

## Roselle Catholic - Algebra 1 Placement Exam Overview

The following topics and skills represent the content that the placement exam will cover.

### Fundamentals/ Properties of Real Numbers

- Addition and Subtraction of Signed Numbers
- Multiplication and Division of Signed Numbers
- Exponents and Powers
- Order of Operations
- Evaluating Expressions with Variables
- Adding Like Terms
- The Distributive Property

### Solving Equations & Inequalities

- Solving One-Step Linear Equations
- Solving Multi-Step Linear Equations
- Solving Absolute-Value Equations
- Writing Algebraic Expressions & Equations
- Solving One-Step Linear Inequalities
- Solving Multi-Step Linear Inequalities
- Solving Compound Inequalities
- Solving Absolute-Value Inequalities
- Graphing Linear Inequalities on the Number Line
- Solving Proportions

### Graphing Linear Equations and Inequalities

- Finding the Slope of a Line
- Graphing Linear Equations in Slope-Intercept Form
- Graphing Linear Equations in Standard Form
- Graphing Linear Equations Using Intercepts
- Graphing Horizontal and Vertical Lines
- Graphing Linear Inequalities in Two Variables

### Writing Linear Equations

- Writing Linear Equations in Slope-Intercept Form
- Writing Linear Equations Given Slope and a Point
- Writing Linear Equations Given Two Points
- Writing Linear Equations Given a Point and a Parallel or Perpendicular Line

### Systems of Linear Equations and Inequalities

- Solving Linear Systems by Graphing
- Solving Linear Systems by Substitution
- Solving Linear System by Elimination (Linear Combination)
- Solving Word Problems Using Linear Systems
- Solving Systems of Linear Inequalities

### Exponents

- Multiplication Properties of Exponents
- Zero and Negative Exponents
- Division Properties of Exponents

### Polynomials and Factoring

- Naming Polynomials by Degree and # of Terms
- Adding and Subtracting Polynomials
- Multiplying Polynomials
- Special Products of Polynomials
- Factoring Common Factors
- Factoring  $x^2 + bx + c$
- Factoring  $ax^2 + bx + c$
- Factoring Special Products: Difference of Two Squares, Perfect Square Trinomials

### Quadratic Equations

- Solving Quadratic Equations by Factoring
- Solving Quadratic Equations by Taking Square Roots
- Solving Quadratic Equations by the Quadratic Formula

### Radicals

- Simplifying Radicals
- Operations with Radical Expressions
- Rationalizing Denominators
- Solving Radical Equations

### Rational Expressions

- Simplifying Rational Expressions
- Adding and Subtracting Rational Expressions

## Algebra 1

**Evaluate each expression.**

1)  $4 + 1 - (-6)$

2)  $(-7) + (-4) - (-12)$

3)  $10 + (-8) - (-9)$

4)  $(-7) + 10 + 1$

**Find each product.**

5)  $(-9)(-9)$

6)  $(-10)(3)$

**Find each quotient.**

7)  $\frac{56}{-8}$

8)  $\frac{-45}{-5}$

**Evaluate each expression.**

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

10)  $2 + 5 - (2)(4)$

11)  $3 + (|(-3)|)(-3)$

12)  $(-3)(3) + (-3) + 5$

13)  $\frac{(-2) - 2}{3 - 5}$

14)  $(2)(-3) - 4^2$

**Evaluate each using the values given.**

15)  $-8m + \frac{p}{4}$ ; use  $m = -1$ , and  $p = -8$

16)  $(x + y)(3 + y)$ ; use  $x = -3$ , and  $y = -4$

17)  $(z)\left(\frac{y}{4}\right) + x$ ; use  $x = -5$ ,  $y = -8$ , and  $z = 9$

18)  $z + (x - y)^2$ ; use  $x = -8$ ,  $y = -2$ , and  $z = 4$

**Simplify each expression.**

19)  $-4v + 3(5v + 9)$

20)  $3(9b - 9) + 7b$

21)  $3n(n + 3) - 10n^2$

22)  $-2n - (9n - 4)$

Solve each equation.

23)  $b + 14 = 9$

24)  $-18 + x = -3$

25)  $8b = -104$

26)  $98 = 14x$

27)  $-11x + 5 = 137$

28)  $8(k - 7) = 88$

29)  $\frac{11 + p}{2} = 13$

30)  $-4 = \frac{x}{8} - 5$

31)  $-5(7x - 9) + 3x = 19 - 6x$

32)  $32 - 7n = 9n + 6(-9n - 1)$

33)  $-9p - 36 = 6(5 - 7p)$

34)  $5 + 3(-p - 1) = -4 - 5p$

35)  $|m + 6| = 7$

36)  $|7m| = 28$

37)  $9|n + 10| = 72$

38)  $|n - 3| + 6 = 7$

Write each of the following as an algebraic equation or inequality.

39) the sum of  $x$  and 5 is 13

40) the difference of  $n$  and 10 is 30

41) the quotient of  $w$  and 8 is 19

42)  $z$  squared is equal to 19

43) 17 less than  $d$  is less than or equal to 38

44) 9 more than  $a$  is less than 46

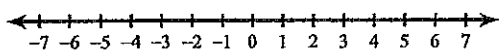
Solve each equation for the indicated variable.

45)  $u = \frac{ka}{b}$ , for  $a$

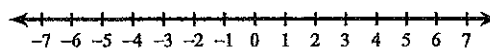
46)  $c - a = d - r$ , for  $a$

Draw a graph for each inequality.

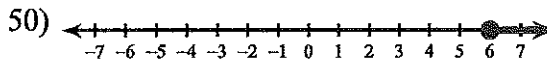
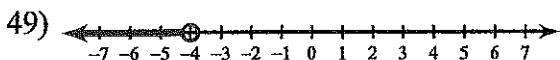
47)  $r \leq -2$



48)  $-x < -3$

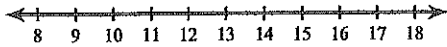


Write an inequality for each graph.

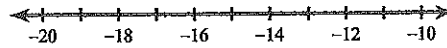


Solve each inequality and graph its solution.

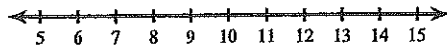
51)  $32 \leq n + 19$



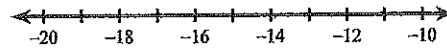
52)  $-14b < 182$



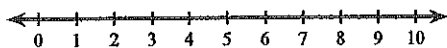
53)  $-6 + 8b < 58$



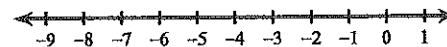
54)  $\frac{x}{12} - 7 \geq -8$



55)  $4(8 + 2x) \geq 37 + 7x$



56)  $-2(a - 6) - 2 < -5a - 5$

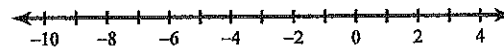


Solve each compound inequality and graph its solution.

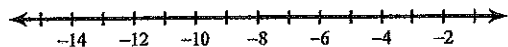
57)  $8 + 2x \leq -8$  or  $3x + 4 \geq -5$



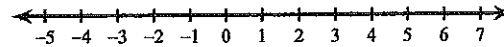
58)  $-51 \leq 6v + 3 < 9$



59)  $4 - 5v \leq 34$  or  $-2 - 6v > 58$

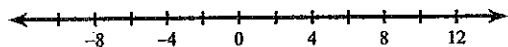


60)  $-19 \leq 1 - 5n \leq -4$

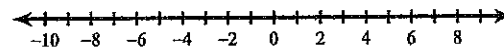


Solve each inequality and graph its solution.

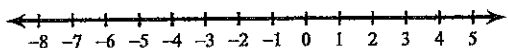
61)  $|x - 2| > 8$



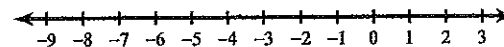
62)  $|3x| < 21$



63)  $|8x + 8| < 32$



64)  $|4x + 8| \geq 8$



Solve each proportion.

65)  $\frac{x}{7} = \frac{3}{4}$

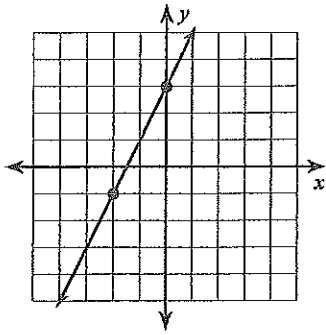
66)  $-\frac{7}{x} = \frac{4}{2}$

67)  $\frac{x-6}{6} = \frac{4}{7}$

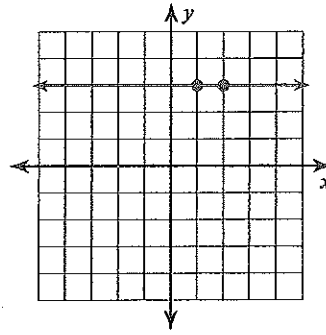
68)  $\frac{3}{b-3} = \frac{10}{7}$

Find the slope of each line.

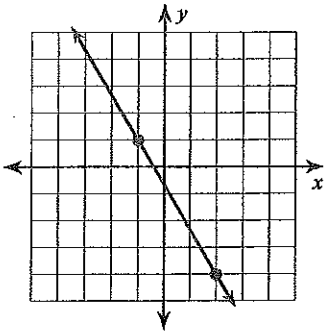
69)



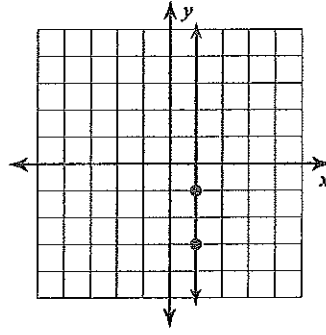
70)



71)



72)



Find the slope of the line through each pair of points.

73)  $(-14, -8), (-7, 18)$

74)  $(-16, 20), (-5, 4)$

Find the slope of each line.

75)  $y = \frac{2}{5}x + 5$

76)  $y = x + 1$

77)  $y = -4$

78)  $x + 4y = -12$

Find the slope of a line parallel to each given line.

79)  $y = 3x + 1$

80)  $y = 1$

Find the slope of a line perpendicular to each given line.

81)  $y = \frac{1}{3}x - 4$

82)  $y = \frac{3}{2}x - 3$

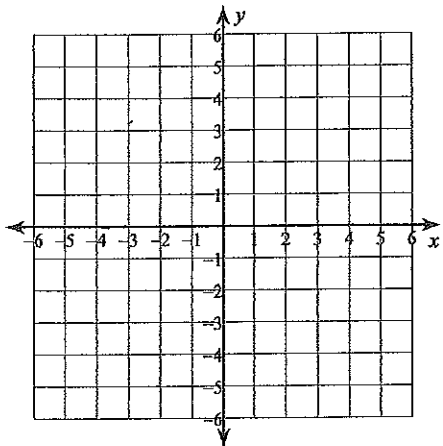
Write the slope-intercept form of the equation of each line given the slope and y-intercept.

83) Slope = 1, y-intercept = -4

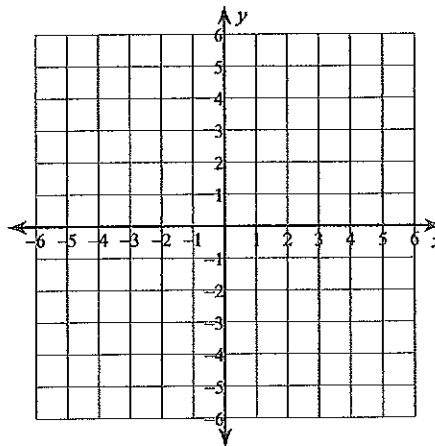
84) Slope =  $-\frac{2}{5}$ , y-intercept = 0

Sketch the graph of each line.

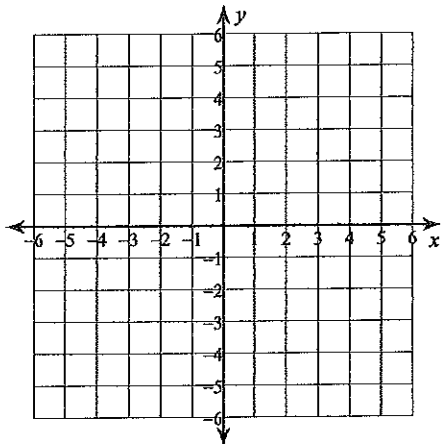
85)  $y = \frac{3}{5}x + 1$



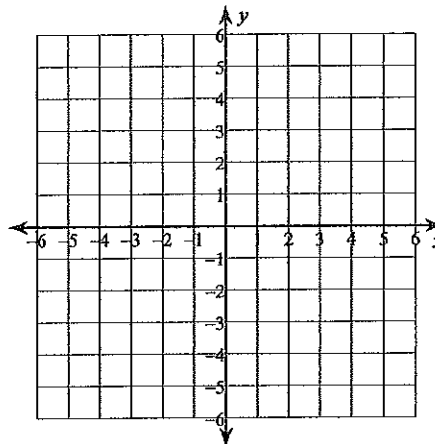
86)  $x + 2y = -8$



87)  $x$ -intercept = 5,  $y$ -intercept = -1

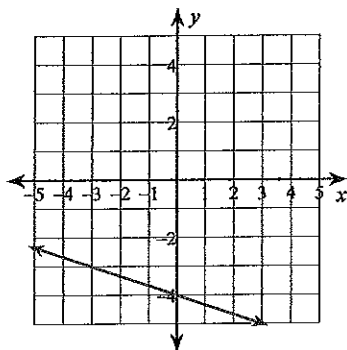


88)  $3y - 9 = 2x$

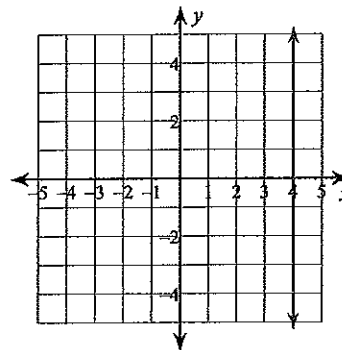


Write the slope-intercept form of the equation of each line.

89)



90)



Write the slope-intercept form of the equation of the line through the given point with the given slope.

91) through:  $(1, 1)$ , slope =  $-3$

92) through:  $(-4, 1)$ , slope =  $-\frac{4}{9}$

Write the slope-intercept form of the equation of the line through the given points.

93) through:  $(0, -1)$  and  $(2, 2)$

94) through:  $(-2, 4)$  and  $(-4, 4)$

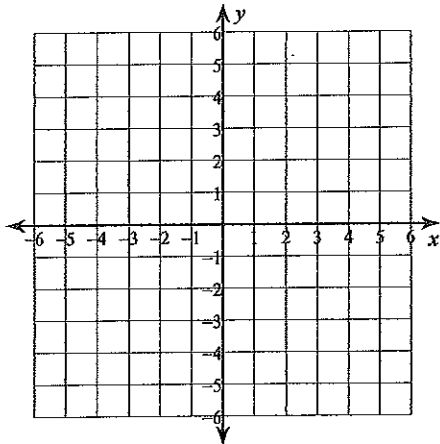
Write the slope-intercept form of the equation of the line described.

95) through:  $(2, 5)$ , parallel to  $y = x - 1$

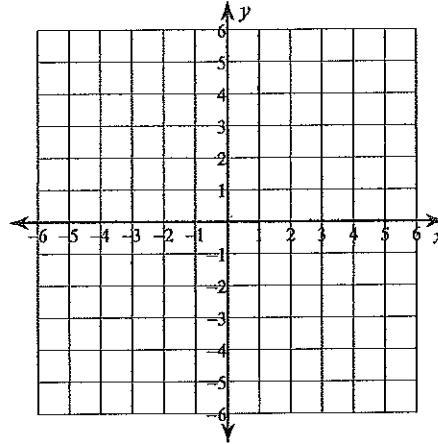
96) through:  $(2, -4)$ , perp. to  $y = \frac{2}{9}x - 4$

Sketch the graph of each linear inequality.

97)  $y \geq -\frac{9}{5}x + 4$

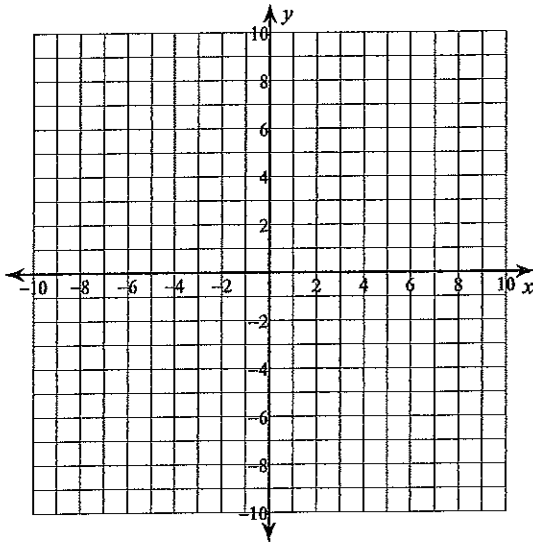


98)  $y < 2x + 5$

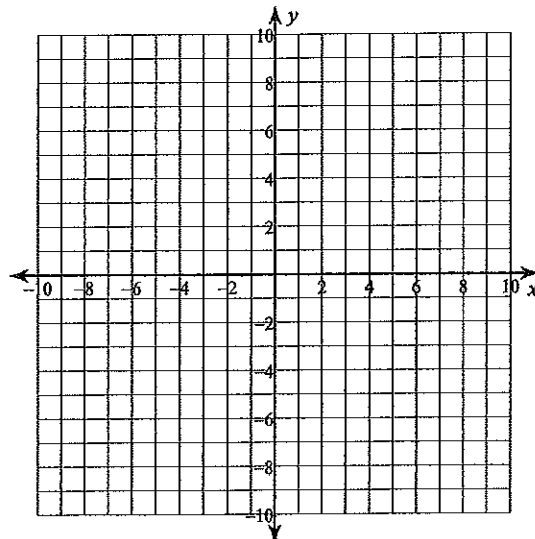


Solve each system by graphing.

99)  $y = \frac{9}{2}x - 6$   
 $y = -2x + 7$



100)  $y = -3x + 1$   
 $y = 4x - 6$



Solve each system by elimination.

101)  $6x - 2y = -22$   
 $12x - 10y = -20$

102)  $-14x - 18y = 2$   
 $7x + 9y = -1$

$$103) \begin{aligned} 7x - 7y &= 21 \\ -3x - 6y &= -9 \end{aligned}$$

$$104) \begin{aligned} -3x + 9y &= 21 \\ 4x - 8y &= -12 \end{aligned}$$

Solve each system by substitution.

$$105) \begin{aligned} x - 3y &= 15 \\ -7x + 3y &= 3 \end{aligned}$$

$$106) \begin{aligned} -3x + 18y &= -8 \\ x - 6y &= 2 \end{aligned}$$

$$107) \begin{aligned} 8x + 3y &= -24 \\ -7x - y &= 8 \end{aligned}$$

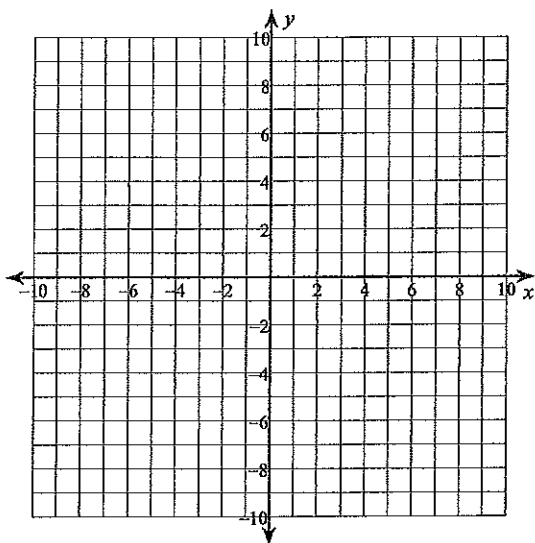
$$108) \begin{aligned} 3x - 3y &= 3 \\ -6x - 2y &= -14 \end{aligned}$$

109) The difference of two numbers is 4. Their sum is 24. What are the numbers?

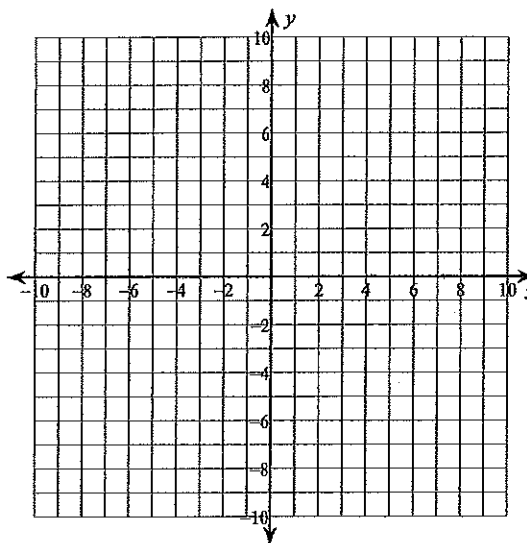
110) The senior classes at High School A and High School B planned separate trips to the county fair. The senior class at High School A rented and filled 8 vans and 4 buses with 320 students. High School B rented and filled 7 vans and 4 buses with 308 students. Each van and each bus carried the same number of students. Find the number of students in each van and in each bus.

Sketch the solution to each system of inequalities.

$$111) \begin{aligned} y &< -2x - 3 \\ y &\geq 5 \end{aligned}$$



$$112) \begin{aligned} y &\leq -\frac{1}{2}x - 5 \\ y &< 4x + 4 \end{aligned}$$



Simplify. Your answer should contain only positive exponents.

$$113) 4b^2 \cdot 3b$$

$$114) 2x^3 \cdot 3x^2$$

$$115) 4x^2 \cdot 4x^{-4}$$

$$116) 3u \cdot u^{-1}v^2$$

$$117) (2m^2n^0)^{-3}$$

$$118) (2x^{-3}y^{-3})^2$$



119)  $\frac{y^2}{2y^2}$

120)  $\frac{2x^{-2}y^0}{3y^{-2}}$

121)  $(2y^{-3})^0 \cdot x^4$

122)  $(2x^{-3})^{-4} \cdot x^4y^{-2}$

123)  $\frac{(2a^4b^0)^{-1} \cdot 2a^3b^{-4}}{a^{-4}b^{-4}}$

124)  $\frac{x^4y^2 \cdot 2x^0y^{-3}}{(2x^{-1}y^2)^4}$

125)  $\frac{2^2 \cdot (2^0)^2}{2^3}$

126)  $\frac{(2^2)^4}{2^3 \cdot 2^0}$

Name each polynomial by degree and number of terms.

127) 9

128)  $-b + 10$

129)  $7n^2 - 9n - 3$

130)  $8a^3 - a^2 + 7$

Simplify each expression.

131)  $(7 + 8v^2 + 4v^3) + (-4v^3 + 2v - v^2)$

132)  $(-6p^2 - 6p^4 + 4p^3) - (8p^4 - 2p^3 - 4p^2)$

133)  $(-8 + 4r^3 + 5r^4) + (-r^4 - 5r^3 - 2)$

134)  $(-x + 4 - 8x^3) - (-7x^3 + 4 + 8x)$

Find each product.

135)  $(a + 7)(3a + 5)$

136)  $(4a - 4)(5a - 8)$

137)  $(4x - 2)(x - 6)$

138)  $(6m - 8)(7m + 4)$

139)  $(x + 1)^2$

140)  $(r - 6)(r + 6)$

141)  $(3n + 5)(3n - 5)$

142)  $(8x - 4)^2$

143)  $(5n - 5)(-8n^2 + n + 2)$

144)  $(-6x + 2)(5x^2 + 4x + 1)$

**Factor the common factor out of each expression.**

145)  $40x + 45$

146)  $-50a^3 - 15a$

147)  $8x^3 + 32x - 4$

148)  $45a^3 + 9a^2 + 81a$

**Factor each completely.**

149)  $r^2 - 5r + 4$

150)  $a^2 + 6a - 27$

151)  $k^2 - 4$

152)  $4x^2 - 1$

153)  $k^2 + 8k + 16$

154)  $9p^2 - 24p + 16$

155)  $5a^2 - 45a$

156)  $n^2 - 4$

157)  $k^2 + 18k + 80$

158)  $p^2 - p - 2$

159)  $n^2 + n - 30$

160)  $2x^2 - 8x - 10$

161)  $2r^2 - 7r + 6$

162)  $4x^2 + 26x - 48$

**Solve each equation by factoring.**

163)  $(n + 1)(5n + 7) = 0$

164)  $(5x - 6)(x - 5) = 0$

165)  $m^2 - 3m - 4 = 0$

166)  $p^2 + p - 6 = 0$

167)  $r^2 - 25 = 0$

168)  $4a^2 - 16a - 128 = 0$

**Solve each equation by taking square roots.**

169)  $n^2 + 8 = 108$

170)  $7x^2 = 28$

171)  $n^2 - 9 = 72$

172)  $-3x^2 = -108$

**Solve each equation with the quadratic formula.**

173)  $4n^2 - 9n - 90 = 0$

174)  $2n^2 - 6n - 4 = 0$

175)  $3v^2 + v = 1$

176)  $11m^2 = 3 + 12m$

**Simplify.**

177)  $\sqrt{112}$

179)  $\sqrt{256b^2}$

181)  $3\sqrt{2} + 3\sqrt{2}$

183)  $-\sqrt{20} - 3\sqrt{45}$

185)  $3\sqrt{12} - 3\sqrt{12} - \sqrt{3}$

187)  $\sqrt{3} \cdot 3\sqrt{6}$

189)  $\sqrt{5}(5 + \sqrt{10})$

191)  $-\frac{5}{\sqrt{5}}$

178)  $\sqrt{100}$

180)  $\sqrt{48k^2}$

182)  $-3\sqrt{6} - \sqrt{6}$

184)  $2\sqrt{27} - 2\sqrt{3}$

186)  $3\sqrt{18} - 3\sqrt{8} + 3\sqrt{2}$

188)  $-4\sqrt{15} \cdot 5\sqrt{9}$

190)  $\sqrt{3}(\sqrt{6} + 3)$

192)  $\frac{\sqrt{4}}{3\sqrt{3}}$

**Solve each equation. Remember to check for extraneous solutions.**

193)  $\sqrt{12n+9} - 2 = 7$

194)  $3\sqrt{9v-2} = 15$

**Simplify each expression.**

195)  $\frac{28v^3}{8v}$

196)  $-\frac{42x}{54x^2}$

197)  $\frac{15a-50}{15}$

198)  $\frac{16b}{14b^2+2b}$

199)  $\frac{n^2-6n-40}{6n-60}$

200)  $\frac{a^2-2a-63}{a^2-a-72}$

201)  $\frac{5}{6} - \frac{6a}{2b^2}$

202)  $\frac{3u-6v}{4v^2} + \frac{6u}{5v}$

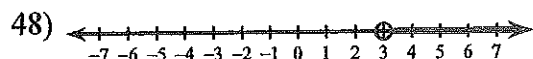
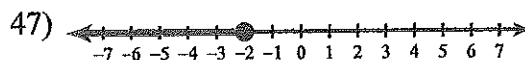
203)  $\frac{x-1}{x-4} + \frac{3x}{2x}$

204)  $\frac{2}{r-2} + \frac{2}{5r+6}$

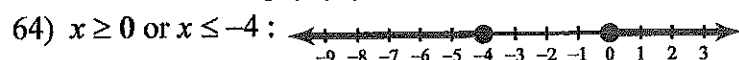
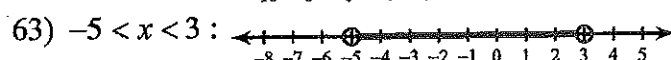
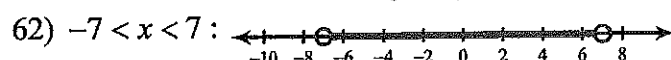
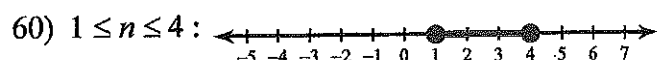
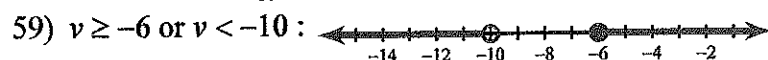
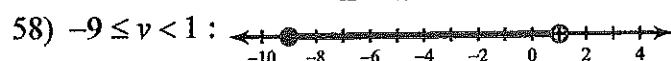
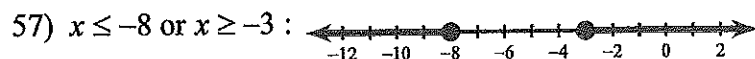
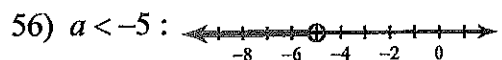
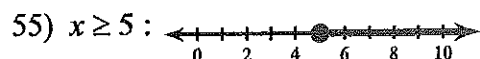
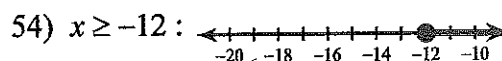
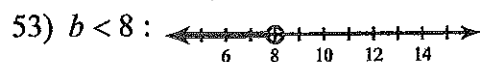
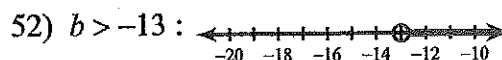
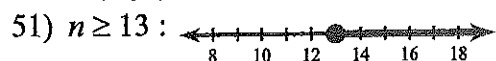
# Answers to Algebra 1

- |                        |                |                      |                   |
|------------------------|----------------|----------------------|-------------------|
| 1) 11                  | 2) 1           | 3) 11                | 4) 4              |
| 5) 81                  | 6) -30         | 7) -7                | 8) 9              |
| 9) 4                   | 10) -1         | 11) -6               | 12) -7            |
| 13) 2                  | 14) -22        | 15) 6                | 16) 7             |
| 17) -23                | 18) 40         | 19) $11v + 27$       | 20) $34b - 27$    |
| 21) $-7n^2 + 9n$       | 22) $-11n + 4$ | 23) $\{-5\}$         | 24) $\{15\}$      |
| 25) $\{-13\}$          | 26) $\{7\}$    | 27) $\{-12\}$        | 28) $\{18\}$      |
| 29) $\{15\}$           | 30) $\{8\}$    | 31) $\{1\}$          | 32) $\{-1\}$      |
| 33) $\{2\}$            | 34) $\{-3\}$   | 35) $\{1, -13\}$     | 36) $\{4, -4\}$   |
| 37) $\{-2, -18\}$      | 38) $\{4, 2\}$ | 39) $x + 5 = 13$     | 40) $n - 10 = 30$ |
| 41) $\frac{w}{8} = 19$ | 42) $z^2 = 19$ | 43) $d - 17 \leq 38$ | 44) $a + 9 < 46$  |

45)  $a = \frac{ub}{k}$                       46)  $a = c - d + r$



49)  $a < -4$                       50)  $r \geq 6$



65)  $\left\{\frac{21}{4}\right\}$

66)  $\left\{-\frac{7}{2}\right\}$

67)  $\left\{\frac{66}{7}\right\}$

68)  $\left\{\frac{51}{10}\right\}$

69) 2

70) 0

71)  $-\frac{5}{3}$

72) Undefined

73)  $\frac{26}{7}$

74)  $-\frac{16}{11}$

75)  $\frac{2}{5}$

76) 1

77) 0

78)  $-\frac{1}{4}$

79) 3

80) 0

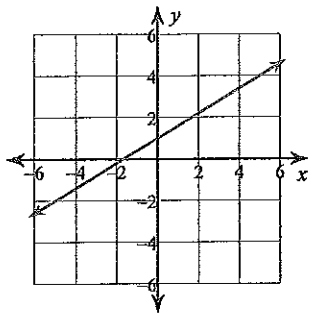
81) -3

82)  $-\frac{2}{3}$

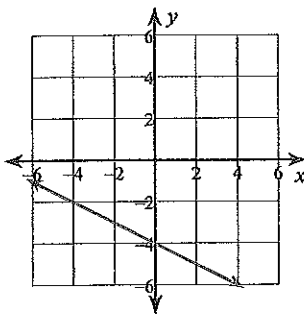
83)  $y = x - 4$

84)  $y = -\frac{2}{5}x$

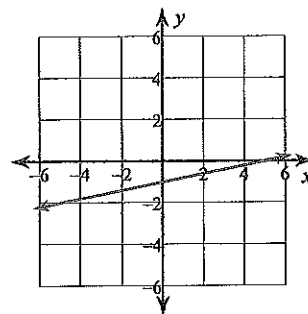
85)



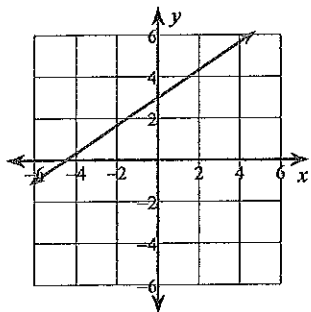
86)



87)



88)



89)  $y = -\frac{1}{3}x - 4$

90)  $x = 4$

91)  $y = -3x + 4$

92)  $y = -\frac{4}{9}x - \frac{7}{9}$

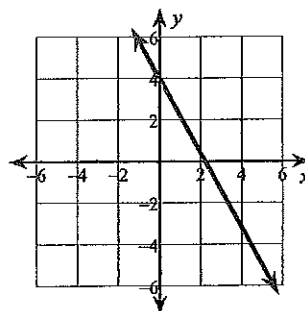
93)  $y = \frac{3}{2}x - 1$

94)  $y = 4$

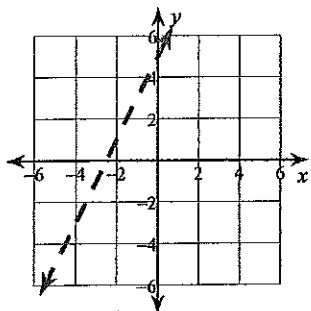
95)  $y = x + 3$

96)  $y = -\frac{9}{2}x + 5$

97)



98)



99) (2, 3)

100) (1, -2)

101) (-5, -4)

102) Infinite number of solutions

103) (3, 0)

104) (5, 4)

105) (-3, -6)

106) No solution

107) (0, -8)

108) (2, 1)

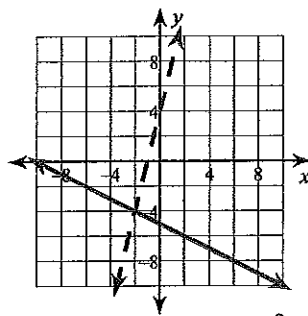
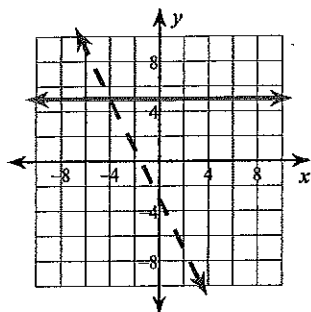
109) 10 and 14

110) Van: 12, Bus: 56

111)

112)

113)  $12b^3$



114)  $6x^5$

115)  $\frac{16}{x^2}$

116)  $3v^2$

117)  $\frac{1}{8m^6}$

- 118)  $\frac{4}{x^6 y^6}$       119)  $\frac{1}{2}$       120)  $\frac{2y^2}{3x^2}$       121)  $x^4$
- 122)  $\frac{x^{16}}{16y^2}$       123)  $a^3$       124)  $\frac{x^8}{8y^9}$       125)  $\frac{1}{2}$
- 126)  $2^5$       127) constant monomial      128) linear binomial
- 129) quadratic trinomial      130) cubic trinomial      131)  $7v^2 + 2v + 7$
- 132)  $-14p^4 + 6p^3 - 2p^2$       133)  $4r^4 - r^3 - 10$       134)  $-x^3 - 9x$
- 135)  $3a^2 + 26a + 35$       136)  $20a^2 - 52a + 32$       137)  $4x^2 - 26x + 12$       138)  $42m^2 - 32m - 32$
- 139)  $x^2 + 2x + 1$       140)  $r^2 - 36$       141)  $9n^2 - 25$       142)  $64x^2 - 64x + 16$
- 143)  $-40n^3 + 45n^2 + 5n - 10$       144)  $-30x^3 - 14x^2 + 2x + 2$       145)  $5(8x + 9)$
- 146)  $-5a(10a^2 + 3)$       147)  $4(2x^3 + 8x - 1)$       148)  $9a(5a^2 + a + 9)$       149)  $(r - 4)(r - 1)$
- 150)  $(a - 3)(a + 9)$       151)  $(k + 2)(k - 2)$       152)  $(2x + 1)(2x - 1)$       153)  $(k + 4)^2$
- 154)  $(3p - 4)^2$       155)  $5a(a - 9)$       156)  $(n - 2)(n + 2)$       157)  $(k + 10)(k + 8)$
- 158)  $(p - 2)(p + 1)$       159)  $(n + 6)(n - 5)$       160)  $2(x - 5)(x + 1)$       161)  $(2r - 3)(r - 2)$
- 162)  $2(2x - 3)(x + 8)$       163)  $\left\{-1, -\frac{7}{5}\right\}$       164)  $\left\{\frac{6}{5}, 5\right\}$       165)  $\{4, -1\}$
- 166)  $\{-3, 2\}$       167)  $\{-5, 5\}$       168)  $\{-4, 8\}$       169)  $\{10, -10\}$
- 170)  $\{2, -2\}$       171)  $\{9, -9\}$       172)  $\{6, -6\}$       173)  $\left\{6, -3\frac{3}{4}\right\}$
- 174)  $\left\{\frac{3 + \sqrt{17}}{2}, \frac{3 - \sqrt{17}}{2}\right\}$       175)  $\left\{\frac{-1 + \sqrt{13}}{6}, \frac{-1 - \sqrt{13}}{6}\right\}$       176)  $\left\{\frac{6 + \sqrt{69}}{11}, \frac{6 - \sqrt{69}}{11}\right\}$
- 177)  $4\sqrt{7}$       178) 10      179)  $16b$       180)  $4k\sqrt{3}$
- 181)  $6\sqrt{2}$       182)  $-4\sqrt{6}$       183)  $-11\sqrt{5}$       184)  $4\sqrt{3}$
- 185)  $-\sqrt{3}$       186)  $6\sqrt{2}$       187)  $9\sqrt{2}$       188)  $-60\sqrt{15}$
- 189)  $5\sqrt{5} + 5\sqrt{2}$       190)  $3\sqrt{2} + 3\sqrt{3}$       191)  $-\sqrt{5}$       192)  $\frac{2\sqrt{3}}{9}$
- 193)  $\{6\}$       194)  $\{3\}$       195)  $\frac{7v^2}{2}$       196)  $-\frac{7}{9x}$
- 197)  $\frac{3a - 10}{3}$       198)  $\frac{8}{7b + 1}$       199)  $\frac{n + 4}{6}$       200)  $\frac{a + 7}{a + 8}$
- 201)  $\frac{5b^2 - 18a}{6b^2}$       202)  $\frac{15u - 30v + 24uv}{20v^2}$       203)  $\frac{5x - 14}{2(x - 4)}$
- 204)  $\frac{12r + 8}{(r - 2)(5r + 6)}$