

1. [U1·L1 — Order of Operations] Evaluate: $8 + 3 \times (7 - 2)^2$

$$(7-2)^2=5^2=25$$

$$3 \times 25 = 75$$

$$8 + 75 = 83$$

Answer: 83

2. [U1·L1 — Order of Operations] Evaluate: $20 - 4 \times 3 + 2^3$

$$2^3=8$$

$$4 \times 3 = 12$$

$$20 - 12 + 8 = 16$$

Answer: 16

3. [U1·L2 — Evaluating Expressions] Evaluate $2a^2 - b$ when $a = 3$ and $b = 5$.

$$2(3)^2 - 5$$

$$2(9) - 5 = 18 - 5$$

Answer: 13

4. [U1·L2 — Evaluating Expressions] Evaluate $(5x - y) \div 2$ when $x = 4$ and $y = 6$.

$$(20 - 6) \div 2$$

$$14 \div 2$$

Answer: 7

5. [U1·L3 — Combining Like Terms] Simplify: $6x - 2 + 3x + 9$

$$6x + 3x = 9x$$

$$-2 + 9 = 7$$

Answer: $9x + 7$

6. [U1·L3 — Combining Like Terms] Simplify: $4a + 5b - a + 2b$

$$4a - a = 3a$$

$$5b + 2b = 7b$$

Answer: $3a + 7b$

7. [U1·L4 — Distributive Property] Expand: $5(3x + 2)$

$$5 \cdot 3x = 15x$$

$$5 \cdot 2 = 10$$

Answer: $15x + 10$

8. [U1·L4 — Distributive Property] Expand and simplify: $-2(4x - 3) + 5x$

$$-8x + 6 + 5x$$

$$-8x + 5x = -3x$$

Answer: $-3x + 6$

9. [U1·L5 — Integer & Signed-Number Rules] Simplify: $-9 + 15 - (-6)$

$$-9 + 15 = 6$$

$$6 - (-6) = 6 + 6$$

Answer: 12

10. [U1·L5 — Integer & Signed-Number Rules] Simplify: $(-8)(3) + (-20) \div (-4)$

$$(-8)(3) = -24$$

$$(-20) \div (-4) = 5$$

$$-24 + 5$$

Answer: -19

11. [U2·L1 — Multi-Step & Literal Equations] Solve: $4x - 7 = 21$

$$4x = 28$$

$$x = 7$$

Answer: $x = 7$

12. [U2·L1 — Multi-Step & Literal Equations] Solve for y: $3x + 2y = 12$

$$2y = 12 - 3x$$

$$y = (12 - 3x) / 2$$

Answer: $y = 6 - 1.5x$

13. [U2·L2 — Compound Inequalities] Solve: $-2 < x + 3 \leq 5$

subtract 3 from all parts

$$-5 < x \leq 2$$

Answer: $-5 < x \leq 2$

14. [U2·L2 — Compound Inequalities] Solve: $-4x > 20$

divide by -4 and FLIP

$$x < -5$$

Answer: $x < -5$

15. [U2·L3 — Modeling Real-World Situations] Three consecutive integers sum to 48. Find them.

$$n + (n+1) + (n+2) = 48$$

$$3n + 3 = 48, 3n = 45, n = 15$$

Answer: 15, 16, 17

16. [U2·L3 — Modeling Real-World Situations] A gym charges \$25 to join plus \$15/month. Write and solve for the number of months m that make the total \$145.

$$25 + 15m = 145$$

$$15m = 120$$

$$m = 8$$

Answer: $m = 8$ months

17. [U3·L1 — Introduction to Functions] Is $\{(1,2), (3,4), (1,5)\}$ a function? Explain in one sentence.

input 1 maps to both 2 and 5

Answer: No — the input 1 has two different outputs.

18. [U3·L1 — Introduction to Functions] Does the set $\{(0,3), (1,3), (2,3)\}$ represent a function?

each input has exactly one output (repeated outputs are allowed)

Answer: Yes — each input has exactly one output.

19. [U3·L2 — Function Notation] If $f(x) = 2x - 5$, find $f(4)$.

$$2(4) - 5$$

$$8 - 5$$

Answer: 3

20. [U3·L2 — Function Notation] If $g(x) = x^2 + 1$, find $g(-3)$.

$$(-3)^2 + 1$$

$$9 + 1$$

Answer: 10

21. [U3·L3 — Graphs of Functions] For $y = x - 2$, complete the point (5, ?).

$$y = 5 - 2$$

Answer: (5, 3)

22. [U3·L3 — Graphs of Functions] Does the point (2, 7) lie on the graph of $y = 3x + 1$?

$$3(2) + 1 = 7 \checkmark$$

Answer: Yes — $3(2) + 1 = 7$.

23. [U3·L4 — Graphical Features and Terminology] A line crosses the x-axis at (4,0) and the y-axis at (0,-2). State the x- and y-intercepts.

x-int is where $y=0$; y-int is where $x=0$

Answer: x-intercept 4; y-intercept -2

24. [U3·L4 — Graphical Features and Terminology] A parabola has its lowest point at (1,-4). Is this a maximum or a minimum, and what is its value?

lowest point = minimum

Answer: Minimum; value -4 (at $x = 1$)

25. [U3·L5 — Exploring Functions on the TI-Nspire] Using a table for $y = 2x + 1$, list the outputs for $x = 0, 1, 2, 3$.

$$1, 3, 5, 7$$

Answer: 1, 3, 5, 7

26. [U3·L5 — Exploring Functions on the TI-Nspire] Graphing $y = x^2$ and $y = 4$, at what two x-values do they intersect?

$$x^2 = 4 \rightarrow x = \pm 2$$

Answer: $x = -2$ and $x = 2$

27. [U3·L6 — Average Rate of Change] Find the average rate of change of f between (2,5) and (6,17).

$$(17-5)/(6-2) = 12/4$$

Answer: 3

28. [U3·L6 — Average Rate of Change] A table shows $f(1)=10$ and $f(5)=2$. Find the average rate of change.

$$(2-10)/(5-1) = -8/4$$

Answer: -2

29. [U3·L7 — Domain and Range] State the domain and range of $\{(-1,4),(0,5),(2,9)\}$.

domain = x-values, range = y-values

Answer: Domain $\{-1,0,2\}$; Range $\{4,5,9\}$

30. [U3·L7 — Domain and Range] A graph runs from $x = -3$ to $x = 3$. What is its domain (in interval notation)?

closed if endpoints included

Answer: $[-3, 3]$

31. [U4·L1 — Proportional Relationships] y is proportional to x and $y = 12$ when $x = 3$. Find the constant k and write the equation.

$k = y/x = 12/3 = 4$

Answer: $k = 4$; $y = 4x$

32. [U4·L1 — Proportional Relationships] If $y = 4x$, what is y when $x = 7$?

$4 \cdot 7$

Answer: 28

33. [U4·L2 — Unit Conversions] Convert 5 feet to inches (12 in = 1 ft).

$5 \text{ ft} \times 12 \text{ in/ft}$

Answer: 60 inches

34. [U4·L2 — Unit Conversions] A car travels 90 miles in 1.5 hours. Find its speed in miles per hour.

$90/1.5$

Answer: 60 mph

35. [U4·L3 — Non-Proportional Linear Relationships] Identify the slope and y-intercept of $y = -2x + 7$.

m is coefficient of x ; b is constant

Answer: slope -2 ; y-intercept 7

36. [U4·L3 — Non-Proportional Linear Relationships] Does $y = 3x + 5$ pass through the origin? Explain.

at $x=0$, $y=5$, not 0

Answer: No — its y-intercept is 5, not 0.

37. [U4·L4 — More Work Graphing Linear Functions] Rewrite $2x + y = 8$ in slope-intercept form.

$y = 8 - 2x$

Answer: $y = -2x + 8$

38. [U4·L4 — More Work Graphing Linear Functions] For $y = \frac{1}{2}x - 3$, give the y-intercept and one other point using the slope.

$b = -3 \rightarrow (0, -3)$; rise 1 run 2 $\rightarrow (2, -2)$

Answer: $(0, -3)$ and $(2, -2)$

39. [U4·L5 — Writing Equations in Slope-Intercept Form] Write the line through $(0,4)$ with slope -3 .

$b=4$, $m=-3$

Answer: $y = -3x + 4$

40. [U4·L5 — Writing Equations in Slope-Intercept Form] Write the equation of the line through (1,5) and (3,11).

$$m = (11 - 5) / (3 - 1) = 3$$

$$5 = 3(1) + b \rightarrow b = 2$$

Answer: $y = 3x + 2$

41. [U4·L6 — Modeling with Linear Functions] A plumber charges \$60 plus \$40/hour. Write the cost model C for h hours and find C for 3 hours.

$$C = 60 + 40h$$

$$C = 60 + 120$$

Answer: $C = 60 + 40h$; \$180

42. [U4·L6 — Modeling with Linear Functions] A tank has 50 L and drains 5 L/min. Write the amount A after t minutes.

start 50, rate -5

Answer: $A = 50 - 5t$

43. [U4·L7 — More Linear Modeling] Using $C = 60 + 40h$, how many hours give a cost of \$220?

$$220 = 60 + 40h$$

$$160 = 40h, h = 4$$

Answer: 4 hours

44. [U4·L7 — More Linear Modeling] $A = 50 - 5t$. When is the tank empty ($A = 0$)?

$$0 = 50 - 5t$$

$$5t = 50, t = 10$$

Answer: $t = 10$ minutes

45. [U4·L8 — Strange Lines — Vertical and Horizontal] Write the equation of the horizontal line through (3, -2).

horizontal $\rightarrow y = \text{constant}$

Answer: $y = -2$

46. [U4·L8 — Strange Lines — Vertical and Horizontal] What is the slope of the vertical line $x = 5$?

vertical lines have undefined slope

Answer: Undefined

47. [U4·L9 — Absolute Value and Step Functions] Evaluate $|-7| + |3|$.

$$7 + 3$$

Answer: 10

48. [U4·L9 — Absolute Value and Step Functions] Solve $|x| = 6$.

x is 6 units from 0

Answer: $x = 6$ or $x = -6$

49. [U4·L10 — The Truth About Graphs] Is (-1, 4) on the graph of $y = -2x + 2$?

$$-2(-1) + 2 = 4 \checkmark$$

Answer: Yes — $-2(-1) + 2 = 4$.

50. [U4•L10 — The Truth About Graphs] Is (3, 5) on the graph of $y = x^2 - 4$?

$$3^2 - 4 = 5 \checkmark$$

Answer: Yes — $3^2 - 4 = 5$.

51. [U4•L11 — Graphs of Linear Inequalities] For $y \leq 2x - 1$, is the boundary line solid or dashed, and do you shade above or below?

$\leq \rightarrow$ solid; y less-than $\rightarrow$ below

Answer: Solid line; shade below

52. [U4•L11 — Graphs of Linear Inequalities] Test whether (0,0) satisfies $y > x + 3$.

$$0 > 0 + 3? \quad 0 > 3 \text{ false}$$

Answer: No — (0,0) does not satisfy it.

53. [U4•L12 — Introduction to Sequences] An arithmetic sequence starts at 4 with common difference 3. Write the first four terms.

4, 7, 10, 13

Answer: 4, 7, 10, 13

54. [U4•L12 — Introduction to Sequences] Find the 6th term of the arithmetic sequence 2, 5, 8, ...

$$d=3; \text{ term} = 2 + (n-1)3; n=6 \rightarrow 2+15$$

Answer: 17

55. [U5•L1 — Solving Systems by Graphing] The lines $y = x + 1$ and $y = -x + 5$ intersect at what point?

$$x+1 = -x+5 \rightarrow 2x=4 \rightarrow x=2, y=3$$

Answer: (2, 3)

56. [U5•L1 — Solving Systems by Graphing] How many solutions does a system of two parallel lines have?

parallel lines never intersect

Answer: None (no solution)

57. [U5•L2 — Solving Systems by Substitution] Solve: $y = 2x$ and $x + y = 9$.

$$x+2x=9 \rightarrow 3x=9 \rightarrow x=3, y=6$$

Answer: (3, 6)

58. [U5•L2 — Solving Systems by Substitution] Solve: $y = x - 4$ and $2x + y = 5$.

$$2x+(x-4)=5 \rightarrow 3x=9 \rightarrow x=3, y=-1$$

Answer: (3, -1)

59. [U5•L3 — Properties of Systems] Multiply the equation $x - 2y = 4$ by 3. Write the result.

distribute 3

Answer: $3x - 6y = 12$

60. [U5•L3 — Properties of Systems] Do $x + y = 5$ and $2x + 2y = 10$ have the same solution set? Explain.

second is first $\times 2$ — same line

Answer: Yes — the second is the first multiplied by 2.

61. [U5•L4 — The Method of Elimination] Solve by elimination: $x + y = 10$ and $x - y = 4$.

add: $2x=14 \rightarrow x=7; y=3$

Answer: (7, 3)

62. [U5•L4 — The Method of Elimination] Solve by elimination: $2x + 3y = 12$ and $2x - y = 4$.

subtract: $4y=8 \rightarrow y=2; 2x-2=4 \rightarrow x=3$

Answer: (3, 2)

63. [U5•L5 — Modeling with Systems of Equations] Two numbers sum to 20 and differ by 6. Find them.

$x+y=20, x-y=6 \rightarrow 2x=26 \rightarrow x=13, y=7$

Answer: 13 and 7

64. [U5•L5 — Modeling with Systems of Equations] Adult tickets \$10, child \$6. 8 tickets cost \$60. How many of each?

$a+c=8, 10a+6c=60 \rightarrow a=3, c=5$

Answer: 3 adult, 5 child

65. [U5•L6 — Solving Equations Graphically] To solve $2x + 1 = x + 4$ graphically, at what x do $y = 2x+1$ and $y = x+4$ meet?

$2x+1=x+4 \rightarrow x=3$

Answer: $x = 3$

66. [U5•L6 — Solving Equations Graphically] The graphs of $y = |x|$ and $y = 2$ cross at which two x -values?

$|x|=2 \rightarrow x=\pm 2$

Answer: $x = -2$ and $x = 2$

67. [U5•L7 — Systems of Inequalities] Does (0,0) satisfy the system $y > x - 1$ and $y < 3$? Explain.

$0 > -1$ ✓ and $0 < 3$ ✓

Answer: Yes — both are true at (0,0).

68. [U5•L7 — Systems of Inequalities] For $y \geq 1$ and $y \leq 4$, name one point in the solution region.

any point with $1 \leq y \leq 4$

Answer: e.g. (0, 2)

69. [U5•L8 — Modeling with Systems of Inequalities] You have at most \$30. Pens cost \$2, notebooks \$5. Write an inequality for p pens and n notebooks.

total cost ≤ 30

Answer: $2p + 5n \leq 30$

70. [U5•L8 — Modeling with Systems of Inequalities] A worker needs at least 20 hours: x weekday + y weekend. Write the inequality.

at least $\rightarrow \geq$

Answer: $x + y \geq 20$

71. [U6·L1 — Simplifying Exponents] Simplify: $x^5 \cdot x^3$

add exponents: $5+3$

Answer: x^8

72. [U6·L1 — Simplifying Exponents] Simplify: $(x^4)^2$

multiply exponents: $4 \cdot 2$

Answer: x^8

73. [U6·L2 — Zero and Negative Exponents] Evaluate: 7^0

any nonzero base to the 0 = 1

Answer: 1

74. [U6·L2 — Zero and Negative Exponents] Write 2^{-3} as a fraction.

$2^{-3} = 1/2^3 = 1/8$

Answer: $1/8$

75. [U6·L3 — Exponential Growth and Decay] A colony doubles each hour, starting at 5. How many after 3 hours?

$5 \cdot 2^3 = 5 \cdot 8$

Answer: 40

76. [U6·L3 — Exponential Growth and Decay] Is multiplying by 0.5 each step growth or decay?

factor between 0 and 1 $\rightarrow$ decay

Answer: Decay

77. [U6·L4 — Introduction to Exponential Functions] For $y = 3 \cdot 2^x$, find y when $x = 4$.

$3 \cdot 2^4 = 3 \cdot 16$

Answer: 48

78. [U6·L4 — Introduction to Exponential Functions] In $y = 3 \cdot 2^x$, name the starting value and the growth factor.

$a=3$, $b=2$

Answer: start 3; factor 2

79. [U6·L5 — Percent Review] Find 25% of 80.

0.25×80

Answer: 20

80. [U6·L5 — Percent Review] What percent is 18 out of 24?

$18/24 = 0.75$

Answer: 75%

81. [U6·L6 — Percent Increase and Decrease] A \$40 item increases 15%. Find the new price.

40×1.15

Answer: \$46

82. [U6·L6 — Percent Increase and Decrease] A \$50 item is discounted 20%. Find the sale price.

$$50 \times 0.80$$

Answer: \$40

83. [U6·L7 — Exponential Models from Percent] A town of 1000 grows 5% per year. Write the model P after t years.

$$b=1.05$$

Answer: $P = 1000(1.05)^t$

84. [U6·L7 — Exponential Models from Percent] A \$2000 car loses 10% value per year. Write the model V after t years.

$$b=0.90$$

Answer: $V = 2000(0.90)^t$

85. [U6·L8 — Linear versus Exponential] Sequence 3, 6, 12, 24 — linear or exponential? Explain.
each term $\times 2$

Answer: Exponential (multiplying by 2)

86. [U6·L8 — Linear versus Exponential] Sequence 5, 8, 11, 14 — linear or exponential? Explain.
each term $+3$

Answer: Linear (adding 3)

87. [U6·L9 — Geometric Sequences] Find the common ratio of 2, 6, 18, 54.

$$6/2=3$$

Answer: 3

88. [U6·L9 — Geometric Sequences] Find the 5th term of the geometric sequence 3, 6, 12, ...

$$r=2; 3 \cdot 2^4 = 3 \cdot 16$$

Answer: 48

89. [U7·L1 — Introduction to Polynomials] Add: $(3x^2 + 2x - 1) + (x^2 - 5x + 4)$

$$3x^2 + x^2 = 4x^2$$

$$2x - 5x = -3x$$

$$-1 + 4 = 3$$

Answer: $4x^2 - 3x + 3$

90. [U7·L1 — Introduction to Polynomials] Write in standard form: $5 - 2x + 3x^2$

highest power first

Answer: $3x^2 - 2x + 5$

91. [U7·L2 — Multiplying Polynomials] Multiply: $(x + 3)(x + 5)$

$$\text{FOIL: } x^2 + 5x + 3x + 15$$

Answer: $x^2 + 8x + 15$

92. [U7·L2 — Multiplying Polynomials] Expand: $(x - 4)^2$

$$(a-b)^2 = a^2 - 2ab + b^2$$

$$x^2 - 8x + 16$$

Answer: $x^2 - 8x + 16$

93. [U7·L3 — Factoring — GCF] Factor out the GCF: $6x^2 + 9x$

GCF=3x

Answer: $3x(2x + 3)$

94. [U7·L3 — Factoring — GCF] Factor out the GCF: $12x^3 - 8x^2$

GCF=4x²

Answer: $4x^2(3x - 2)$

95. [U7·L4 — Factoring — Conjugate Pairs] Factor: $x^2 - 25$

difference of squares

Answer: $(x + 5)(x - 5)$

96. [U7·L4 — Factoring — Conjugate Pairs] Factor: $9x^2 - 16$

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

Answer: $(3x + 4)(3x - 4)$

97. [U7·L5 — Factoring Trinomials] Factor: $x^2 + 7x + 12$

$3 \cdot 4 = 12$, $3 + 4 = 7$

Answer: $(x + 3)(x + 4)$

98. [U7·L5 — Factoring Trinomials] Factor: $x^2 - 5x + 6$

$-2 \cdot -3 = 6$, $-2 - 3 = -5$

Answer: $(x - 2)(x - 3)$

99. [U7·L6 — More Work Factoring Trinomials] Factor completely: $2x^2 + 10x + 12$

GCF 2 $\rightarrow 2(x^2 + 5x + 6)$

$2(x+2)(x+3)$

Answer: $2(x + 2)(x + 3)$

100. [U7·L6 — More Work Factoring Trinomials] Factor: $x^2 - 9x + 20$

$-4 \cdot -5 = 20$, $-4 - 5 = -9$

Answer: $(x - 4)(x - 5)$

101. [U7·L7 — Multiplying Using Area Models] Use an area model to multiply $(x + 2)(x + 6)$.

cells: x^2 , $6x$, $2x$, 12

Answer: $x^2 + 8x + 12$

102. [U7·L7 — Multiplying Using Area Models] Use an area model to multiply $(2x + 1)(x + 3)$.

$2x^2 + 6x + x + 3$

Answer: $2x^2 + 7x + 3$

103. [U7·L8 — Factoring Trinomials Using Area] Use the area/product-sum method to factor $x^2 + 6x + 8$.

$2 \cdot 4 = 8$, $2 + 4 = 6$

Answer: $(x + 2)(x + 4)$

104. [U7·L8 — Factoring Trinomials Using Area] Factor $x^2 + 2x - 15$ (product -15 , sum 2).

$$5 \cdot -3 = -15, 5 - 3 = 2$$

Answer: $(x + 5)(x - 3)$

105. [U7·L9 — Checking Polynomial Work (TI-Nspire)] You factored $x^2 + 5x + 6$ as $(x+2)(x+3)$. Multiply back to check.

$$(x+2)(x+3) = x^2 + 5x + 6 \checkmark$$

Answer: Checks — equals $x^2 + 5x + 6$

106. [U7·L9 — Checking Polynomial Work (TI-Nspire)] Verify with a table: do $x^2 - 1$ and $(x-1)(x+1)$ match at $x = 3$?

$$8 = 2 \cdot 4 = 8 \checkmark$$

Answer: Yes — both equal 8 at $x = 3$.

107. [U8·L1 — Introduction to Quadratic Functions] For $f(x) = x^2 - 2$, find $f(3)$.

$$3^2 - 2 = 9 - 2$$

Answer: 7

108. [U8·L1 — Introduction to Quadratic Functions] What shape is the graph of a quadratic function? degree-2 $\rightarrow$ parabola

Answer: A parabola

109. [U8·L2 — More Work with Parabolas] Does $y = -2x^2 + 1$ open up or down?

$$a = -2 < 0 \rightarrow \text{down}$$

Answer: Down

110. [U8·L2 — More Work with Parabolas] Which is narrower: $y = 3x^2$ or $y = x^2$?

larger $|a|$ is narrower

Answer: $y = 3x^2$

111. [U8·L3 — The Shifted Form of a Parabola] State the vertex of $y = (x - 4)^2 + 1$.

vertex (h, k)

Answer: $(4, 1)$

112. [U8·L3 — The Shifted Form of a Parabola] State the vertex of $y = (x + 2)^2 - 5$.

$$h = -2, k = -5$$

Answer: $(-2, -5)$

113. [U8·L4 — Perfect Square Trinomial Warm-Up] Expand: $(x + 5)^2$

$$x^2 + 2 \cdot 5x + 25$$

Answer: $x^2 + 10x + 25$

114. [U8·L4 — Perfect Square Trinomial Warm-Up] What number completes the square: $x^2 + 8x + \underline{\hspace{1cm}}$?

$$(8/2)^2 = 16$$

Answer: 16

115. [U8·L5 — Completing the Square] Complete the square to write $x^2 + 6x + 5$ in vertex form.

$$(6/2)^2=9$$

$$x^2+6x+9-9+5=(x+3)^2-4$$

Answer: $(x + 3)^2 - 4$

116. [U8·L5 — Completing the Square] Write $x^2 - 4x + 1$ in vertex form.

$$(-4/2)^2=4$$

$$(x-2)^2-4+1$$

Answer: $(x - 2)^2 - 3$

117. [U8·L6 — The Axis of Symmetry Formula] Find the axis of symmetry of $y = x^2 - 6x + 2$.

$$x=-b/2a=6/2$$

Answer: $x = 3$

118. [U8·L6 — The Axis of Symmetry Formula] Find the vertex of $y = x^2 - 6x + 2$.

$$x=3; y=9-18+2=-7$$

Answer: $(3, -7)$

119. [U8·L7 — Stretching Parabolas] A parabola has vertex $(0,0)$ and passes through $(1,3)$. Find a in $y = ax^2$.

$$3=a \cdot 1^2$$

Answer: $a = 3$

120. [U8·L7 — Stretching Parabolas] To complete the square on $2x^2 + 8x$, what do you factor out first?

factor the leading coefficient

Answer: Factor out 2

121. [U8·L8 — The Zeroes of a Quadratic] Find the zeroes: $(x - 3)(x + 7) = 0$

each factor = 0

Answer: $x = 3$ or $x = -7$

122. [U8·L8 — The Zeroes of a Quadratic] Find the zeroes of $x^2 - 9 = 0$.

$$(x-3)(x+3)=0$$

Answer: $x = 3$ or $x = -3$

123. [U8·L9 — Zeros of a Quadratic — Extra Practice] Solve by factoring: $x^2 + 5x + 6 = 0$

$$(x+2)(x+3)=0$$

Answer: $x = -2$ or $x = -3$

124. [U8·L9 — Zeros of a Quadratic — Extra Practice] Solve by factoring: $x^2 - 7x + 10 = 0$

$$(x-2)(x-5)=0$$

Answer: $x = 2$ or $x = 5$

125. [U8·L10 — More Zero Product Law] Solve: $x(x - 4) = 0$

$$x=0 \text{ or } x-4=0$$

Answer: $x = 0$ or $x = 4$

126. [U8·L10 — More Zero Product Law] Solve: $3x(x + 2) = 0$

$$x=0 \text{ or } x+2=0$$

Answer: $x = 0$ or $x = -2$

127. [U8·L11 — Solving Linear-Quadratic Systems] Solve: $y = x^2$ and $y = x + 2$.

$$x^2=x+2 \rightarrow x^2-x-2=0 \rightarrow (x-2)(x+1)$$

$$x=2 \rightarrow y=4; x=-1 \rightarrow y=1$$

Answer: (2, 4) and (-1, 1)

128. [U8·L11 — Solving Linear-Quadratic Systems] How many times can a line and a parabola intersect?

0, 1 (tangent), or 2

Answer: Zero, one, or two times

129. [U8·L12 — Quadratic Word Problems] A rectangle has length x and width $x - 2$, area 15. Write the equation and solve for x .

$$x(x-2)=15 \rightarrow x^2-2x-15=0 \rightarrow (x-5)(x+3)$$

$$x=5 \text{ (length positive)}$$

Answer: $x = 5$

130. [U8·L12 — Quadratic Word Problems] Two consecutive integers multiply to 42. Write the equation and find them.

$$n(n+1)=42 \rightarrow n^2+n-42=0 \rightarrow (n-6)(n+7)$$

$$n=6 \rightarrow 6, 7$$

Answer: 6 and 7 (or -7 and -6)

131. [U8·L13 — Additional Quadratic Word Problems] A number plus its square is 20. Find the positive value.

$$n+n^2=20 \rightarrow n^2+n-20=0 \rightarrow (n+5)(n-4)$$

$$n=4$$

Answer: 4

132. [U8·L13 — Additional Quadratic Word Problems] A rectangle is 3 longer than wide with area 40. Find the width.

$$w(w+3)=40 \rightarrow w^2+3w-40=0 \rightarrow (w+8)(w-5)$$

$$w=5$$

Answer: width 5

133. [U8·L14 — The Factored Form of a Polynomial] State the zeroes of $y = (x - 1)(x + 4)$.

$$x-1=0, x+4=0$$

Answer: $x = 1$ and $x = -4$

134. [U8·L14 — The Factored Form of a Polynomial] Find the y-intercept of $y = (x - 2)(x + 6)$.

$$x=0: (-2)(6)$$

Answer: y-intercept -12

135. [U8·L16 — Graphing & Checking Quadratics (TI-Nspire)] Graphing $y = x^2 - 4x + 3$, what is the vertex? (axis $x = -b/2a$)

$$x = 4/2 = 2; y = 4 - 8 + 3 = -1$$

Answer: (2, -1)

136. [U8·L16 — Graphing & Checking Quadratics (TI-Nspire)] From a graph, $y = x^2 - 4x + 3$ crosses the x-axis at which points?

$$(x-1)(x-3)=0$$

Answer: $x = 1$ and $x = 3$

137. [U9·L1 — Square Roots] Simplify: $\sqrt{50}$

$$\sqrt{(25 \cdot 2)} = 5\sqrt{2}$$

Answer: $5\sqrt{2}$

138. [U9·L1 — Square Roots] Simplify: $\sqrt{8} \cdot \sqrt{2}$

$$\sqrt{16}$$

Answer: 4

139. [U9·L2 — Irrational Numbers] Is $\sqrt{16}$ rational or irrational? Explain.

$$\sqrt{16} = 4$$

Answer: Rational — $\sqrt{16} = 4$

140. [U9·L2 — Irrational Numbers] Is $3 + \sqrt{2}$ rational or irrational?

rational + irrational = irrational

Answer: Irrational

141. [U9·L3 — Square Root Functions and Shifting] What is the domain of $f(x) = \sqrt{x-3}$?

$$x-3 \geq 0$$

Answer: $x \geq 3$

142. [U9·L3 — Square Root Functions and Shifting] The graph of $y = \sqrt{x}$ is shifted to give $y = \sqrt{x} + 2$. Which direction?

outside +2 → up

Answer: Up 2 units

143. [U9·L4 — Solving Quadratics by Inverse Operations] Solve: $x^2 = 49$

$$x = \pm\sqrt{49}$$

Answer: $x = 7$ or $x = -7$

144. [U9·L4 — Solving Quadratics by Inverse Operations] Solve: $2x^2 = 18$

$$x^2 = 9 \rightarrow x = \pm 3$$

Answer: $x = 3$ or $x = -3$

145. [U9·L5 — Area and Completing the Square] What term completes the square: $x^2 + 10x + \underline{\hspace{1cm}}$?

$$(10/2)^2 = 25$$

Answer: 25

146. [U9·L5 — Area and Completing the Square] Write $x^2 + 10x + 25$ as a binomial squared.
perfect square

Answer: $(x + 5)^2$

147. [U9·L6 — Finding Zeroes by Completing the Square] Solve by completing the square: $x^2 + 6x - 7 = 0$

$$(x+3)^2 - 9 - 7 = 0 \rightarrow (x+3)^2 = 16 \rightarrow x+3 = \pm 4$$

Answer: $x = 1$ or $x = -7$

148. [U9·L6 — Finding Zeroes by Completing the Square] Solve: $(x - 2)^2 = 9$

$$x - 2 = \pm 3$$

Answer: $x = 5$ or $x = -1$

149. [U9·L7 — The Quadratic Formula] Use the quadratic formula: $x^2 + 3x - 4 = 0$

$$a=1, b=3, c=-4; \text{ disc}=9+16=25$$

$$x = \frac{-3 \pm 5}{2}$$

Answer: $x = 1$ or $x = -4$

150. [U9·L7 — The Quadratic Formula] Find the discriminant of $x^2 + 2x + 5 = 0$ and state the number of real solutions.

$$b^2 - 4ac = 4 - 20 = -16 < 0$$

Answer: -16 ; no real solutions

151. [U9·L8 — Final Work with Quadratic Equations] Solve $x^2 - 4x = 0$ by the best method.

$$x(x-4)=0$$

Answer: $x = 0$ or $x = 4$

152. [U9·L8 — Final Work with Quadratic Equations] Solve $x^2 = 6x - 9$.

$$x^2 - 6x + 9 = 0 \rightarrow (x-3)^2 = 0$$

Answer: $x = 3$ (double root)

153. [U9·L9 — Checking Roots (TI-Nspire)] Check: is $x = 2$ a solution of $x^2 - x - 2 = 0$? Substitute.

$$4 - 2 - 2 = 0 \checkmark$$

Answer: Yes — it gives 0.

154. [U9·L9 — Checking Roots (TI-Nspire)] $\sqrt{18} \approx ?$ Round to the hundredth.

$$\sqrt{18} = 3\sqrt{2} \approx 4.2426$$

Answer: ≈ 4.24

155. [U10·L1 — Graphically Representing Data] Data: 3,3,4,5,5,5,6. What value appears most often (the mode)?

5 appears three times

Answer: 5

156. [U10·L1 — Graphically Representing Data] In a histogram, what does grouping data into 'bins' mean?

intervals of equal width

Answer: Sorting data into equal-width intervals

157. [U10•L2 — Quartiles and Box Plots] Find the median of 4, 7, 7, 8, 10, 12, 15.

middle of 7 values

Answer: 8

158. [U10•L2 — Quartiles and Box Plots] For 2, 4, 6, 8, 10, 12, find Q1 and Q3.

lower half 2,4,6 → $Q1=4$; upper 8,10,12 → $Q3=10$

Answer: $Q1 = 4$, $Q3 = 10$

159. [U10•L3 — Measures of Central Tendency] Find the mean of 6, 8, 10, 12.

$36/4$

Answer: 9

160. [U10•L3 — Measures of Central Tendency] Data: 2, 3, 4, 100. Which is larger, the mean or the median?

mean pulled up by 100

Answer: The mean (outlier pulls it up)

161. [U10•L4 — Variation within a Data Set] Find the IQR for $Q1 = 4$ and $Q3 = 10$.

$Q3 - Q1$

Answer: 6

162. [U10•L4 — Variation within a Data Set] Which shows more spread: standard deviation 2 or standard deviation 9?

larger SD = more spread

Answer: Standard deviation 9

163. [U10•L5 — Outliers] With $Q1 = 10$, $Q3 = 20$ (IQR 10), any value above what number is an outlier?

$Q3 + 1.5 \cdot \text{IQR} = 20 + 15$

Answer: Above 35

164. [U10•L5 — Outliers] Does an outlier affect the mean or the median more?

mean is sensitive

Answer: The mean

165. [U10•L6 — Two-Way Frequency Tables] In a class, 12 like tea and 8 like coffee (20 total). What relative frequency likes tea?

$12/20$

Answer: 0.6 (60%)

166. [U10•L6 — Two-Way Frequency Tables] A two-way table organizes data by how many variables?

two categorical variables

Answer: Two

167. [U10•L7 — Bivariate Data Analysis] A scatter plot trends upward. Is the correlation positive or negative?

upward → positive

Answer: Positive

168. [U10•L7 — Bivariate Data Analysis] If ice-cream sales and drownings both rise in summer, does one cause the other?

correlation $\neq$ causation

Answer: No — correlation is not causation

169. [U10•L8 — Linear Regression on the Calculator] A best-fit line is $y = 2x + 3$. Predict y when $x = 5$.

$2 \cdot 5 + 3$

Answer: 13

170. [U10•L8 — Linear Regression on the Calculator] In the best-fit line $y = 2x + 3$, what does the slope 2 represent?

rate of change

Answer: y increases 2 for each 1-unit increase in x

171. [U10•L9 — Other Types of Regression] Data doubles each step: 2, 4, 8, 16. Which model fits — linear or exponential?

constant ratio $\rightarrow$ exponential

Answer: Exponential

172. [U10•L9 — Other Types of Regression] Data 1, 4, 9, 16 (perfect squares) best fits which model?

$y = x^2$

Answer: Quadratic

173. [U10•L10 — Quantifying Predictability] A correlation coefficient is $r = -0.95$. Is the linear fit strong or weak, and what direction?

$|r|$ near 1 = strong; negative

Answer: Strong, negative

174. [U10•L10 — Quantifying Predictability] Between $r = 0.3$ and $r = 0.85$, which shows the stronger linear relationship?

closer to 1

Answer: $r = 0.85$

175. [U10•L11 — Residuals] A model predicts 12 but the actual value is 15. Find the residual.

actual – predicted = $15 - 12$

Answer: 3

176. [U10•L11 — Residuals] A residual plot shows no pattern. Is the model a good fit?

no pattern = good fit

Answer: Yes

177. [U10•L12 — Statistics on the TI-Nspire] 1-Var Stats gives the mean of 5, 10, 15, 20. What is it?

$50/4$

Answer: 12.5

178. [U10•L12 — Statistics on the TI-Nspire] Which calculator tool gives the regression line: 1-Var Stats or 2-Var/LinReg?

two-variable

Answer: 2-Var / LinReg

179. [U11·L1 — Function Transformations] $g(x) = 3 \cdot f(x)$. If $f(2) = 5$, find $g(2)$.

3·5

Answer: 15

180. [U11·L1 — Function Transformations] $y = 2 \cdot f(x)$ is a vertical stretch by what factor?

coefficient

Answer: 2

181. [U11·L2 — Horizontal Stretching of Functions] $g(x) = f(2x)$ changes inputs. Is this a horizontal stretch or compression?

factor >1 inside $\rightarrow$ compression

Answer: Horizontal compression

182. [U11·L2 — Horizontal Stretching of Functions] If f has a zero at $x = 6$, where is the zero of $f(2x)$?

$2x=6 \rightarrow x=3$

Answer: $x = 3$

183. [U11·L3 — Discrete Functions] Number of students on b buses (each holds 40): continuous or discrete?

counting $\rightarrow$ discrete

Answer: Discrete

184. [U11·L3 — Discrete Functions] A solution gives $x = 2.5$ people. Is this viable in a discrete model?

can't have half a person

Answer: No — not viable

185. [U11·L4 — Linear and Exponential Models] Points (0,2) and (1,6): fit $y = a \cdot b^x$. Find a and b .

$a=2$ (at $x=0$); $6=2b \rightarrow b=3$

Answer: $a = 2$, $b = 3$

186. [U11·L4 — Linear and Exponential Models] Points (0,2) and (1,6): fit a linear model $y = mx + b$.

$b=2$, $m=4$

Answer: $y = 4x + 2$

187. [U11·L5 — Step Functions] Parking is \$3 for each hour or part of an hour. Cost for 2.5 hours?

rounds up to 3 hours $\rightarrow 3 \cdot 3$

Answer: \$9

188. [U11·L5 — Step Functions] A step function is constant over intervals, then does what?

jumps

Answer: Jumps to a new value

189. [U11·L6 — Piecewise Linear Functions] $f(x)=x$ for $x<2$ and $f(x)=5$ for $x \geq 2$. Find $f(1)$ and $f(4)$.

$f(1)=1$; $f(4)=5$

Answer: $f(1) = 1$, $f(4) = 5$

190. [U11·L6 — Piecewise Linear Functions] For the same f , find $f(2)$.

$x \geq 2$ branch $\rightarrow 5$

Answer: 5

191. [U11·L7 — More Work with Piecewise Functions] A piecewise function can include what besides line segments?

curved pieces

Answer: Curved pieces (e.g., parabolas)

192. [U11·L7 — More Work with Piecewise Functions] $f(x) = x^2$ for $x \leq 0$ and $f(x) = x$ for $x > 0$. Find $f(-3)$.

$x \leq 0$ branch $\rightarrow (-3)^2$

Answer: 9

193. [U11·L8 — Quadratic Modeling] Height $h = -16t^2 + 32t$. When does the object return to the ground ($h = 0$)?

$-16t(t-2) = 0 \rightarrow t = 0$ or $t = 2$

Answer: $t = 2$ seconds

194. [U11·L8 — Quadratic Modeling] A rectangle's length is x and width $10 - x$. Write its area $A(x)$.

length $\cdot$ width

Answer: $A(x) = x(10 - x)$

195. [U11·L9 — Limits to Accuracy of Our Models] A measurement is 4.2 cm (2 sig figs). A result computes to 13.056. Round appropriately.

match least precise: 2 sig figs

Answer: 13 (2 significant figures)

196. [U11·L9 — Limits to Accuracy of Our Models] Why report an answer to the same precision as the data?

can't be more precise than measurements

Answer: An answer can't be more precise than its measurements

197. [U11·L10 — Checking Models (TI-Nspire)] To verify $y = (x-2)^2 + 1$ has vertex (2,1), what do you look for on the graph?

turning point

Answer: The turning point at (2, 1)

198. [U11·L10 — Checking Models (TI-Nspire)] Graphing confirms a parabola's zeroes at $x = 1$ and $x = 5$. Write it in factored form.

$(x-1)(x-5)$

Answer: $y = (x - 1)(x - 5)$