Summer Math

The Summer Before 8th Grade

SEACREST
COUNTRY DAY SCHOOL

7th Grade

Summer Math
7th Grade
The Summer Before 8th Grade

Summer Math Sections:	Notes:
Summer Math The Summer Before 8th Grade Practice Packet	**Focuses On:** - all four operations with decimals, including order of operations with decimals - all four operations with fractions & mixed numbers - ratios, rates, & unit rates - converting fractions, decimals, and percent - finding the percent of a number - comparing integers & absolute value - graphing in the coordinate plane (all 4 quadrants) - perimeter and area of 2D figures (rectangles, parallelograms, triangles, & trapezoids) & volume of rectangular prisms - evaluating algebraic expressions - solving one-step equations - problem solving - all four operations with integers (including order of operations problems with integers) - all four operations with rational numbers (positive and negative decimals, fractions, and mixed numbers) - solving one- and two-step equations - solving proportions and percent problems - area, perimeter, circumference, surface area, and volume **Includes explanations & examples and practice problems for the summer.** Recommended Use: • Practice 25 problems a week for 8 weeks • Show all your work and calculations • Provided answer key to check your work.
Virtual Nerd Video Tutorial Browser See Provided Letter	Recommended Use: • View supporting math video tutorials before, during, or after your practice session with your summer math packet. • Actively view the videos while recording and solving examples.

Middle School Summer Math
The Summer Before 8th Grade
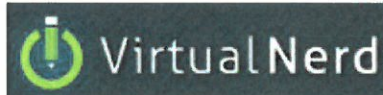
Virtual Nerd is an expansive library of instructional math content. Please use it this summer as a supplemental learning resource. It is a helpful resource that helps bring practice, clarity and skill reinforcement to your at home math routine.

Suggested Summer Use:

- Practice content in your summer math packet.

- Use a mobile device to SCAN your grade level's QR code(s) to access the Virtual Nerd website. If you're using a desktop or laptop computer use the provided website.

- Search for a video related to the math content practiced in your packet that day. For example: if you're working on finding the **MULTI-STEP INEQUALITIES** in your math packet, either before, during or after your practice session, search **MULTI-STEP INEQUALITIES** by expanding the topic lists (Click on the **+** sign until you find your topic and specific tutorial) **OR** type directly into the search bar by keyword or topic.

EXPANDING TOPICS OPTION

SEARCH BAR OPTION

Within the screenshot:

VirtualNerd

Multi-step Inequality

How Do You Solve a Multi-Step Inequality?

⊕ **The Tools of Algebra**
⊕ **Solving One- and Two-Step Equations**
⊖ **Multi-Step Equations and Inequalities**
- ⊕ Multi-Step Equations
- ⊕ Equations with Variables on Both Sides
- ⊕ Inequalities and their Graphs
- ⊕ Solving Inequalities by Adding and Subtracting
- ⊕ Solving Inequalities by Multiplying and Dividing
- ⊕ Multi-Step Inequalities
- ⊕ Formulas

⊕ **Factors, Fractions, and Exponents**
⊕ **Rational Numbers**
⊕ **Ratios and Proportions**
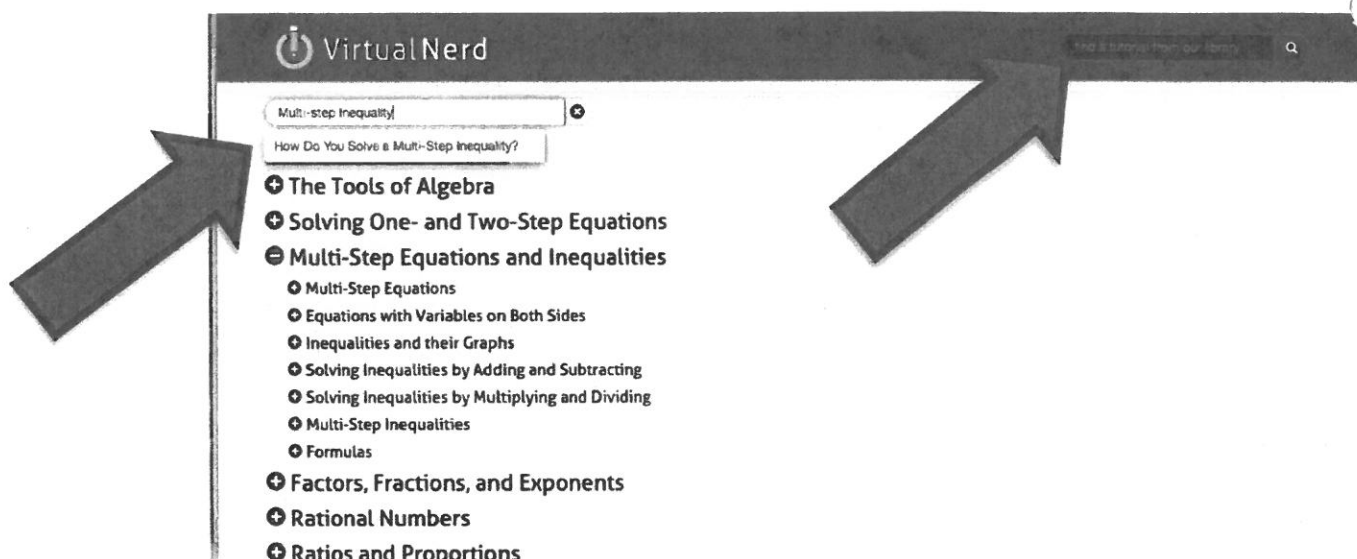
View the video with a **notebook** and **pencil.** Walk through the examples in the video with the instructional coach. Play the video, pause to copy the problem, work through to solve it with the coach.

Virtual Nerd Access	
6-8 MATH	**PRE-ALGEBRA**
https://www.virtualnerd.com/middle-math/all/	https://www.virtualnerd.com/pre-algebra/all/
6-8 MATH TOPICS *Featuring 400+ Video Tutorials* • Number Sense and Algebraic Reasoning • Measurement • Decimals • Number Theory and Fractions • Adding and Subtracting Fractions • Multiplying and Dividing Fractions • Ratios, Proportions, and Percent • Geometric Figures • Geometry and Measurement • Integers and the Coordinate Plane • Equations and Functions • Probability and Statistics	**PRE-ALGEBRA MATH TOPICS** *Featuring 700+ Video Tutorials* • The Tools of Algebra Expand All Here • Solving One- and Two-Step Equations • Multi-Step Equations and Inequalities • Factors, Fractions, and Exponents • Rational Numbers • Ratios and Proportions • Percents • Linear Functions and Graphing • Geometry • Real Numbers and Right Triangles • Perimeter, Area and Volume • Probability and Data Analysis • Polynomials and Nonlinear Functions

Operations with Integers

Adding Integers

- <u>Negative + Negative</u>: Add the absolute values of the two numbers and make the answer negative.

    ex: $-5 + (-9) \longrightarrow 5 + 9 = 14 \longrightarrow$ answer: $\boxed{-14}$

- <u>Negative + Positive (or Positive + Negative)</u>: Subtract the absolute values of the two numbers (larger minus smaller) and take the sign of the number with the greater absolute value.

    ex: $-7 + 12 \longrightarrow 12 - 7 = 5 \longrightarrow 12 > 7$, so answer is positive $\longrightarrow$ answer: $\boxed{5}$

    ex: $6 + (-9) \longrightarrow 9 - 6 = 3 \longrightarrow 9 > 6$, so answer is negative $\longrightarrow$ answer: $\boxed{-3}$

Subtracting Integers

- Keep the first number the same, change the subtraction sign to an addition sign, and change the sign of the second number. Then use the integer addition rules.

    ex: $-3 - 9 \longrightarrow -3 + (-9) = \boxed{-12}$

    ex: $15 - (-8) \longrightarrow 15 + 8 = \boxed{23}$

    ex: $-6 - (-4) \longrightarrow -6 + 4 = \boxed{-2}$

Multiplying & Dividing Integers

Ignore the signs and multiply or divide as usual. Then determine the sign of the answer using the following rules:

- Negative $\cdot$ or $\div$ Negative = Positive
- Negative $\cdot$ or $\div$ Positive (or Positive $\cdot$ or $\div$ Negative) = Negative

    ex: $-3 \cdot (-5) \longrightarrow 3 \cdot 5 = 15 \longrightarrow$ neg $\cdot$ neg = pos $\longrightarrow$ answer: $\boxed{15}$

    ex: $48 \div (-6) \longrightarrow 48 \div 6 = 8 \longrightarrow$ pos $\div$ neg = neg $\longrightarrow$ answer: $\boxed{-8}$

Order of Operations

Parentheses
Exponents
Multiplication & Division (left to right)
Addition & Subtraction (left to right)

Find the sum or difference.

1. -80 + 77

2. 77 + 160

3. -64 + (-33)

4. 104 - (-92)

5. -105 - (-122)

6. 185 - (-154)

7. -53 - (-59)

8. -6 + (-35)

9. 15 - (-26) - (-39)

10. -93 + 191 + (-179)

11. 18 + (-34) + 52

12. -50 - (-93) + (-17)

Find the product or quotient.

13. 60 ÷ 12

14. -194 ÷ (-2)

15. 88 · (-2)

16. -12 · 10

17. -10 · (-11)

18. 90 ÷ (-6)

19. 3 · (-59)

20. -7 · (-2)

21. -28 ÷ (-88) · (-22)

22. -56 · 140 ÷ (-80)

23. 108 ÷ (-11) · (-11)

24. -84 · (-17) ÷ 42

Evaluate the numerical expression. (Be sure to use the order of operations!)

25. -78 + (-2) · (-56)

26. -65 + 6 ÷ (-3) + 40

27. -94 - (84 - 10)

28. 43 + (-23) - (-57)

29. -15 - (-11) + 5 · (-4)

30. -26 - (-64) + (-93)

31. -84 ÷ 4 + (-20)

32. -56 + (-50) + (-10) · (-9)

Operations with Rational Numbers

Adding & Subtracting Rational Numbers

Determine whether you should add or subtract using integer rules. Then add or subtract.

- Decimals: Line up the decimal points. Then add or subtract and bring the decimal point down. Use integer rules to determine the sign of the answer.

$$\text{ex: } -9.8 + 6.24 \longrightarrow \text{neg + pos: subtract} \longrightarrow \begin{array}{r} 9.80 \\ -\ 6.24 \\ \hline 3.56 \end{array} \longrightarrow \text{answer: } \boxed{-3.56}$$

- Fractions/Mixed Numbers: Find a common denominator and then add or subtract. Borrow or convert an improper fraction answer, if necessary. Use integer rules to determine the sign of the answer.

$$\text{ex: } 5\tfrac{3}{4} - \left(-3\tfrac{7}{8}\right) \longrightarrow 5\tfrac{3}{4} \quad 3\tfrac{7}{8} \longrightarrow \text{pos + pos: add} \longrightarrow \begin{array}{r} 5\tfrac{3}{4} = \tfrac{6}{8} \\ +\ 3\tfrac{7}{8} = \tfrac{7}{8} \\ \hline 8 \quad \tfrac{13}{8} \end{array} \longrightarrow \text{answer: } \boxed{9\tfrac{5}{8}}$$

Multiplying & Dividing Rational Numbers

Determine the sign of the answer using integer rules. Then multiply or divide.

- Multiplying Decimals: Ignore the decimal points. Multiply the numbers. Then count the decimal places in the problem to determine the location of the decimal point in the answer.

$$\text{ex: } -9.23 \cdot (-1.1) \longrightarrow \text{neg} \cdot \text{neg} = \text{pos} \longrightarrow \begin{array}{r} 9.23 \\ \times\ 1.1 \\ \hline 923 \\ 9230 \\ \hline 10153 \end{array} \longrightarrow \text{answer: } \boxed{10.153}$$

- Dividing Decimals: Move the decimal in the divisor to the end of the number. Move the decimal in the dividend the same number of places and then bring it straight up in quotient.

$$\text{ex: } -5.2 \div 0.2 \longrightarrow \text{neg} \div \text{pos} = \text{neg} \longrightarrow 02.\overline{)52.}^{\,26.} \longrightarrow \text{answer: } \boxed{-26}$$

- Multiplying Fractions: Convert mixed numbers to improper fractions. Then cross-simplify. Multiply the numerators and multiply the denominators. Simplify if necessary.

$$\text{ex: } -1\tfrac{3}{4} \cdot \tfrac{6}{14} \longrightarrow \text{neg} \cdot \text{pos} = \text{neg} \longrightarrow \tfrac{\cancel{7}^{1}}{\cancel{4}_{2}} \cdot \tfrac{\cancel{6}^{3}}{\cancel{14}_{2}} = \tfrac{3}{4} \longrightarrow \text{answer: } \boxed{-\tfrac{3}{4}}$$

- Dividing Fractions: Convert mixed numbers to improper fractions. Then flip the second fraction to its reciprocal and multiply the two fractions. Simplify if necessary.

$$\text{ex: } -\tfrac{1}{2} \div \left(-\tfrac{3}{8}\right) \longrightarrow \text{neg} \div \text{neg} = \text{pos} \longrightarrow \tfrac{1}{\cancel{2}_{1}} \cdot \tfrac{\cancel{8}^{4}}{3} = \tfrac{4}{3} \longrightarrow \text{answer: } \boxed{1\tfrac{1}{3}}$$

Find the sum, difference, product, or quotient.

33. $38.61 + 36.841$

34. $1.755 - 1.23$

35. $0.71 \cdot 9.2$

36. $13.12 \div 0.1$

37. $3.651 - (-12.63)$

38. $-3.9 + (-7.6)$

39. $17.6 \cdot 4.3$

40. $6 \cdot (-16.7)$

41. $26.474 - 14.527$

42. $-2.1 + 3.78$

43. $-6.15 \div (-8.2)$

44. $-12.8 \cdot (-4.88)$

Find the sum, difference, product, or quotient.

45. $15\ 1/2 + 15\ 1/4$

46. $18\ ^{11}/_{20} - 17\ 1/2$

47. $2\ 1/4 \cdot 1\ ^4/_5$

48. $3\ 1/2 \div 1\ ^3/_7$

49. $3\ 1/3 - 5\ 1/9$

50. $5 \cdot (-1\ ^2/_5)$

51. $-4\ ^2/_3 + (-1\ ^3/_4)$

52. $-\ ^5/_6 \div (-2\ 1/6)$

53. $9 \div (-4\ 1/2)$

54. $-18 + 3\ ^4/_5$

55. $-5\ ^2/_3 \cdot (-2\ ^5/_6)$

56. $-5\ ^3/_4 - (-3\ ^7/_8)$

Solving Equations

Solving One-Step Equations

- Cancel out the number on the same side of the equation as the variable by using the inverse operation. (Addition/Subtraction; Multiplication/Division). Be sure to do the same thing to both sides of the equation!

ex: $6x = -18$ $\longrightarrow$ $\dfrac{6x}{6} = \dfrac{-18}{6}$ $\longrightarrow$ answer: $x = -3$

ex: $y + 23 = -9$ $\longrightarrow$ $\begin{array}{c} y + 23 = -9 \\ -23 \quad -23 \end{array}$ $\longrightarrow$ answer: $y = -32$

ex: $\dfrac{h}{3} = 4$ $\longrightarrow$ $3 \cdot \dfrac{h}{3} = 4 \cdot 3$ $\longrightarrow$ answer: $h = 12$

ex: $w - 13 = -5$ $\longrightarrow$ $\begin{array}{c} w - 13 = -5 \\ +13 \quad +13 \end{array}$ $\longrightarrow$ answer: $w = 8$

Solving Two-Step Equations

- Undo operations using inverse operations one at a time using the order of operations in reverse. (i.e.: undo addition/subtraction before undoing multiplication/division)

ex: $7x - 4 = -32$ $\longrightarrow$ $\begin{array}{c} 7x - 4 = -32 \\ +4 \quad +4 \end{array}$ $\longrightarrow$ $\dfrac{7x}{7} = \dfrac{-28}{7}$ $\longrightarrow$ answer: $x = -4$

ex: $\dfrac{j}{5} + 13 = 15$ $\longrightarrow$ $\begin{array}{c} \dfrac{j}{5} + 13 = 15 \\ -13 \quad -13 \end{array}$ $\longrightarrow$ $5 \cdot \dfrac{j}{5} = 2 \cdot 5$ $\longrightarrow$ answer: $j = 10$

ex: $\dfrac{b + 7}{3} = -2$ $\longrightarrow$ $3 \cdot \dfrac{b + 7}{3} = -2 \cdot 3$ $\longrightarrow$ $\begin{array}{c} b + 7 = -6 \\ -7 \quad -7 \end{array}$ $\longrightarrow$ answer: $b = -13$

Solve the one-step equation.

57. $19 + j = -34$

58. $m - 26 = 13$

59. $\dfrac{x}{5} = -3$

60. $12f = 216$

61. $g - (-31) = -7$

62. $\dfrac{h}{9} = 13$

63. $b + (-3) = -9$

64. $-4w = -280$

Solve the two-step equation.

65. $5m - 3 = 27$

66. $7 + \dfrac{y}{2} = -3$

67. $4 + 3r = -8$

68. $\frac{1}{2}p - 4 = 7$

69. $\dfrac{k+8}{3} = -2$

70. $\dfrac{f}{5} - (-13) = 12$

71. $-15 - \dfrac{g}{3} = -5$

72. $-8 + 4m = 2$

73. $-18 - \frac{3}{4}v = 3$

74. $\dfrac{-5+n}{4} = -1$

75. $3.5m + 0.75 = -6.25$

76. $2y + 3 = 19$

Proportions and Percent

Solving Proportions

- Set cross-products equal to each other and then solve the one-step equation for the given variable.

  ex: $\dfrac{5}{b}=\dfrac{4}{10}$ $\longrightarrow$ $5\cdot 10 = 4b$ $\longrightarrow$ $\dfrac{50}{4}=\dfrac{4b}{4}$ $\longrightarrow$ answer: $\boxed{b = 12.5}$

Solving Percent Problems with Proportions

- Set up and solve a proportion as follows: $\dfrac{\%}{100}=\dfrac{part}{whole}$

  ex: 25 is what percent of 500? $\longrightarrow$ $\dfrac{x}{100}=\dfrac{25}{500}$ $\longrightarrow$ answer: x = $\boxed{5\%}$

  ex: What is 15% of 88? $\longrightarrow$ $\dfrac{15}{100}=\dfrac{x}{88}$ $\longrightarrow$ answer: x = $\boxed{13.2}$

  ex: 18 is 30% of what number? $\longrightarrow$ $\dfrac{30}{100}=\dfrac{18}{x}$ $\longrightarrow$ answer: x = $\boxed{60}$

Solving Percent Problems with Equations

- Translate the question to an equation and then solve. (Be sure to convert percents to decimals or fractions.)

  ex: 20 is 40% of what number? $\longrightarrow$ $20 = 0.4x$ $\longrightarrow$ answer: x = $\boxed{50}$

  ex: 8 is what percent of 32? $\longrightarrow$ $8 = 32x$ $\longrightarrow$ $x = 0.25$ $\longrightarrow$ answer: $\boxed{25\%}$

  ex: What is 25% of 88? $\longrightarrow$ $x = 0.25 \cdot 88$ $\longrightarrow$ answer: x = $\boxed{22}$

Real-World Percent Problems

(This is just one way of many to solve real-world percent problems)

- <u>Tax</u>: Find the amount of tax using a proportion or equation. Then add the tax to the original amount to find the total cost.

- <u>Discount</u>: Find the amount of the discount using a proportion or equation. Then subtract the amount of discount from the original price to find the sale price.

Solve the proportion.

77. $\dfrac{h}{6} = \dfrac{20}{24}$

78. $\dfrac{5}{7} = \dfrac{c}{14}$

79. $\dfrac{6}{8} = \dfrac{21}{b}$

80. $\dfrac{30}{J} = \dfrac{26}{39}$

81. $\dfrac{5}{k} = \dfrac{15}{20}$

82. $\dfrac{32}{112} = \dfrac{a}{14}$

83. $\dfrac{16}{7} = \dfrac{18}{g}$

84. $\dfrac{w}{60} = \dfrac{15}{200}$

Solve the percent problem.

85. Find 15% of 85.

86. 6 is 75% of what number?

87. 40 is what percent of 320?

88. What is 20% of 45?

89. 70 is what percent of 350?

90. Find $33.\overline{3}$% of 81.

91. A $58 camera is on sale for 20% off. Find the sale price.

92. Find the total price of a $14.00 shirt including the 7% sales tax.

Geometry

Geometry Basics

- Perimeter is the distance around a polygon

- Circumference is the distance around a circle

- Area is the space inside a figure

- Volume is the capacity of a 3-dimensional figure

- Surface Area is the sum of the areas of all the faces on a 3-dimensional figure

2-Dimensional Geometry Formulas

- Perimeter of Any Figure: sum of side lengths

- Circumference = $\pi \cdot$ diameter

- Area of Parallelogram = base $\cdot$ height

- Area of Triangle = $\frac{1}{2} \cdot$ base $\cdot$ height

- Area of Trapezoid = $\frac{1}{2} \cdot$ height(base$_1$ + base$_2$)

- Area of Circle = $\pi \cdot$ radius^2

3-Dimensional Geometry Formulas

- Volume of Rectangular Prism = length $\cdot$ width $\cdot$ height

- Volume of Cylinder = $\pi \cdot$ radius^2 $\cdot$ height

- Surface Area of Rectangular Prism = 2 $\cdot$ length $\cdot$ width + 2 $\cdot$ length $\cdot$ height + 2 $\cdot$ height $\cdot$ width

- Surface Area of Cylinder = 2 $\cdot \pi \cdot$ radius^2 + 2 $\cdot \pi \cdot$ radius $\cdot$ height

Find the perimeter (or circumference) and area. Use 3.14 for pi.

93.

15 cm

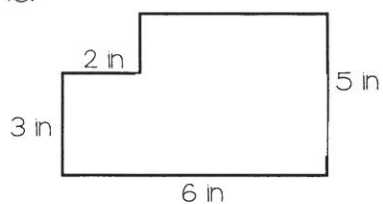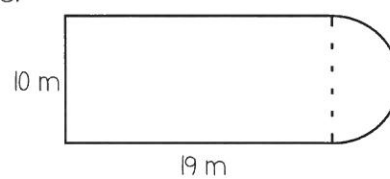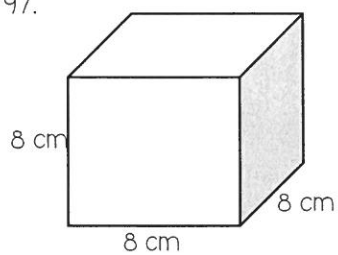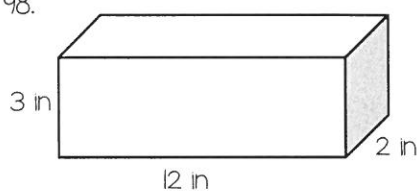5 cm   4 cm

9 cm

94.

23 mm

95.

2 in

3 in

5 in

6 in

96.

10 m

19 m
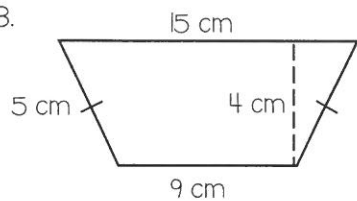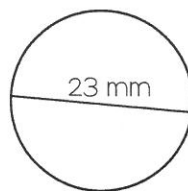
Find the surface area and volume.

97.

8 cm

8 cm

8 cm

98.

3 in

12 in

2 in

99.

7 cm

3 cm

100.

9 mm

13 mm
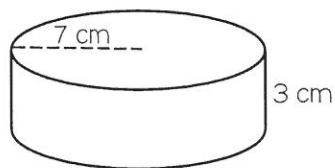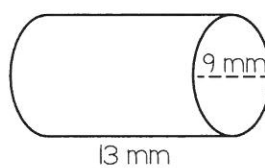
Summer Math Answer Key

The Summer Before 8th Grade

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Answer Key

1. -3
2. 237
3. -97
4. 196

5. 17
6. 339
7. 6
8. -41

9. 80
10. -81
11. 36
12. 26

13. 5
14. 97
15. -176
16. -120

17. 110
18. -15
19. -177
20. 14

21. -7
22. 98
23. 108
24. 34

25. 34
26. -27
27. -168
28. 77

29. -24
30. -55
31. -41
32. -16

33. 75.451
34. 0.525
35. 6.532
36. 131.2

37. 16.281
38. -11.5
39. 75.68
40. -100.2

41. 11.947
42. 1.68
43. 0.75
44. 62.464

45. 30 3/4
46. 1 1/20
47. 4 1/20
48. 2 9/20

49. -1 7/9
50. -7
51. -6 5/12
52. 5/13

53. -2
54. -14 1/5
55. 16 1/18
56. -1 7/8

57. j = -53
58. m = 39
59. x = -15
60. f = 18

61. g = -38
62. h = 117
63. b = -6
64. w = 70

65. m = 6
66. y = -20
67. r = -4
68. p = 22

69. k = -14
70. f = -5
71. g = -30
72. m = 2 1/2

73. v = -28
74. n = 1
75. m = -2
76. y = 8

77. h = 5
78. c = 10
79. b = 28
80. j = 45

81. k = 6 2/3
82. a = 4
83. g = 7 7/8
84. w = 4 1/2

85. 12.75
86. 8
87. 12.5%
88. 9

89. 20%
90. 27
91. $46.40
92. $14.98

93. P = 34 cm;
    A = 48 cm²
94. C = 72.22 mm;
    A = 415.265 mm²
95. P = 22 in;
    A = 26 in²
96. P = 63.7 m;
    A = 229.25 m²

97. SA = 384 cm²;
    V = 512 cm³
98. SA = 132 in²;
    V = 72 in³
99. SA = 439.6 cm²;
    V = 461.58 cm³
100. SA = 494.55 mm²;
     V = 826.605 mm³