

1. [U1 — Order Of Operations] Evaluate: $3 + 4(2^3 - 5) \div 2$

$$2^3=8; 8-5=3$$

$$4 \cdot 3=12; 12 \div 2=6$$

$$3+6=9$$

Answer: 9

2. [U1 — Evaluating Expressions] Evaluate $3x^2 - 2y + 7$ for $x = -2$, $y = 5$.

$$3(-2)^2 - 2(5) + 7$$

$$3(4) - 10 + 7 = 12 - 10 + 7$$

Answer: 9

3. [U1 — Distributive Property] Simplify: $5(2x - 3) - 4x + 9$

$$10x - 15 - 4x + 9$$

$$6x - 6$$

Answer: $6x - 6$

4. [U1 — Properties Of Real Numbers] Name the property illustrated: $4 + (6 + 9) = (4 + 6) + 9$

grouping changes, order stays

Answer: Associative Property of Addition

5. [U1 — Order Of Operations] Evaluate: $|-7| + (-3)(4) - 2^2$

$$|-7|=7; (-3)(4)=-12; 2^2=4$$

$$7 - 12 - 4$$

Answer: -9

6. [U2·L1 — Multi-Step Equations] Solve: $3(2x - 4) + 5 = 2x + 7$

$$6x - 12 + 5 = 2x + 7$$

$$6x - 7 = 2x + 7; 4x = 14$$

Answer: $x = 7/2$

7. [U2·L1 — Multi-Step Equations] Solve: $\blacksquare x - 5 = 7$

$$\blacksquare x = 12$$

$$x = 12 \cdot 3/2$$

Answer: $x = 18$

8. [U2·L2 — Compound Inequalities] Solve and graph: $-3 < 2x + 1 \leq 9$

$$\text{subtract 1: } -4 < 2x \leq 8$$

$$\text{divide 2}$$

Answer: $-2 < x \leq 4$

9. [U2·L2 — Compound Inequalities] Solve: $4x - 5 < 7$ OR $x + 6 \geq 15$

$$4x < 12 \rightarrow x < 3; x \geq 9$$

Answer: $x < 3$ or $x \geq 9$

10. [U2·L3 — Modeling] A rental car costs \$35 plus \$0.20 per mile. Write an equation for total cost C in terms of miles m, then find the miles driven if the total cost was \$75.

$$C = 35 + 0.20m$$

$$75 = 35 + 0.20m \rightarrow 40 = 0.20m$$

Answer: $C = 35 + 0.20m$; $m = 200$ miles

11. [U2·L3 — Modeling] Twice a number decreased by 7 is at least 15. Write and solve an inequality to find the number.

$$2n - 7 \geq 15$$

$$2n \geq 22$$

Answer: $n \geq 11$

12. [U3·L1 — Intro To Functions] Is the relation $\{(1,2), (2,4), (3,6), (1,5)\}$ a function? Explain.

input 1 $\rightarrow$ 2 and 5

Answer: No — input 1 has two outputs

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

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

$$8 + 6 + 1$$

Answer: 15

14. [U3·L3–L4 — Graphs & Features] Find the zeros and y-intercept of $f(x) = x^2 - 4$.

$$x^2 - 4 = 0 \rightarrow x = \pm 2; \text{ y-int at } x = 0$$

Answer: zeros $x = \pm 2$; y-intercept -4

15. [U3·L7 — Domain & Range] Find the domain and range of $f(x) = \sqrt{x - 3}$.

$$x - 3 \geq 0$$

Answer: domain $x \geq 3$; range $y \geq 0$

16. [U3·L6 — Average Rate Of Change] Find the average rate of change of $f(x) = x^2$ from $x = 1$ to $x = 4$.

$$(16 - 1) / (4 - 1) = 15/3$$

Answer: 5

17. [U3·L4 — Graphical Features] State whether $f(x) = -2x + 5$ is increasing, decreasing, or constant.

$$\text{slope } -2 < 0$$

Answer: Decreasing

18. [U3·L2 — Function Notation] $g(x) = 3x - 1$ models the cost in dollars for x items. Find $g(5)$ and explain what it means.

$$g(5) = 3(5) - 1 = 14$$

Answer: $g(5) = 14$ — 5 items cost \$14

19. [U3·L7 — Domain & Range] Find the domain of $f(x) = 1 / (x - 6)$.

$$\text{denominator} \neq 0$$

Answer: all reals except $x = 6$

20. [U4·L1 — Proportional Relationships] Is $y = 4x$ a proportional relationship? Identify the constant of proportionality.

$$\text{passes through origin, } y = kx$$

Answer: Yes; $k = 4$

21. [U4·L2 — Unit Conversions] Convert 45 miles per hour to feet per second.

$$45 \times 5280 / 3600$$

Answer: 66 ft/s

22. [U4·L5 — Writing Equations] Write the equation of the line through (1, 4) and (3, 10).

$$m = (10 - 4) / (3 - 1) = 3$$

$$4 = 3(1) + b \rightarrow b = 1$$

Answer: $y = 3x + 1$

23. [U4·L4 — More Graphing] State the slope and y-intercept of $y = \blacksquare x - 4$.

read m and b

Answer: slope $\blacksquare$; y-intercept -4

24. [U4·L6 — Modeling] A gym charges a \$20 startup fee plus \$15/month. Write an equation for total cost and find the cost after 8 months.

$$C = 20 + 15m$$

$$C = 20 + 15(8) = 20 + 120$$

Answer: $C = 20 + 15m$; \$140

25. [U4·L7 — More Modeling] A tank starts with 200 gallons and drains at 8 gal/min. Write an equation for the volume and find when the tank is empty.

$$V = 200 - 8t$$

$$0 = 200 - 8t$$

Answer: $V = 200 - 8t$; 25 minutes

26. [U4·L8 — Strange Lines] Write the equations of the vertical and horizontal lines through (4, -2).

vertical $x = \text{const}$; horizontal $y = \text{const}$

Answer: $x = 4$ and $y = -2$

27. [U4·L9 — Absolute Value Functions] Evaluate $f(x) = |x - 3| + 2$ at $x = -1$ and $x = 7$.

$$|-1 - 3| + 2 = 6; |7 - 3| + 2 = 6$$

Answer: $f(-1) = 6$, $f(7) = 6$

28. [U4·L9 — Step Functions] A parking garage charges \$5 for the first hour (or part of an hour) and \$3 for each additional hour (or part). Find the cost for 2 hours 15 minutes.

first hr \$5; 1h15min = 2 part-hours $\times$ \$3

Answer: \$11

29. [U4·L10 — Truth About Graphs] Does the graph of $x = 5$ represent a function? Explain.

$x = 5$ is a vertical line

Answer: No — fails the vertical line test

30. [U4·L11 — Linear Inequalities] Solve $2x - 3y \leq 12$ for y .

$$-3y \leq 12 - 2x$$

divide by -3 , flip

Answer: $y \geq (2/3)x - 4$

31. [U4·L12 — Sequences] Find the next three terms of 7, 11, 15, 19, ... and write an explicit formula.

$$d = 4; a_n = 7 + (n - 1)4$$

Answer: 23, 27, 31; $a_n = 4n + 3$

32. [U4·L12 — Sequences] Is 5, 10, 20, 40, ... arithmetic or geometric? Find the next term.

ratio 2 each term

Answer: Geometric ($r=2$); next term 80

33. [U4·L3 — Non-Proportional Linear] A line passes through (2, 5) with slope -3 . Write its equation.

Is it a proportional relationship?

$$y-5=-3(x-2) \rightarrow y=-3x+11$$

Answer: $y = -3x + 11$; not proportional ($b \neq 0$)

34. [U5·L1 — Solving By Graphing] Find the intersection point of $y = 2x - 1$ and $y = -x + 5$.

$$2x-1=-x+5 \rightarrow 3x=6$$

Answer: (2, 3)

35. [U5·L2 — Substitution] Solve by substitution: $y = 3x - 2$ and $2x + y = 8$.

$$2x+(3x-2)=8 \rightarrow 5x=10$$

Answer: (2, 4)

36. [U5·L3 — Properties Of Systems] How many solutions does the system $y = 2x + 3$ and $y = 2x - 1$ have? Explain.

same slope 2, different intercept

Answer: No solution (parallel lines)

37. [U5·L4 — Elimination] Solve by elimination: $3x + 2y = 16$ and $5x - 2y = 8$.

$$\text{add equations: } 8x=24 \rightarrow x=3$$

$$9+2y=16 \rightarrow y=3.5$$

Answer: (3, 3.5)

38. [U5·L5 — Modeling With Systems] Two numbers have a sum of 24 and a difference of 8. Find the numbers.

$$x+y=24, x-y=8 \rightarrow 2x=32$$

Answer: 16 and 8

39. [U5·L5 — Modeling With Systems] A theater sells adult tickets for \$12 and child tickets for \$8. 150 tickets were sold for a total of \$1500. How many of each type were sold?

$$a+c=150; 12a+8c=1500$$

$$4a=300$$

Answer: 75 adult, 75 child

40. [U5·L6 — Solving Equations Graphically] Solve $x^2 - 4 = x$ algebraically (where the graphs intersect).

$$x^2-x-4=0$$

$$\text{disc}=1+16=17$$

Answer: $x = (1 \pm \sqrt{17})/2$

41. [U5·L7 — Systems Of Inequalities] Graph and shade the solution region for $y > x - 2$ and $y \leq -x + 4$. Is (0, 0) a solution?

$$0 > 0-2 \checkmark \text{ and } 0 \leq 0+4 \checkmark$$

Answer: Yes — (0,0) satisfies both

42. [U5·L8 — Modeling With Inequalities] Vendor A charges \$150 flat + \$5/student. Vendor B charges \$8/student, no flat fee. For how many students is Vendor A cheaper?

$$150 + 5s < 8s \rightarrow 150 < 3s$$

Answer: $s > 50$ (51+ students)

43. [U5·L8 — Modeling With Inequalities] Write a system of inequalities: you have at most \$60 for x notebooks at \$3 each and y folders at \$2 each, and need at least 5 items total.

$$\text{cost} \leq 60; \text{items} \geq 5$$

Answer: $3x + 2y \leq 60$ and $x + y \geq 5$

44. [U6·L1 — Simplifying Exponents] Simplify: $(3x^2y^3)(4x^2y)$

$$3 \cdot 4 = 12; x^2 \cdot x^2 = x^4; y^3 \cdot y = y^4$$

Answer: $12x^4y^4$

45. [U6·L2 — Zero & Negative Exponents] Simplify: $(2a^3b^{-2})^2$

$$2^2 = 4; (a^3)^2 = a^6; (b^{-2})^2 = b^{-4}$$

Answer: $4a^6/b^4$

46. [U6·L2 — Zero & Negative Exponents] Evaluate: $5^{-1} + 3^{-2}$

$$5^{-1} = 1/5; 3^{-2} = 1/9$$

Answer: $10/9$

47. [U6·L3 — Exponential Growth & Decay] A bacteria population grows by $P(t) = 200(1.15)^t$, t in hours. Find the population after 6 hours (nearest whole).

$$200(1.15)^6 = 200(2.3131)$$

Answer: ≈ 463

48. [U6·L3 — Exponential Growth & Decay] A car worth \$24,000 depreciates 12% per year. Write the decay model and find its value after 5 years.

$$V = 24000(0.88)^t$$

$$0.88^5 \approx 0.52773$$

Answer: $V = 24000(0.88)^5$; $\approx \$12,665.57$

49. [U6·L5–L6 — Percent Review] A \$40 shirt is discounted 25%, then an additional 10% off the sale price. Find the final price.

$$40 \times 0.75 = 30$$

$$30 \times 0.90 = 27$$

Answer: \$27

50. [U6·L6 — Percent Increase & Decrease] A city's population grew from 50,000 to 54,000 in one year. Find the percent increase.

$$4000/50000 = 0.08$$

Answer: 8%

51. [U6·L8 — Linear Vs. Exponential] Does the table $x = 0, 1, 2, 3 \rightarrow y = 5, 10, 20, 40$ represent linear or exponential growth? Write the function.

$$\text{each } y \times 2$$

Answer: Exponential; $y = 5(2)^x$

52. [U6·L9 — Geometric Sequences] Find the 8th term of a geometric sequence with $a_1 = 3$, $r = 2$.
 $3 \cdot 2^{7} = 3 \cdot 128$

Answer: 384

53. [U6·L7 — Exponential Models From % Growth] Compare $y = 3x + 2$ (linear) and $y = 2(1.5)^x$ (exponential) at $x = 10$. Which is greater?
 linear=32; $2(1.5)^{10} \approx 115.33$

Answer: Exponential is greater (≈ 115.3 vs 32)

54. [U7·L1 — Intro To Polynomials] Add: $(3x^2 - 5x + 2) + (-x^2 + 4x - 7)$
 combine like terms

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

55. [U7·L1 — Intro To Polynomials] Subtract: $(5x^3 - 2x + 1) - (2x^3 + 4x^2 - 3)$
 distribute $-$; $5x^3 - 2x^3 = 3x^3$; $-4x^2$; $-2x$; $+4$

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

56. [U7·L2 — Multiplying Polynomials] Multiply: $(x + 3)(x - 5)$
 $x^2 - 5x + 3x - 15$

Answer: $x^2 - 2x - 15$

57. [U7·L7 — Multiplying — Area Models] Multiply using an area model: $(2x + 1)(3x - 4)$
 $6x^2 - 8x + 3x - 4$

Answer: $6x^2 - 5x - 4$

58. [U7·L3 — Factoring — Gcf] Factor out the GCF: $12x^3y - 8x^2y^2 + 4xy$
 GCF= $4xy$

Answer: $4xy(3x^2 - 2xy + 1)$

59. [U7·L4 — Conjugate Pairs] Factor: $x^2 - 49$
 difference of squares

Answer: $(x + 7)(x - 7)$

60. [U7·L5 — Factoring Trinomials] Factor: $x^2 + 7x + 12$
 $3 \cdot 4 = 12$, $3 + 4 = 7$

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

61. [U7·L6 — More Factoring Trinomials] Factor: $2x^2 + 5x - 3$
 split middle: $6x - x$

Answer: $(2x - 1)(x + 3)$

62. [U7·L8 — Factoring Trinomials — Area] Factor using an area model: $3x^2 + 11x + 6$
 product 18, factors 9,2

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

63. [U7·Calc — Checking Polynomial Work] Describe how to use the TI-Nspire to verify that $(x - 4)(x + 4) = x^2 - 16$.

expand($(x-4)(x+4)$) $\rightarrow x^2 - 16$

Answer: Use expand(), or compare graphs/tables — both give $x^2 - 16$

64. [U8·L3 — The Shifted Form] Identify the vertex and axis of symmetry of $y = (x - 2)^2 + 3$.

vertex (h,k); axis $x=h$

Answer: vertex (2, 3); axis $x = 2$

65. [U8·L1–L2 — Intro To Quadratics] Does $y = -2x^2 + 4x - 1$ open up or down? Is it narrower or wider than $y = x^2$?

$a=-2<0$; $|a|=2>1$

Answer: Opens down; narrower than x^2

66. [U8 — Warm-Up: Perfect Square Trinomials] Factor: $x^2 + 10x + 25$

$(x+5)^2$

Answer: $(x + 5)^2$

67. [U8·L4 — Completing The Square] Solve by completing the square: $x^2 + 8x + 7 = 0$

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

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

68. [U8·L4.5 — Axis Of Symmetry Formula] Find the axis of symmetry of $y = 3x^2 - 12x + 5$ using the formula.

$x=-b/2a=12/6$

Answer: $x = 2$

69. [U8·L5 — Stretching Parabolas] Convert $y = 2x^2 + 8x + 3$ to vertex form by completing the square.

$2(x^2+4x)+3=2(x+2)^2-8+3$

Answer: $y = 2(x + 2)^2 - 5$

70. [U8·L6 — Zeroes Of A Quadratic] Solve using the zero product law: $(x - 3)(x + 7) = 0$

set each factor 0

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

71. [U8·L6.5 — Zeros Extra Practice] Solve: $x^2 - 9x = 0$

$x(x-9)=0$

Answer: $x = 0$ or $x = 9$

72. [U8·L7 — More Zero Product Law] Solve: $2x^3 - 8x = 0$

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

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

73. [U8·L7.5 — Linear-Quadratic Systems] Solve the system: $y = x + 1$ and $y = x^2 - 1$.

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

Answer: (2, 3) and (-1, 0)

74. [U8·L8 — Quadratic Word Problems] A rectangle's length is 3 more than twice its width, and its area is 65 ft². Find the dimensions.

$w(2w+3)=65 \rightarrow 2w^2+3w-65=0$

disc=529, $w=5$

Answer: width 5 ft, length 13 ft

75. [U8·L9 — More Word Problems] The product of two consecutive positive integers is 132. Find the integers.

$$n(n+1)=132 \rightarrow n^2+n-132=0 \rightarrow (n-11)(n+12)$$

Answer: 11 and 12

76. [U8·L10 — Factored Form Of A Polynomial] Write the factored form of a polynomial function with zeros at $x = -2$, 1 , and 4 .

one factor per zero

Answer: $f(x) = (x + 2)(x - 1)(x - 4)$

77. [U8 — Unit 8 Review] Solve $x^2 - 5x - 14 = 0$ by any method.

$$(x-7)(x+2)=0$$

Answer: $x = 7$ or $x = -2$

78. [U8·Calc — Graphing & Checking Quadratics] Describe the TI-Nspire menu path to find the zeros of a graphed quadratic function.

Graphs analyze menu

Answer: menu ■ Analyze Graph ■ Zero, then set left/right bounds

79. [U8·L3 — The Shifted Form] Write $y = x^2 - 6x + 5$ in vertex form and state the minimum value of the function.

$$(x-3)^2-9+5$$

Answer: $y = (x - 3)^2 - 4$; minimum -4

80. [U9·L1 — Square Roots] Simplify: $\sqrt{72}$

$$\sqrt{(36 \cdot 2)}$$

Answer: $6\sqrt{2}$

81. [U9·L2 — Irrational Numbers] Classify $\sqrt{50}$ and $4/9$ as rational or irrational.

$$\sqrt{50}=5\sqrt{2} \text{ (non-terminating); } 4/9 \text{ is a fraction}$$

Answer: $\sqrt{50}$ irrational; $4/9$ rational

82. [U9·L3 — Square Root Functions & Shifting] Describe the shift from $y = \sqrt{x}$ to $f(x) = \sqrt{x + 2}$.

inside $+2 \rightarrow$ left

Answer: Shift left 2 units

83. [U9·L4 — Solving By Inverse Operations] Solve: $\sqrt{x - 3} = 5$

$$\text{square both sides: } x-3=25$$

Answer: $x = 28$

84. [U9·L4.5 — Area & Completing The Square] Solve by completing the square: $x^2 + 4x = 12$

$$(x+2)^2-4=12 \rightarrow (x+2)^2=16$$

Answer: $x = 2$ or $x = -6$

85. [U9·L5 — Zeroes By Completing The Square] Solve by completing the square: $2x^2 - 4x - 6 = 0$

$$\div 2: x^2-2x-3=0 \rightarrow (x-1)^2=4$$

Answer: $x = 3$ or $x = -1$

86. [U9·L6 — The Quadratic Formula] Use the quadratic formula to solve: $x^2 + 3x - 10 = 0$

disc=9+40=49; $x=(-3\pm7)/2$

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

87. [U9·L6 — The Quadratic Formula] Use the quadratic formula to solve: $2x^2 - 3x - 5 = 0$

disc=9+40=49; $x=(3\pm7)/4$

Answer: $x = 5/2$ or $x = -1$

88. [U9·L7 — Final Work With Quadratics] Use the discriminant to describe the roots of $x^2 + 2x + 5 = 0$ without solving.

disc=4-20=-16 < 0

Answer: No real roots (two non-real roots)

89. [U9·Calc — Checking Roots On The Ti-Nspire] Describe the TI-Nspire menu path used to verify the roots of a graphed quadratic.

Graphs analyze menu

Answer: menu ■ Analyze Graph ■ Zero (set bounds)

90. [U10·L1–L2 — Graphical Displays & Box Plots] Find the five-number summary of: 4, 7, 7, 8, 10, 12, 15

ordered; min/Q1/med/Q3/max

Answer: min 4, Q1 7, median 8, Q3 12, max 15

91. [U10·L4.5 — Outliers ($1.5\times IQR$)] Using the summary above, find the IQR and check for outliers using the $1.5\times IQR$ rule.

IQR=12-7=5; fences 7-7.5, 12+7.5

Answer: IQR 5; no outliers (fences -0.5 and 19.5)

92. [U10·L3 — Central Tendency] Find the mean, median, and mode of: 3, 5, 5, 6, 8, 8, 8, 20

sum=63; mean=63/8; median avg(6,8); mode

Answer: mean 7.875, median 7, mode 8

93. [U10·L3 — Central Tendency] Which measure of central tendency best represents the data set above, given the value 20? Explain.

20 is an outlier

Answer: Median — the outlier 20 inflates the mean

94. [U10·L4 — Variation] Find the range and population standard deviation (nearest hundredth) of: 2, 4, 4, 6, 9

range 9-2; mean 5; $\sigma=\sqrt{(28/5)}$

Answer: range 7; $\sigma \approx 2.37$

95. [U10·L5 — Two-Way Frequency Tables] A survey of 100 students: 30 dog owners play video games, 20 dog owners don't, 15 non-owners play, 35 non-owners don't. Find the relative frequency of gamers among dog owners.

30/(30+20)

Answer: 0.60 (60%)

96. [U10·L5 — Two-Way Frequency Tables] Using the same table, find the relative frequency of dog ownership among gamers.

gamers=30+15=45; owners among them 30

Answer: $30/45 \approx 0.67$ (67%)

97. [U10·L6 — Bivariate Data Analysis] Data (hours studied, test score): (1,65) (2,70) (3,78) (4,85) (5,90). Describe the association.

scores rise with hours

Answer: Strong positive (linear) association

98. [U10·L7–L8 — Regression] Find the equation of the line of best fit for the data above (round to the nearest hundredth).

$x=3$, $y=77.6$; slope= $S_{xy}/S_{xx}=65/10$

Answer: $y = 6.5x + 58.1$

99. [U10·L7 — Regression On The Calculator] Use the regression equation above to predict the score for 6 hours studied. Is this interpolation or extrapolation?

$6.5(6)+58.1$; 6 is beyond data 1–5

Answer: ≈ 97.1 ; extrapolation

100. [U10·L9 — Quantifying Predictability] Find the correlation coefficient r for the data above (nearest hundredth) and interpret its strength.

$r = S_{xy} / \sqrt{(S_{xx} \cdot S_{yy})}$

Answer: $r \approx 0.997$ (very strong positive)

101. [U10·Calc — Stats On The Ti-Nspire] Describe the TI-Nspire menu path used to run a linear regression on two lists.

Lists & Spreadsheet stat calc

Answer: menu ■ Statistics ■ Stat Calculations ■ Linear Regression ($mx+b$)

102. [U11·L1 — Function Transformations] Describe the transformation from $f(x) = x^2$ to $g(x) = (x - 3)^2 + 2$.

$h=3$ right, $k=2$ up

Answer: Right 3, up 2

103. [U11·L1 — Function Transformations] Describe the transformation from $f(x) = x^2$ to $g(x) = 2(x + 1)^2 - 4$.

left 1, stretch $\times 2$, down 4

Answer: Left 1, vertical stretch $\times 2$, down 4

104. [U11·L2 — Horizontal Stretching] Write $g(x)$ if the graph of $f(x) = \sqrt{x}$ is stretched horizontally by a factor of 2.

$f(x/2)$ stretches horizontally by 2

Answer: $g(x) = \sqrt{(x/2)}$

105. [U11·L3 — Discrete Functions] Is the sequence 2, 5, 8, 11, ... arithmetic? Write a recursive formula.

common difference 3

Answer: Yes; $a_1=2$, $a_n = a_{n-1} + 3$

106. [U11·L4 — Linear & Exponential Models] Compare $P(t) = 500 + 40t$ (linear) and $P(t) = 500(1.08)^t$ (exponential) after 20 years. Which predicts more growth?

linear 1300; exp $500(1.08)^{20} \approx 2330$

Answer: Exponential predicts more ($\approx \$2330$ vs $\$1300$)

107. [U11·L5 — Step Functions] Explain why a data plan charging per whole GB used is best modeled by a step function.

constant within each GB, jumps at whole GB

Answer: Cost is constant over each interval then jumps — a step function

108. [U11·L6 — Piecewise Linear Functions] A phone plan costs \$30 flat for up to 2GB, then \$10 per additional GB. Write the piecewise function and find the cost for 5GB.

30 for $x \leq 2$; $30 + 10(x-2)$ for $x > 2$

$f(5) = 30 + 30$

Answer: \$60 ($f(x) = 30$ for $0 \leq x \leq 2$; $30 + 10(x-2)$ for $x > 2$)

109. [U11·L6.5 — More Piecewise Functions] A tax model charges 10% on income up to \$10,000 and 20% on income above that. Find the tax on \$15,000.

$0.10(10000) + 0.20(5000)$

Answer: \$2000

110. [U11·L7 — Quadratic Modeling] A ball is launched with $h(t) = -16t^2 + 64t + 5$. Find the maximum height and when it occurs.

vertex $t = -64/(2 \cdot -16) = 2$; $h(2) = 69$

Answer: Max height 69 ft at $t = 2$ s

111. [U11·L7 — Quadratic Modeling] Using the model above, find when the ball hits the ground (round to the nearest hundredth).

$-16t^2 + 64t + 5 = 0$; $t = (64 \pm \sqrt{4416})/32$

Answer: ≈ 4.08 s

112. [U11·L8 — Limits To Accuracy] Explain why the model in the previous two problems should not be evaluated at $t = 10$.

ball lands ≈ 4.08 s; $t = 10$ is outside the domain

Answer: The ball already landed; $t = 10$ gives a meaningless (negative) height

113. [U11·Calc — Checking Models On The TI-Nspire] Describe the TI-Nspire menu path to find the maximum of a graphed function.

Graphs analyze menu

Answer: menu ■ Analyze Graph ■ Maximum (set bounds)