PRACTICE TEST 6

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

1. What is the value of $8 + 12 \div 4 - 2 \times 3$?

A. 5

B. 8

C. 2

D. 11

2. A shirt originally costs $48 and is on sale for 25% off. What is the sale price?

A. $36

B. $38

C. $40

D. $42

3. Simplify: 7/9 - 2/3

A. 5/6

B. 1/9

C. 5/9

D. 2/9

4. If $6x + 9 = 45$, what is the value of x?

A. 4

B. 5

C. 6

D. 7

5. Which of the following is an irrational number?

A. $\sqrt{16}$

B. 0.75

C. $\sqrt{13}$

D. 3/7

6. What is the greatest common factor (GCF) of 36 and 60?

A. 6

B. 12

C. 18

D. 4

7. A recipe requires 2/3 cup of sugar for 12 cookies. How many cups are needed for 30 cookies?

A. 1 1/3 cups

B. 1 2/3 cups

C. 5/3 cups

D. 2 cups

8. Solve: $4(x - 5) = 2x + 6$

A. x = 10

B. x = 11

C. x = 12

D. x = 13

9. What is the slope of a line passing through points (3, 7) and (9, 19)?

A. 2

B. 3

C. 1/2

D. 12

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

A. $15x^3y^7$

B. $15x^2y^7$

C. $8x^3y^7$

D. $15x^3y^{12}$

11. What is 18% of 250?

A. 40

B. 45

C. 50

D. 55

12. If f(x) = 4x - 7, what is f(5)?

A. 11

B. 13

C. 17

D. 23

13. Factor: $x^2 + 9x + 20$

A. $(x + 4)(x + 5)$

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

C. $(x + 1)(x + 20)$

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

14. What is the area of a circle with radius 8? (Use $\pi \approx 3.14$)

A. 25.12

B. 50.24

C. 200.96

D. 100.48

15. Solve for x: $3x - 8 \leq 19$

A. $x \leq 8$

B. $x \geq 9$

C. $x \leq 11$

D. $x \leq 9$

16. A number is increased by 40% and the result is 84. What was the original number?

A. 50

B. 60

C. 70

D. 80

17. What is the distance between points (-2, 5) and (4, -3)?

A. 10

B. 8

C. 12

D. 14

18. Simplify: $\sqrt{98} - \sqrt{32}$

A. $\sqrt{66}$

B. $2\sqrt{2}$

C. $3\sqrt{2}$

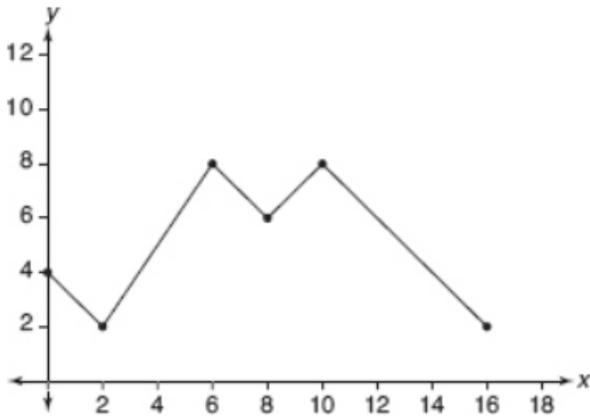D. $3\sqrt{2}$

19. If $2^x = 128$, what is the value of x?

A. 5

B. 6

C. 7

D. 8

20. What is the median of: 14, 23, 18, 31, 16, 27, 19?

A. 18

B. 19

C. 23

D. 21

21. The members of the varsity baseball team at Meadowlawn High School are all juniors and seniors. There are 5 more seniors on the team than juniors. If 40% of the team members are juniors, how many students are on the team?

A. 18

B. 24

C. 20

D. 25

22. Solve: $|2x - 5| = 11$

A. x = 8 or x = -3

B. x = 8 or x = 3

C. x = 3 or x = -3

D. x = -8 or x = 3

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

A. 360°

B. 540°

C. 540°

D. 720°

24. A rectangular prism has dimensions 6 cm × 4 cm × 9 cm. What is its volume?

A. 180 cm³

B. 216 cm³

C. 240 cm³

D. 196 cm³

25. If $\log_3(x) = 5$, what is x?

A. 15

B. 125

C. 81

D. 243

26. What percent is 35 out of 140?

A. 25%

B. 20%

C. 30%

D. 35%

27. Simplify: (x - 4)(x + 4)

A. x^2 - 8

B. x² + 8x - 16

C. x² - 16

D. x² + 16

28. A car travels at 65 mph for 4.5 hours. How far does it travel?

A. 272.5 miles

B. 292.5 miles

C. 302.5 miles

D. 282.5 miles

29. What is the value of sin 60°?

A. 1/2

B. 1

C. √2/2

D. √3/2

30. Solve the system:

2x + 3y = 16

4x - 3y = 8

A. x = 4, y = 8/3

B. x = 5, y = 2

C. x = 2, y = 4

D. x = 3, y = 10/3

31. What is the range of f(x) = -x² + 9?

A. All real numbers

B. y ≥ 9

C. y ≤ 9

D. y > 0

32. Convert 5π/3 radians to degrees.

A. 240°

B. 300°

C. 270°

D. 315°

33. A cone has radius 5 and height 12. What is its volume? (Use $\pi \approx 3.14$)

A. 188.4

B. 251.2

C. 376.8

D. 314

34. Factor completely: $2x^2 - 18$

A. $2(x + 3)(x - 3)$

B. $(2x + 6)(x - 3)$

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

D. $(x + 3)(2x - 6)$

35. What is the least common multiple (LCM) of 12 and 18?

A. 6

B. 24

C. 36

D. 72

36. If f(x) = x² + 2x - 3 and g(x) = x - 1, what is f(g(3))?

A. 3

B. 3

C. 5

D. 8

37. A triangle has sides 7, 24, and 25. Is this a right triangle?

A. No

B. Cannot determine

C. Only if given angles

D. Yes

38. What is the slope of the line 3x - 4y = 12?

A. 3/4

B. -3/4

C. 4/3

D. -4/3

39. Simplify: (3x - 2)²

A. 9x² - 4

B. 9x² + 12x - 4

C. 9x² - 12x + 4

D. 9x² - 6x + 4

40. A bag contains 5 red, 7 blue, and 3 green marbles. What is the probability of drawing a blue marble?

A. 3/15

B. 7/15

C. 5/15

D. 1/3

41. What is the 8th term of the arithmetic sequence: 4, 9, 14, 19, ...?

A. 34

B. 38

C. 42

D. 39

42. Solve: $x^2 + 4x - 21 = 0$

A. x = 3 or x = -7

B. x = -3 or x = 7

C. x = 7 or x = -3

D. x = 21 or x = -1

43. What is the circumference of a circle with radius 11? (Use $\pi \approx 3.14$)

A. 34.54

B. 379.94

C. 69.08

D. 138.16

44. A rectangle has length twice its width. If the perimeter is 48, what is the width?

A. 6

B. 8

C. 10

D. 12

45. What is cos 0°?

A. 0

B. 1/2

C. √3/2

D. 1

46. Simplify: $\sqrt{12x^4y^2} + \sqrt{27x^4y^2}$

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

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

C. $6x^2y\sqrt{3}$

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

47. In how many ways can 4 people be selected from a group of 10?

A. 40

B. 5,040

C. 210

D. 720

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

A. (-5, 3)

B. (5, 3)

C. (5, -3)

D. (-5, -3)

49. If $5^{x+2} = 625$, what is x?

A. 1

B. 3

C. 4

D. 2

50. What is the area of a trapezoid with bases 12 and 18, and height 8?

A. 120

B. 96

C. 144

D. 108

51. Solve: 7x + 3 > 5x + 19

A. x > 7

B. x < 8

C. x > 8

D. x > 16

52. What is the value of tan 45°?

A. √3

B. 1

C. 1/2

D. √3/2

53. A sphere has radius 6. What is its surface area? (Use $\pi \approx 3.14$)

A. 113.04

B. 226.08

C. 376.8

D. 452.16

54. Simplify: $(2a^2b^3)^4$

A. $16a^8b^{12}$

B. $8a^8b^{12}$

C. $16a^6b^7$

D. $2a^8b^{12}$

55. What is the domain of f(x) = 1/(x - 3)?

A. All real numbers

B. x ≠ 0

C. x ≠ 3

D. x > 3

56. A store marks up items 75% above cost. If the cost is $60, what is the selling price?

A. $100

B. $105

C. $110

D. $120

57. What is the sum of the solutions to $x^2 - 11x + 28 = 0$?

A. 28

B. -28

C. -11

D. 11

58. If $P(A) = 0.3$ and $P(B) = 0.5$, and events are independent, what is $P(A$ and $B)$?

A. 0.15

B. 0.8

C. 0.2

D. 0.65

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

A. 108°

B. 120°

C. 120°

D. 135°

60. Solve: $4^x = 256$

A. 3

B. 4

C. 5

D. 6

61. A cylinder has radius 7 and height 10. What is its volume? (Use $\pi \approx 3.14$)

A. 1,099.6

B. 439.6

C. 769.3

D. 1,538.6

62. Factor: $4x^2 + 12x + 9$

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

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

C. $(4x + 3)(x + 3)$

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

63. What is the slope of a line perpendicular to $y = (2/5)x - 3$?

A. 2/5

B. -2/5

C. -5/2

D. 5/2

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

A. $5 + 2i$

B. $11 + 2i$

C. $8 - 3i$

D. $11 - 4i$

65. The first term of a geometric sequence is 3 and the common ratio is 2. What is the 6th term?

A. 48

B. 64

C. 32

D. 96

66. What is the distance from point (5, -2) to the x-axis?

A. 2

B. 5

C. $\sqrt{29}$

D. 7

67. Solve: $(x + 3)^2 = 49$

A. x = 4 or x = -10

B. x = 7 or x = -7

C. x = 4 or x = -10

D. x = 46 or x = -52

68. What is the area of a triangle with base 14 and height 9?

A. 126

B. 63

C. 23

D. 46

69. If f(x) = 3x + 2 and f⁻¹ is the inverse function, what is $f^{-1}(11)$?

A. 35

B. 11/3

C. 4

D. 3

70. What is the value of 5! ÷ 3!?

A. 20

B. 10

C. 60

D. 2

71. A number decreased by 30% equals 56. What is the original number?

A. 72

B. 75

C. 80

D. 85

72. Simplify: $\sqrt{(x^8y^6)}$

A. x^2y^3

B. x^4y^3

C. x^8y^6

D. x^4y^2

73. What is the range of the data set: 23, 15, 31, 19, 27, 12?

A. 12

B. 15

C. 23

D. 19

74. Solve the system:

x - y = 5

2x + y = 10

A. x = 5, y = 0

B. x = 4, y = -1

C. x = 6, y = 1

D. x = 3, y = -2

75. What is the equation of a circle with center (2, -3) and radius 5?

A. $(x - 2)^2 + (y + 3)^2 = 5$

B. $(x + 2)^2 + (y - 3)^2 = 25$

C. $(x - 2)^2 + (y + 3)^2 = 25$

D. $x^2 + y^2 = 25$

76. In a class of 40 students, 24 are girls. What percent are boys?

A. 60%

B. 40%

C. 24%

D. 16%

77. What is the length of the hypotenuse of a right triangle with legs 8 and 15?

A. 23

B. $\sqrt{289}$

C. 16

D. 17

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

A. x^2y

B. x^2y^2

C. x^3y

D. xy

79. What is the mode of: 5, 8, 5, 12, 9, 5, 14, 8?

A. 8

B. 9

C. 5

D. 12

80. Evaluate: $\log_5(25) + \log_5(125)$

A. 3

B. 5

C. 4

D. 6

81. A ladder 26 feet long leans against a wall. If the base is 10 feet from the wall, how high does it reach?

A. 16 feet

B. 20 feet

C. 22 feet

D. 24 feet

82. What is the solution to $3x^2 = 48$?

A. $x = \pm 4$

B. $x = \pm 16$

C. $x = 4$

D. $x = \pm 8$

83. How many diagonals does a hexagon have?

A. 6

B. 12

C. 9

D. 15

84. Simplify: $3/(x + 2) + 2/(x + 2)$

A. $5/(2x + 4)$

B. $5/(x + 2)$

C. $6/(x + 2)$

D. $1/(x + 2)$

85. What is the y-intercept of $5x - 2y = 10$?

A. 5

B. 2

C. 10

D. -5

86. A regular polygon has 9 sides. What is the sum of its interior angles?

A. 1,260°

B. 1,080°

C. 900°

D. 1,440°

87. If matrix A is 3 × 2 and matrix B is 2 × 4, what are the dimensions of AB?

A. 2 × 2

B. 3 × 2

C. 3 × 4

D. Cannot multiply

88. What is the area of a rhombus with diagonals 12 and 16?

A. 192

B. 96

C. 48

D. 28

89. Solve: $2|x - 3| = 14$

A. x = 10 or x = -4

B. x = 7 or x = -1

C. x = 11 or x = -5

D. x = 10 or x = -4

90. What is the probability of rolling a sum of 5 with two dice?

A. 1/9

B. 1/6

C. 5/36

D. 1/12

91. Simplify: (5x - 3) - (2x + 7)

A. 3x + 4

B. 7x - 10

C. 3x - 10

D. 3x + 10

92. What is the volume of a rectangular prism with length 10, width 6, and height 8?

A. 240

B. 480

C. 360

D. 520

93. If $3^{x+1} = 243$, what is x?

A. 3

B. 4

C. 5

D. 4

94. What is the surface area of a cube with edge 7?

A. 294

B. 343

C. 196

D. 147

95. Factor: x³ - 8

A. (x - 2)(x² + 4)

B. (x - 2)(x² - 2x + 4)

C. (x - 2)(x² + 2x + 4)

D. (x + 2)(x² - 2x + 4)

96. What is the mean of: 12, 18, 15, 22, 18, 25?

A. 18

B. 18.33

C. 19

D. 20

97. Solve: x/4 + 3 = x/2 - 1

A. x = 8

B. x = 12

C. x = 20

D. x = 16

98. What is the value of $(64)^{2/3}$?

A. 16

B. 32

C. 8

D. 4

99. If the ratio of x to y is 4:7 and x = 20, what is y?

A. 28

B. 11.43

C. 35

D. 40

100. What is the equation of a line with slope -3 passing through (4, 5)?

A. y = -3x + 17

B. y = -3x - 7

C. y = -3x + 5

D. y = -3x + 12

Answer Key and Explanations

1. A. 5

Solution: Follow order of operations (PEMDAS). First divide: $12 \div 4 = 3$. Next multiply: $2 \times 3 = 6$. Now substitute: $8 + 3 - 6$. Work left to right: $8 + 3 = 11$, then $11 - 6 = 5$.

2. A. $36

Solution: Calculate 25% of $48: $0.25 \times \$48 = \$12$. Subtract the discount: $\$48 - \$12 = \$36$. Alternatively, the sale price is 75% of the original: $0.75 \times \$48 = \$36$.

3. B. 1/9

Solution: Convert 2/3 to ninths: $2/3 = 6/9$. Subtract: $7/9 - 6/9 = 1/9$.

4. C. 6

Solution: Subtract 9 from both sides: $6x = 36$. Divide by 6: $x = 6$.

5. C. √13

Solution: Check each option: $\sqrt{16} = 4$ (rational), $0.75 = 3/4$ (rational), and 3/7 is already a fraction (rational). However, $\sqrt{13}$ cannot be simplified to a whole number or fraction because 13 is not a perfect square, making it irrational.

6. B. 12

Solution: List factors of 36: 1, 2, 3, 4, 6, 9, 12, 18, 36. List factors of 60: 1, 2, 3, 4, 5, 6, 10, 12, 15, 20, 30, 60. The greatest common factor is 12.

7. C. 5/3 cups

Solution: Set up a proportion: (2/3 cups)/(12 cookies) = (x cups)/(30 cookies). Cross multiply: $12x = (2/3)(30) = 20$. Divide: $x = 20/12 = 5/3$ cups.

8. D. x = 13

Solution: Distribute: $4x - 20 = 2x + 6$. Subtract 2x: $2x - 20 = 6$. Add 20: $2x = 26$. Divide by 2: $x = 13$.

9. A. 2

Solution: Slope $= (y_2 - y_1)/(x_2 - x_1) = (19 - 7)/(9 - 3) = 12/6 = 2$.

10. A. $15x^3y^7$

Solution: Multiply coefficients: $5 \times 3 = 15$. For x: $x^2 \times x = x^3$. For y: $y^3 \times y^4 = y^7$. Result: $15x^3y^7$.

11. B. 45

Solution: Calculate: $0.18 \times 250 = 45$.

12. B. 13

Solution: Substitute 5 for x: $f(5) = 4(5) - 7 = 20 - 7 = 13$.

13. A. (x + 4)(x + 5)

Solution: Find two numbers that multiply to 20 and add to 9. The numbers are 4 and 5: $4 \times 5 = 20$ and $4 + 5 = 9$. Therefore $x^2 + 9x + 20 = (x + 4)(x + 5)$.

14. C. 200.96

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

15. D. $x \leq 9$

Solution: Add 8 to both sides: $3x \leq 27$. Divide by 3: $x \leq 9$.

16. B. 60

Solution: Let the original number be x. After a 40% increase, it becomes $1.4x = 84$. Divide by 1.4: $x = 84/1.4 = 60$.

17. A. 10

Solution: Distance $= \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2]} = \sqrt{[(4 - (-2))^2 + (-3 - 5)^2]} = \sqrt{[36 + 64]} = \sqrt{100} = 10$.

18. D. $3\sqrt{2}$

Solution: Simplify each: $\sqrt{98} = \sqrt{(49 \times 2)} = 7\sqrt{2}$ and $\sqrt{32} = \sqrt{(16 \times 2)} = 4\sqrt{2}$. Subtract: $7\sqrt{2} - 4\sqrt{2} = 3\sqrt{2}$.

19. C. 7

Solution: Rewrite 128 as a power of 2: $128 = 2^7$. Since $2^x = 2^7$, we have $x = 7$.

20. B. 19

Solution: Arrange in order: 14, 16, 18, 19, 23, 27, 31. With 7 values, the median is the 4th value: 19.

21. D. 25

Solution: Let j = number of juniors. Seniors = j + 5. Total = j + (j + 5) = 2j + 5. Since 40% are juniors: 0.4(2j + 5) = j. Expand: 0.8j + 2 = j. Subtract 0.8j: 2 = 0.2j. Divide: j = 10. Total = 2(10) + 5 = 25.

22. A. x = 8 or x = -3

Solution: Split into cases: 2x - 5 = 11 OR 2x - 5 = -11. First case: 2x = 16, so x = 8. Second case: 2x = -6, so x = -3.

23. C. 540°

Solution: Sum of interior angles: (n - 2) × 180° = (5 - 2) × 180° = 3 × 180° = 540°.

24. B. 216 cm³

Solution: Volume = length × width × height = 6 × 4 × 9 = 216 cm³.

25. D. 243

Solution: $\log_3(x) = 5$ means $3^5 = x$. Calculate: $3^5 = 243$.

26. A. 25%

Solution: Percent = (part/whole) × 100 = (35/140) × 100 = 0.25 × 100 = 25%.

27. C. x² - 16

Solution: This is the difference of squares pattern: $(a + b)(a - b) = a^2 - b^2$. So $(x - 4)(x + 4) = x^2 - 16$.

28. B. 292.5 miles

Solution: Distance = speed × time = 65 × 4.5 = 292.5 miles.

29. D. √3/2

Solution: From the unit circle or 30-60-90 triangle, sin 60° = √3/2.

30. A. x = 4, y = 8/3

Solution: Add the equations to eliminate y: (2x + 3y) + (4x - 3y) = 16 + 8, giving 6x = 24, so x = 4. Substitute into first equation: 2(4) + 3y = 16, so 8 + 3y = 16, giving 3y = 8, and y = 8/3.

31. C. y ≤ 9

Solution: The function $f(x) = -x^2 + 9$ is a downward-opening parabola with vertex at (0, 9). The maximum value is 9, so the range is $y \leq 9$.

32. B. 300°

Solution: Convert: $(5\pi/3) \times (180/\pi) = (5 \times 180)/3 = 900/3 = 300°$.

33. D. 314

Solution: Volume of cone: $V = (1/3)\pi r^2 h = (1/3)(3.14)(5^2)(12) = (1/3)(3.14)(25)(12) = (1/3)(942) = 314$.

34. A. 2(x + 3)(x - 3)

Solution: Factor out GCF: $2x^2 - 18 = 2(x^2 - 9)$. Recognize difference of squares: $2(x + 3)(x - 3)$.

35. C. 36

Solution: List multiples of 12: 12, 24, 36, 48... List multiples of 18: 18, 36, 54... The least common multiple is 36.

36. C. 35

Solution: First find g(3): $g(3) = 3 - 1 = 2$. Now find f(2): $f(2) = 2^2 + 2(2) - 3 = 4 + 4 - 3 = 5$.

37. D. Yes

Solution: Check Pythagorean theorem: $7^2 + 24^2$ should equal 25^2 if it's a right triangle. Calculate: $49 + 576 = 625$, and $25^2 = 625$. Since they're equal, this is a right triangle. This is the 7-24-25 Pythagorean triple.

38. A. 3/4

Solution: Rewrite in slope-intercept form: $3x - 4y = 12$ becomes $-4y = -3x + 12$, so $y = (3/4)x - 3$. The slope is 3/4.

39. C. 9x² - 12x + 4

Solution: Use the pattern $(a - b)^2 = a^2 - 2ab + b^2$. Here: $(3x)^2 - 2(3x)(2) + 2^2 = 9x^2 - 12x + 4$.

40. B. 7/15

Solution: Total marbles = $5 + 7 + 3 = 15$. Probability of blue = 7/15.

41. D. 39

Solution: Formula: $a_n = a_1 + (n - 1)d$. Here $a_1 = 4$, $d = 5$, $n = 8$: $a_8 = 4 + (8 - 1)(5) = 4 + 35 = 39$.

42. A. x = 3 or x = -7

Solution: Factor: find numbers that multiply to -21 and add to 4. The numbers are 7 and -3: $7 \times (-3) = -21$ and $7 + (-3) = 4$. So $x^2 + 4x - 21 = (x + 7)(x - 3) = 0$. Solutions: $x = -7$ or $x = 3$.

43. C. 69.08

Solution: Circumference: $C = 2\pi r = 2(3.14)(11) = 69.08$.

44. B. 8

Solution: Let width $= w$, then length $= 2w$. Perimeter: $2(2w) + 2w = 48$. Simplify: $4w + 2w = 48$, so $6w = 48$. Divide: $w = 8$.

45. D. 1

Solution: From the unit circle, $\cos 0° = 1$.

46. A. 5x²y√3

Solution: Simplify each: $\sqrt{(12x^4y^2)} = 2x^2y\sqrt{3}$ and $\sqrt{(27x^4y^2)} = 3x^2y\sqrt{3}$. Add: $2x^2y\sqrt{3} + 3x^2y\sqrt{3} = 5x^2y\sqrt{3}$.

47. C. 210

Solution: Use combination formula: $C(10, 4) = 10!/(4! \times 6!) = (10 \times 9 \times 8 \times 7)/(4 \times 3 \times 2 \times 1) = 5{,}040/24 = 210$.

48. B. (5, 3)

Solution: For vertex form $y = (x - h)^2 + k$, the vertex is (h, k). Here the vertex is $(5, 3)$.

49. D. 2

Solution: Rewrite 625 as a power of 5: $625 = 5^4$. So $5^{x+2} = 5^4$, meaning $x + 2 = 4$, and $x = 2$.

50. A. 120

Solution: Area of trapezoid: $A = (1/2)(b_1 + b_2)h = (1/2)(12 + 18)(8) = (1/2)(30)(8) = 120$.

51. C. x > 8

Solution: Subtract 5x from both sides: 2x + 3 > 19. Subtract 3: 2x > 16. Divide by 2: x > 8.

52. B. 1

Solution: From the unit circle or 45-45-90 triangle, tan 45° = 1.

53. D. 452.16

Solution: Surface area of sphere: $SA = 4\pi r^2 = 4(3.14)(6^2) = 4(3.14)(36) = 452.16$.

54. A. 16a⁸b¹²

Solution: Apply power rule: $(2a^2b^3)^4 = 2^4(a^2)^4(b^3)^4 = 16a^8b^{12}$.

55. C. x ≠ 3

Solution: The denominator cannot equal zero: x - 3 ≠ 0, so x ≠ 3. The domain is all real numbers except 3.

56. B. $105

Solution: Markup: 0.75 × $60 = $45. Selling price: $60 + $45 = $105. Alternatively: 1.75 × $60 = $105.

57. D. 11

Solution: For a quadratic $ax^2 + bx + c = 0$, the sum of solutions equals -b/a. Here: -(-11)/1 = 11.

58. A. 0.15

Solution: For independent events: P(A and B) = P(A) × P(B) = 0.3 × 0.5 = 0.15.

59. C. 120°

Solution: Sum of interior angles: (6 - 2) × 180° = 720°. Each angle in regular hexagon: 720° ÷ 6 = 120°.

60. B. 4

Solution: Rewrite 256 as a power of 4: 256 = 4⁴. So $4^x = 4^4$, meaning x = 4.

61. D. 1,538.6

Solution: Volume of cylinder: $V = \pi r^2 h = 3.14 \times 7^2 \times 10 = 3.14 \times 49 \times 10 = 1,538.6$.

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

Solution: Recognize as perfect square trinomial: $4x^2 + 12x + 9 = (2x)^2 + 2(2x)(3) + 3^2 = (2x + 3)^2$.

63. C. -5/2

Solution: The given line has slope 2/5. Perpendicular slope is the negative reciprocal: -5/2.

64. B. $11 + 2i$

Solution: Use FOIL: $4(2) + 4(-i) + 3i(2) + 3i(-i) = 8 - 4i + 6i - 3i^2 = 8 + 2i - 3(-1) = 8 + 2i + 3 = 11 + 2i$.

65. D. 96

Solution: Formula: $a_n = a_1 \times r^{\wedge}(n-1)$. Here: $a_6 = 3 \times 2^5 = 3 \times 32 = 96$.

66. A. 2

Solution: The distance from a point to the x-axis is the absolute value of the y-coordinate: $|-2| = 2$.

67. C. x = 4 or x = -10

Solution: Take square root: $x + 3 = \pm 7$. This gives $x + 3 = 7$ (so $x = 4$) or $x + 3 = -7$ (so $x = -10$).

68. B. 63

Solution: Area of triangle: $A = (1/2)bh = (1/2)(14)(9) = 63$.

69. D. 3

Solution: To find $f^{-1}(11)$, solve $f(x) = 11$: $3x + 2 = 11$. Subtract 2: $3x = 9$. Divide: $x = 3$.

70. A. 20

Solution: Calculate: $5! = 120$ and $3! = 6$. Divide: $120 \div 6 = 20$.

71. C. 80

Solution: Let x = original number. After 30% decrease: $0.7x = 56$. Divide: $x = 56/0.7 = 80$.

72. B. x^4y^3

Solution: Take square root of each factor: $\sqrt{(x^8)} = x^4$ and $\sqrt{(y^6)} = y^3$. Result: x^4y^3.

73. D. 19

Solution: Range = maximum - minimum = 31 - 12 = 19.

74. A. x = 5, y = 0

Solution: Add the equations: (x - y) + (2x + y) = 5 + 10, giving 3x = 15, so x = 5. Substitute: 5 - y = 5, so y = 0.

75. C. (x - 2)² + (y + 3)² = 25

Solution: Circle equation: $(x - h)^2 + (y - k)^2 = r^2$. With center (2, -3) and radius 5: $(x - 2)^2 + (y - (-3))^2 = 5^2$, which is $(x - 2)^2 + (y + 3)^2 = 25$.

76. B. 40%

Solution: Boys = 40 - 24 = 16. Percent: (16/40) × 100 = 40%.

77. D. 17

Solution: Pythagorean theorem: $c^2 = 8^2 + 15^2 = 64 + 225 = 289$, so $c = \sqrt{289} = 17$. This is the 8-15-17 Pythagorean triple.

78. A. x²y

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

79. C. 5

Solution: Count frequency: 5 appears three times, 8 appears twice, others once. The mode is 5.

80. B. 5

Solution: Use logarithm property: $\log_5(25) + \log_5(125) = \log_5(25 \times 125) = \log_5(3,125) = \log_5(5^5) = 5$.

81. D. 24 feet

Solution: Pythagorean theorem: $10^2 + h^2 = 26^2$. Calculate: $100 + h^2 = 676$, so $h^2 = 576$, and h = 24 feet. This is the 10-24-26 Pythagorean triple (5-12-13 doubled).

82. A. x = ±4

Solution: Divide by 3: $x^2 = 16$. Take square root: x = ±4.

83. C. 9

Solution: Formula for diagonals: $n(n - 3)/2$. For hexagon: $6(6 - 3)/2 = 6(3)/2 = 9$.

84. B. 5/(x + 2)

Solution: Add fractions with same denominator: $3/(x + 2) + 2/(x + 2) = (3 + 2)/(x + 2) = 5/(x + 2)$.

85. D. -5

Solution: Convert to slope-intercept form: $5x - 2y = 10$ becomes $-2y = -5x + 10$, so $y = (5/2)x - 5$. The y-intercept is -5.

86. A. 1,260°

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

87. C. 3 × 4

Solution: Matrix A(3×2) times B(2×4) yields a matrix with dimensions 3 × 4.

88. B. 96

Solution: Area of rhombus: $A = (1/2)d_1d_2 = (1/2)(12)(16) = 96$.

89. D. x = 10 or x = -4

Solution: Divide by 2: $|x - 3| = 7$. Split into cases: $x - 3 = 7$ (so $x = 10$) or $x - 3 = -7$ (so $x = -4$).

90. A. 1/9

Solution: Ways to get sum of 5: (1,4), (2,3), (3,2), (4,1)—that's 4 outcomes out of 36 total. Probability: $4/36 = 1/9$.

91. C. 3x - 10

Solution: Distribute the negative: $(5x - 3) - (2x + 7) = 5x - 3 - 2x - 7 = 3x - 10$.

92. B. 480

Solution: Volume = length × width × height = $10 \times 6 \times 8 = 480$.

93. D. 4

Solution: Rewrite 243 as 3^5. So $3^{x+1} = 3^5$, meaning $x + 1 = 5$, and $x = 4$.

94. A. 294

Solution: A cube has 6 faces, each with area $7^2 = 49$. Surface area: $6 \times 49 = 294$.

95. C. (x - 2)(x² + 2x + 4)

Solution: This is difference of cubes: $a^3 - b^3 = (a - b)(a^2 + ab + b^2)$. Here $x^3 - 8 = x^3 - 2^3 = (x - 2)(x^2 + 2x + 4)$.

96. B. 18.33

Solution: Sum: $12 + 18 + 15 + 22 + 18 + 25 = 110$. Count: 6. Mean: $110 \div 6 \approx 18.33$.

97. D. x = 16

Solution: Multiply all terms by 4 to clear denominators: $x + 12 = 2x - 4$. Subtract x: $12 = x - 4$. Add 4: $x = 16$.

98. A. 16

Solution: Rewrite as: $(64)^{(2/3)} = (64^{(1/3)})^2 = 4^2 = 16$. The cube root of 64 is 4, and 4 squared is 16.

99. C. 35

Solution: Set up proportion: $4/7 = 20/y$. Cross multiply: $4y = 140$. Divide: $y = 35$.

100. A. y = -3x - 17

Solution: Use point-slope form: $y - 5 = -3(x - 4)$. Distribute: $y - 5 = -3x + 12$. Add 5: $y = -3x + 17$.