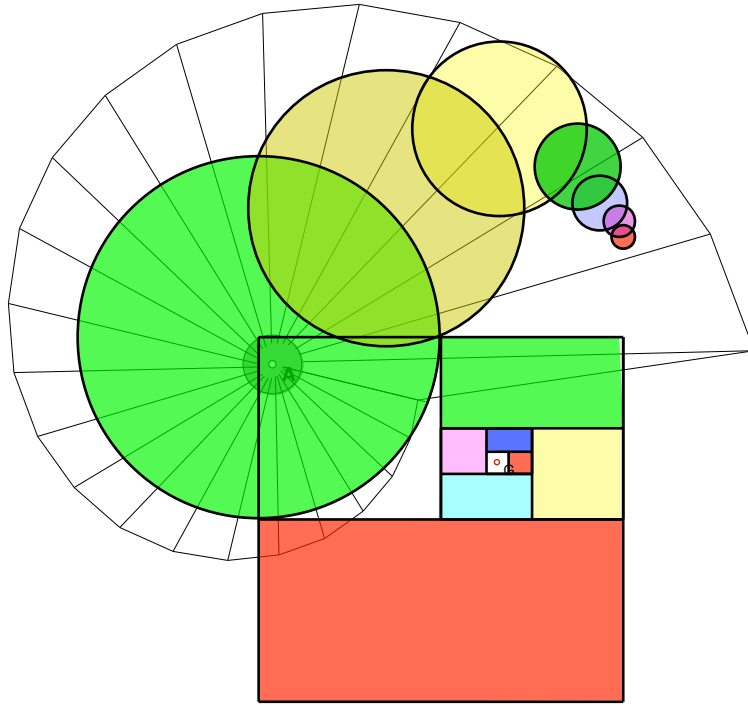


SUMMER REVIEW

Number Sense & Pre-Algebra Skills
For Students Entering
Extended Algebra and Algebra 1



This packet was designed to help you review some of the prerequisite skills needed to be successful in Algebra 1

Table of Contents

1. Comparing and Ordering Numbers
2. Writing Numbers in Exponent Form and as a Power of Ten.
3. Reading and Interpreting Data
4. Central Tendencies
5. Fractions (LCM, GCF, Reduction in Lowest Terms, Addition, Subtraction, Multiplication, Division)
6. Order of Operations
7. Operations with Signed Numbers
8. Translating Verbal Phrases into Algebraic Expressions
9. Evaluating Algebraic Expressions and Formulas
10. Properties of Operations
11. Adding Like Monomials (Combining Like Terms)
12. Solving One Step Equations
13. Solving One Step Inequalities

COMPARING AND ORDERING NUMBERS

I. To compare numbers, start at the left and move right until the digits in the same place are different.

Ex: Compare 4,964 and 4,975 by using =, <, or > between them.

$$4,964 < 4,975 \quad \text{See the digit in bold face}$$

II. When you round to a given place, look at the digit to the right of that place.

If the digit to the right is less than 5, then round down.

If the digit to the right is greater than or equal to 5, then round up

Ex1: Round 67,438 to the nearest hundred.

4 is in the hundreds place, and to its right is 3, a number less than 5.

To round down, keep the digit in the hundreds place and change the digits to the right to zeros.

67,438 rounded to the nearest hundreds is 67,400

Ex2: Round 7,458 to the nearest hundred.

4 is in the hundreds place, and to its right is 5, a number greater than or equal to 5.

To round up, increase the digit in the hundreds place by 1. Change the digits to the right to zeros.

7,458 rounded to the nearest hundreds is 7,500

Note: After the decimal point, the digits to the right are simply dropped.

Exercises

Round to the nearest hundreds

1. 3456

2. 285

3. 8514

4. 39,951

Round to the nearest tenths

5. 0.15

6. 2.083

7. 12.641

8. 15.95

Round to the nearest dollar

9. \$4.345

10. \$1.074

11. \$3.399

12. \$0.98

Round to the nearest cent

13. \$3.659

14. \$1.041

15. \$0.406

16. \$1.952

Compare with =, <, or >

17. 0.02 _ 0.2

19. 9.085153 _ 9.085183

18. 4.236 _ 4.2360

20. 35,345.01 _ 35,365.99

Arrange in order from least to greatest

21. 36,081; 36,180; 36,018

22. 0.527; 0.572; 0.257

23. 3,428,865; 3,428,658; 3,428,685

POWERS AND EXPONENTS

The result of a repeated multiplication is called a **power**. It can be written in exponential form as *base*^{exp onent}

Ex1: Write the product $13 \times 13 \times 13$ using exponent

Solution: 13^3

Ex2: Write $x \cdot x \cdot x \cdot x \cdot x$ in exponential form

Solution: x^5

Ex3: Write the power 6^4 as a repeated multiplication

Solution: $6 \times 6 \times 6 \times 6$

Write as a repeated multiplication

24. 4^3

26. 10^5

28. 10^3

30. 2^7

25. 7^2

27. 6^4

29. 4.2^5

31. 49

Write in exponential form

32. $3 \times 3 \times 3 \times 3 \times 3$

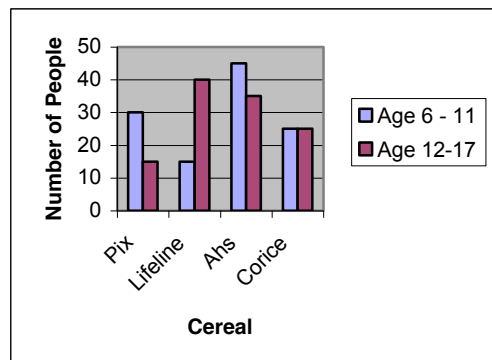
34. $5.2 \times 5.2 \times 5.2$

33. $12 \times 12 \times 12$

35. $10 \times 10 \times 10 \times 10 \times 10$

36. The sun is approximately 9.3×10^7 *miles* from the earth. How many miles is this (in standard form)?

READING AND INTERPRETING DATA



Use the graph above to answer question 37 – 40

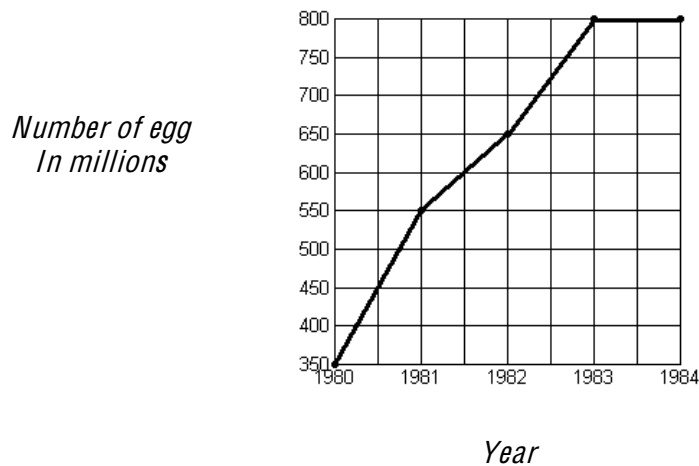
37. How many people in the 6-11 age group like Ahs?

38. What brand is the least favorite among people 12-17?

39. How many more 12 -17 year old prefer Lifeline to Pix?

40. How many people are included in the survey?

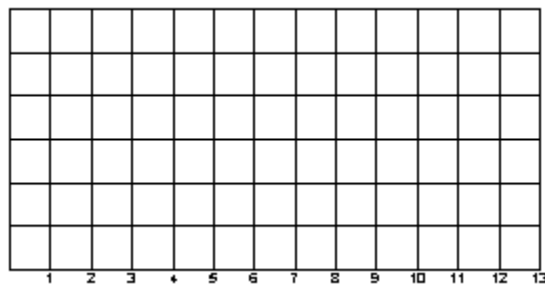
Maryland Egg Production



41. Was there an increase, a decrease or no change between 1983 and 1984?
42. In your estimation, how many eggs were produced in 1981?
43. How many more eggs were produced in 1983 than in 1980?
44. What was the percent increase in production between 1983 and 1984?
45. What was the increase in production from 1980 to 1981?
46. To the nearest whole number, what was the percent increase in production of eggs between 1980 and 1981?
47. Use the set of data below to make a line graph

First Year Sales

Months	1	2	3	4	5	6	7	8	9	10	11	12
Sales(\$)	500	1000	750	1500	1500	2000	750	1250	1750	2000	2400	2750



CENTRAL TENDENCIES (Mean, Median, Mode, Range)

Mean is the sum of the values in a set of data divided by the number of values.

Median is the middle value of a set of data written in ascending order. If there are two middle values, the median is the mean of those values.

Mode is the most frequent value in a set of data

Range is the difference between the greatest and least values in a set of data.

48. Find the statistical measures for the set of data

	Range	Median	Mode	Mean
Data: 108, 93, 426, 766, 518, 210				
Data: 21.5, 35.5, 49.5, 16.3, 35.5				

FRACTIONS (Addition, Subtraction, Multiplication, Division)

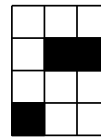
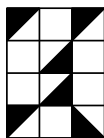
A fraction is the quotient of a part to a whole. $\frac{P}{W}$

The top number is the numerator and the bottom the denominator. If the numerator is greater than the denominator, it is an improper fraction.

AB being the part and AC the whole, write a fraction for each figure below



51. What fraction of each figure is each shaded part?



52. There are six compartments in a freezer. If four of them are empty, what fraction of the freezer is empty?

Write the fractions in lowest terms.

61. $\frac{8}{24}$

62. $\frac{18}{24}$

63. $\frac{15}{20}$

64. $\frac{36}{45}$

Complete

65. $\frac{16}{48} = \frac{\quad}{12}$

66. $\frac{12}{42} = \frac{4}{\quad}$

67. $\frac{20}{32} = \frac{\quad}{16}$

68. $\frac{6}{9} = \frac{12}{\quad}$

Write as improper fractions

69. $2\frac{1}{3}$

70. $1\frac{5}{8}$

71. $5\frac{2}{5}$

72. $4\frac{2}{3}$

Write as a whole number or mixed number or fraction in simplest form

73. $\frac{9}{4}$

74. $\frac{18}{6}$

75. $\frac{28}{8}$

76. $\frac{38}{3}$

Multiply and write the product in simplest form

77. $\frac{5}{12} \times \frac{2}{3}$

78. $2\frac{3}{4} \times 5\frac{1}{4}$

79. $\frac{1}{3} \times \frac{2}{5} \times \frac{1}{2}$

80. $3\frac{1}{4} \times 2\frac{1}{2}$

DIVIDING FRACTIONS

To divide two fractions, multiply the dividend by the reciprocal of the divisor

Ex: Divide $\frac{2}{3} \div 8$

Solution: $\frac{2}{3} \times \frac{1}{8} = \frac{2}{24}$ *which will be* $\frac{2 \div 2}{24 \div 2} = \frac{1}{12}$

in lowest terms

Divide and write the quotient in simplest form.

81. $\frac{3}{4} \div \frac{2}{3}$

83. $12 \div \frac{4}{5}$

85. $3\frac{3}{4} \div 4\frac{2}{3}$

87. $6 \div 2\frac{1}{4}$

82. $\frac{2}{3} \div 5$

84. $\frac{1}{8} \div \frac{5}{6}$

86. $6\frac{3}{4} \div 4$

88. $3 \div 4\frac{2}{3}$

RULES OF OPERATIONS

When several operations are indicated in a numerical expression, proceed in the following order: work within the parentheses, expand each power, multiply and divide (*whichever comes first*) and, finally, add and subtract (*whichever comes first*).

PEMDAS (“*Please Excuse My Dear Aunt Sallie*”) is an acronym that provides a good way to remember your order of operation.

P: Work within the parentheses first

E: Expand numbers raised to a power

MD: Multiply or divide, whichever comes first

AS: Add or subtract, whichever comes first

Example: $[3^2 + (2^3 - 4) + 30 \div 10 \times 2]$

Solution

$$[9 + (8 - 4) + 30 \div 10 \times 2] = [9 + 4 + 30 \div 10 \times 2] = [9 + 4 + 3 \times 2] = [9 + 4 + 6] = 19$$

89. $2^4 - 3(3^2 - 8)$

90. $(4^2 + 10)4 - 10(5^2 - 20)$

95. $[15 - 3(4^2 - 10) + 25 \div 5 \times 15]$

91. $4^2 - 4(5^2 - 32 \div 8 \times 4)$

96. $\{10 - 5[20 - 2(3^2 + 1)]\}$

92. $(8 \times 5 \div 10 + 2)(2^5 - 8^2 \div 2)$

97. $|-32| + 32$

93. $5^2 + -3[6 + -2(20 + -15)]$

98. $\frac{48 - 24 \div 2^3}{3 + 2 \times 6}$

94. $[4^3 + -10(30 - 8 \times 5)]$

ADDING AND SUBTRACTING INTEGERS

- If the integers have the same signs, add their absolute values. The sum will have the sign of the addends.
- If the integers have different signs, subtract their absolute values. The sum has the sign of the addend with the greater absolute value.

Ex1: $-6 + (-4) = -10$

Ex2: $4 + (-9) = -5$

Ex3: $3 - (-2) = 5$

Add or Subtract

99. $5 + (-14)$

103. $17 - (-9)$

100. $10 + (-6)$

104. $-7 - (-9)$

101. $17 + (-27) + (-2)$

105. $-6 - (-19)$

102. $30 + 158 + (-101)$

106. $-100 - (-120)$

MULTIPLYING AND DIVIDING INTEGERS

- The product or quotient of two integers having the same sign is positive.
- The product or quotient of two integers having different signs is negative.

Ex: $7 \times (-10) = -70$

Ex2: $(-5) \times (-9) = 45$

107. $(-7) \times (-5)$

111. $-10 \times (-10) \times (-10)$

108. $-6 \times (-4)$

112. $42 \div (-6)$

109. -8×5

113. $-60 \div (-15)$

110. $-1 \times 4 \times (-5)$

114. $21 \div (-7)$

115. There is a 6° drop in temperature over the past hour. If it is 55° now, what was the temperature an hour ago?

116. It is -9° now. The temperature will drop 5° in two hours. What will the temperature be in two hours?

TRANSLATING WORD PHRASES INTO ALGEBRAIC EXPRESSIONS

Ex: Write an algebraic expression for the word phrase.

a) 6 more than twice a number

Let n represent the number

$$2 \cdot n + 6$$

$$2n + 6$$

b) 16 less than half a number

Let n represent the number

$$\frac{1}{2}n - 16$$

Write an algebraic expression for each word phrase

117. 6 more than a number

120. A number doubled and decreased by 72

118. 12 less than a number

121. 24 more than 6 times a number

119. Twice the sum of a number and 10

122. 45 decreased by twice a number

Write a word phrase for each algebraic expression

123. $9 - a$

126. $\frac{x}{5}$

124. $2x + 4$

127. $\frac{x+6}{2}$

125. $2(n - 5)$

128. $n^2 + 3$

EVALUATING EXPRESSIONS AND FORMULAS

To evaluate an expression, first replace the variable by a given value. Then simplify the resulting numerical expression.

Ex: Evaluate $\frac{2x - y}{3z}$

for $x = 2$, $y = -1$ and $z = 3$

Solution

$$\frac{2(2) - (-1)}{3(3)} = \frac{4 + 1}{9} = \frac{5}{9}$$

Evaluate for $x = -2$ and $y = 5$

129. $x + y$

130. $2x - y$

131. $x^2 + y^3$

132. $-2(y-2x)$

133. $\frac{3x-y}{11}$

134. $\frac{x}{3-y}$

The formula for the volume of a rectangular prism is $V = lwh$, where l is the length, w is the width, and h is the height. Find the volume

135. $l = 4\text{m}; w = 2\text{m}; h = 5\text{m}$

137. $l = 16\text{ in}; w = 6\text{ in}; h = 4\text{ in}$

136. $l = 0.5\text{m}; w = 0.2\text{m}; h = 1.6\text{m}$

138. $l = 2.5\text{ in}; w = 1.6\text{ in}; h = 0.5\text{ in}$

PROPERTIES OF OPERATIONS

Commutative Property of Addition

$$a + b = b + a$$

Associative Property of Addition

$$(a + b) + c = a + (b + c)$$

Commutative Property of Multiplication

$$a \times b = b \times a$$

Associative Property of Multiplication

$$(a \times b) \times c = a \times (b \times c)$$

Distributive Property

$$a(b + c) = ab + ac$$

Name the property illustrated in each expression

139. $8 \times 12 = 12 \times 8$

144. $5 + 7 = 7 + 5$

140. $3 \times (2 \times 5) = (3 \times 2) \times 5$

145. $10(c + f) = 10c + 10f$

141. $2 + 5 + 12 = 5 + 2 + 12$

146. $\frac{1}{4}(8 + 12) = 2 + 3$

142. $7x + 14y = 7(x + 2y)$

147. $(4 + 8) + 5 = 4 + (8 + 5)$

143. $5(2 + 4) = 10 + 20$

148. $5 \times 6 \times 8 = 8 \times 5 \times 6$

COMBINING LIKE TERMS

Ex: $7a + 6b - 3a + 5b$

Solution: $7a - 3a + 6b + 5b$
 $4a + 11b$

Simplify the expression by combining like terms

149. $8m + 5m + 7n - 7n$

153. $5(x + 3y) - 5x$

150. $8x + 5y - x + 4y$

154. $15 - 3(x + 5) + 3x$

151. $4(x + y) - 3(x + 2y)$

155. $8x + 10 + 4x - 5$

152. $3ab - 5b + 2ab - 4b$

156. $2x + 9 + 3x + 1 + 5x - 8$

SOLVING ONE STEP EQUATIONS

Procedure: To solve a One-Step-Equation

1. Use the inverse operation to isolate the variable
2. Replace the value obtained for the variable in the given equation to see if the resulting statement is true.

Ex1: Solve and check $n + 7 = 10$

Solution:
 $n + 7 - 7 = 10 - 7$
 $n = 3$

Ex2. Solve and check $0.6 = y + 1$

Solution
 $0.6 - 1 = y + 1 - 1$
 $-0.4 = y$

Solve and check each equation

157. $16 = x + 2$

163. $.15 + y = 2.85$

158. $y + 20 = 15$

164. $y - 2\frac{1}{2} = 1\frac{1}{2}$

159. $x - 6 = 4$

160. $0.5 = x + 1.5$

165. $\frac{x}{3} = 2$

161. $x - 4.5 = 2.5$

166. $5y = 25$

162. $1.5 = y - 3.5$

167. $45 = 9g$

SOLVING AND GRAPHING ONE STEP INEQUALITIES

Note: Solve an inequality just like you would solve an equation. However, if you multiply or divide both sides of an inequality by a negative number, then the inequality sign reverses (from $<$ to $>$, from \leq to \geq , or vice versa).

Ex1: Solve and graph $x - 4 > 1$

Solution

Add 4 to both sides

$$\begin{aligned}x - 4 + 4 &> 1 + 4 \\x &> 5\end{aligned}$$

The graph of the solution set is



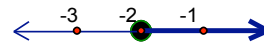
Ex2: Solve and graph $-3x \leq 6$

Solution

Divide both sides by -3

$$\frac{-3x}{-3} \leq \frac{6}{-3} \quad x \geq -2$$

And the graph of the solution set is



Find and graph the solution set of each inequality

168. $x - 2 > 4$

173. $20 + x < 21$

169. $y + 5 < 12$

174. $\frac{k}{5} \geq -1$

170. $6 \leq x - 1$

171. $3x \leq 9$

175. $\frac{-2}{3}x > 8$

172. $10 \geq -5y$

176. $36 \leq -9x$

Answer Key

1. 3500 2. 300 3. 8,500 4. 40,000

5. 0.2 6. 2.1 7. 12.6 8. 16.0

9. \$4.00 10. \$1.00 11. \$3.00 12. \$1.00

13. \$3.66 14. \$1.04 15. \$0.41 16. \$1.95

17. < 18. = 19. < 20. <

21. 36,018; 36,081; 36,180 22. 0.257; 0.527; 0.572

23. 3,428,658; 3,428,685; 3,428,865 24. $4 \times 4 \times 4$ 25. 7^2

26. $10 \times 10 \times 10 \times 10 \times 10$ 27. $6 \times 6 \times 6 \times 6$ 28. $10 \times 10 \times 10$

29. $4.2 \times 4.2 \times 4.2 \times 4.2 \times 4.2$ 30. $4.2 \times 4.2 \times 4.2 \times 4.2 \times 4.2 \times 4.2 \times 4.2$

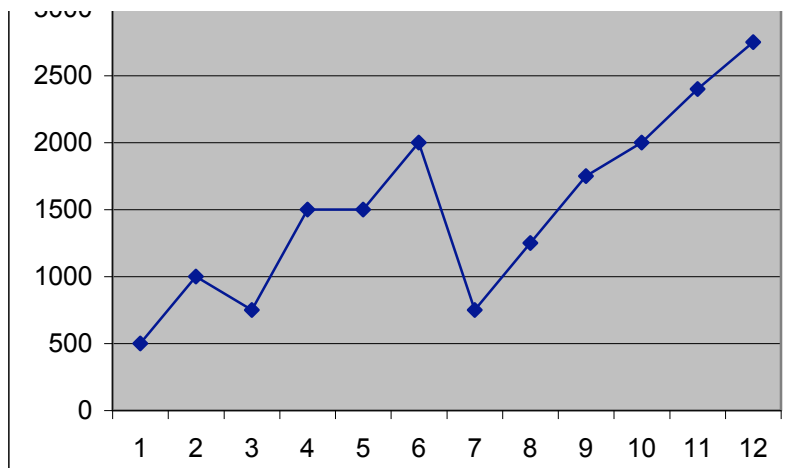
31. 7×7 32. 3^5 33. 12^3 34. 5.2^3

35. 10^5 36. 93,000,000 mi 37. 45 38. PIX

39. 25 40. 230 41. No change 42. 550

43. 450 44. 0% 45. 200 46. 57%

47.



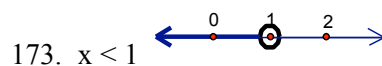
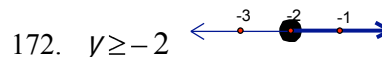
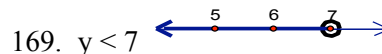
48.

	Range	Median	Mode	Mean
Data: 108, 93, 426, 766, 518, 210	673	318	None	353.5
Data: 21.5, 35.5, 49.5, 16.3, 35.5	33.2	35.5	35.5	31.66


49. $\frac{2}{7}$ 50. $\frac{3}{4}, \frac{1}{6}$ 51. $\frac{1}{3}$ 52. $\frac{2}{3}$
53. 6 54. 6 55. 9 56. 1
57. 54 58. 90 59. 45 60. 192
61. $\frac{1}{3}$ 62. $\frac{3}{4}$ 63. $\frac{3}{4}$ 64. $\frac{4}{5}$
65. 4 66. 14 67. 10 68. 18
69. $\frac{7}{3}$ 70. $\frac{13}{8}$ 71. $\frac{27}{5}$ 72. $\frac{14}{3}$
73. $2\frac{1}{4}$ 74. 3 75. $3\frac{1}{2}$ 76. $12\frac{2}{3}$
77. $\frac{5}{18}$ 78. $14\frac{7}{16}$ 79. $\frac{1}{15}$ 80. $8\frac{1}{8}$
81. $1\frac{1}{8}$ 82. $\frac{2}{15}$ 83. 15 84. $\frac{3}{20}$
85. $\frac{45}{56}$ 86. $1\frac{11}{16}$ 87. $2\frac{2}{3}$ 88. $\frac{9}{14}$
89. 13 90. 54 91. -20 92. 0
93. 97 94. 164 95. 72 96. 10
97. 64 98. 3 99. -9 100. 4
101. -12 102. 87 103. 26 104. 12
105. 13 106. 20 107. 35 108. 24
109. -40 110. 20 111. -1000 112. -7
113. 4 114. -3 115. 61 116. -14°
49. 117. $n + 6$ 118. $n - 12$ 119. $2(n + 10)$ 120. $2n - 72$

121. $6n + 24$
 122. $45 - 2n$
 123. A number less than 9
 124. A number doubled increased by 4
 125. Twice the difference of a number and 5
 126. The quotient of a number and 5
 127. Half the sum of a number and 6
 128. A number squared increased by 3
 129. 3
 130. -9
 131. 129
 132. -18
 133. -1
 134. 1
 135. 40 m^3
 136. 0.16 m^3
 137. 24 in^3
 138. 2 in^3
 139. Commutative property of multiplication
 140. Associative property of multiplication
 141. Commutative property of Addition
 142. Distributive property
 143. Distributive property
 144. Commutative property of Addition
 145. Distributive property
 146. Distributive property
 147. Associative property of Addition

148. Commutative property of multiplication
 149. $13m$
 150. $7x + 9y$
 151. $x - 2y$
 152. $5ab - 9b$
 153. $3y$
 154. 0
 155. $12x + 5$
 156. $10x + 2$
 157. $x = 14$
 158. $y = -5$
 159. $y = 10$
 160. $x = -1$
 161. $x = 7.0$
 162. $y = 5.0$
 163. $y = 2.70$
 164. $y = 4$
 165. $x = 6$
 166. $y = 5$
 167. $g = 5$




174. $k \geq -5$




A number line with arrows at both ends. Three points are marked with red dots and labeled -6, -5, and -4. A thick black circle is drawn at the point -5, and a blue line with an arrow pointing to the left starts from this circle.

175. $x < -12$



A number line with arrows at both ends. Three points are marked with red dots and labeled -13, -12, and -11. A thick black circle is drawn at the point -12, and a blue line with an arrow pointing to the left starts from this circle.

176. $x \leq -4$



A number line with arrows at both ends. Three points are marked with red dots and labeled -5, -4, and -3. A thick black circle is drawn at the point -4, and a blue line with an arrow pointing to the left starts from this circle.