3{,}969 = 4{,}225$, so $c = \sqrt{4{,}225} = 65$. This is the 16-63-65 Pythagorean triple.

80. D. x^3y^3

Solution: Divide: $x^7y^5 \div x^4y^2 = x^{7-4}y^{5-2} = x^3y^3$.

81. A. 18

Solution: Count frequency: 18 appears three times, 22 appears twice, others once. The mode is 18.

82. C. 7

Solution: Use logarithm property: $\log_4(64) + \log_4(256) = \log_4(64 \times 256) = \log_4(16{,}384) = \log_4(4^7) = 7$.

83. B. 32 feet

Solution: Pythagorean theorem: $24^2 + h^2 = 40^2$. Calculate: $576 + h^2 = 1{,}600$, so $h^2 = 1{,}024$, and $h = 32$ feet.

84. D. $x = \pm 7$

Solution: Divide by 3: $x^2 = 49$. Take square root: $x = \pm 7$.

85. A. 54

Solution: Formula for diagonals: $n(n - 3)/2$. For dodecagon: $12(12 - 3)/2 = 12(9)/2 = 54$.

86. C. $7/(x - 6)$

Solution: Subtract fractions with same denominator: $11/(x - 6) - 4/(x - 6) = (11 - 4)/(x - 6) = 7/(x - 6)$.

87. B. 5

Solution: The x-intercept occurs when $y = 0$: $6x - 5(0) = 30$, so $6x = 30$, and $x = 5$.

88. C. 2,880°

Solution: Sum of interior angles: $(n - 2) \times 180° = (18 - 2) \times 180° = 16 \times 180° = 2{,}880°$.

89. A. 3 × 4

Solution: Matrix A(3×6) times B(6×4) yields a matrix with dimensions 3 × 4.

90. C. 520

Solution: Area of rhombus: $A = (1/2)d_1d_2 = (1/2)(26)(40) = 520$.

91. B. x = 4 or x = -10

Solution: Divide by 5: $|x + 3| = 7$. Split into cases: $x + 3 = 7$ (so $x = 4$) or $x + 3 = -7$ (so $x = -10$).

92. D. 1/6

Solution: Ways to get sum of 7: (1,6), (2,5), (3,4), (4,3), (5,2), (6,1)—that's 6 outcomes out of 36 total. Probability: 6/36 = 1/6.

93. A. 4x + 11

Solution: Distribute negative: $(9x + 7) - (5x - 4) = 9x + 7 - 5x + 4 = 4x + 11$.

94. C. 1,008

Solution: Volume = length × width × height = 14 × 9 × 8 = 1,008.

95. B. 5

Solution: Rewrite 4,096 as 8^4. So $8^{x-1} = 8^4$, meaning $x - 1 = 4$, and $x = 5$.

96. D. 1,014

Solution: A cube has 6 faces, each with area $13^2 = 169$. Surface area: $6 \times 169 = 1,014$.

97. A. $(x + 5)(x^2 - 5x + 25)$

Solution: Sum of cubes: $a^3 + b^3 = (a + b)(a^2 - ab + b^2)$. Here $x^3 + 125 = x^3 + 5^3 = (x + 5)(x^2 - 5x + 25)$.

98. C. 31.67

Solution: Sum: 24 + 32 + 28 + 36 + 40 + 30 = 190. Count: 6. Mean: 190 ÷ 6 ≈ 31.67.

99. B. 48

Solution: Multiply all terms by 12: $3x - 36 = 2x + 12$. Subtract 2x: $x - 36 = 12$. Add 36: $x = 48$.

100. D. 36

Solution: Rewrite as: $(216)^{(2/3)} = (216^{(1/3)})^2 = 6^2 = 36$. The cube root of 216 is 6, and 6 squared is 36.