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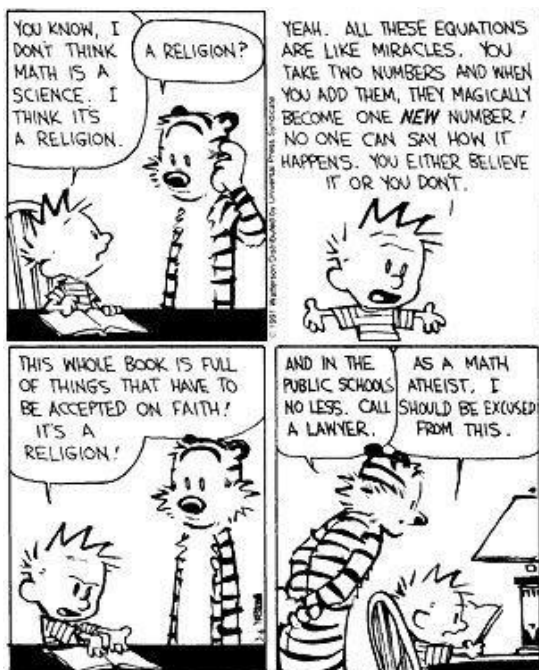
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“Entering Algebra 2” Summer Math Packet

These exercises provide a thorough review of Algebra 1 topics in preparation for starting Algebra 2 at Liberty Common High School. **This problem set should be completed and brought to class on the first full day of school for credit as the first homework assignment of the school year, worth five regular homework assignments. Work all problems on a separate sheet of paper and circle your answers.** The correct answers are provided in the back so that you can check your work; you need to show your work to receive credit for the problem.



Because legibility becomes increasingly important as you advance in math, the first page of this booklet is for penmanship practice. Please neatly copy each line's example 25 times. If penmanship is a problem for you, you might consider recopying this page every few days all summer.



As you work through these problems, you most likely will come across topics that require a little review... you might even find some topics that you have completely forgotten! When this situation presents itself, get help. There are many resources available – websites, textbooks, friends or siblings who are ahead of you in math, previous courses' notes, etc. – that can provide information to assist you.

Have a great summer; see you in August!

x

y

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Entering Algebra 2 Summer Math Packet

Complete all work on your own paper. Copy the original problem. No credit will be given without accompanying work.

1. a. Write an example of an expression which is a polynomial.
- b. Write an example of an expression which is not a polynomial.

Name the polynomial by degree and number of terms.

2. $x^2 - 3x + 5$

3. $x + 5$

4. x^2

5. $x^3 - 4x^2 + 7x - 9$

Simplify by multiplying and adding common terms.

6. $(x + 3)(x - 2)$

7. $(3x + 1)(2x + 3)$

8. $(4x - 1)^2$

9. $(6x + 1)(6x - 1)$

10. $(3x - 5)(4x + 3)$

11. $(x + 1)^2$

12. $(x - 1)^2$

13. $(x + 1)(x - 1)$

14. $(7x - 2)(x + 4)$

15. $(3x - 2)^2$

Factor. If prime, so state.

16. $x^2 + x - 6$

17. $2x^2 - 7x - 4$

18. $25x^2 - 10x - 3$

19. $x^2 - 5x + 6$

20. $x^2 - 6x + 9$

21. $x^2 + 1$

22. $x^2 - 1$

23. $x^2 - 2x + 1$

24. $x^2 + 2x - 1$

25. $9x^2 - 16$

26. $4x^2 + 4x - 3$

27. $x^2 + 9x - 10$

28. $x^2 - 9x + 10$

29. $6x^2 + x - 1$

30. $4x^2 - 21x + 5$

31. $x^2 + 10x + 25$

32. $x^2 - 25$

33. $x^2 - 4x + 4$

34. $x^2 - 4$

35. $x^2 + x - 2$

State whether the following numbers are rational or irrational.

36. a. 4

b. $\sqrt{4}$

c. 14

d. $\sqrt{14}$

37. $|x - 6| = 9$

38. $|4x + 1| = 33$

39. $|7x - 9| = -8$

40. $|8 - x| = 7$

41. $(x + 3)^2 = 25$

42. $(3x - 1)^2 = 64$

43. $x^2 - 4x + 4 = 36$

44. $x^2 + 2x + 1 = 5$

45. $x^2 + 8x - 9 = 0$

46. $x^2 - 5x + 4 = 0$

47. $2x^2 + 8x - 12 = 0$

Solve using the quadratic formula.

48. $x^2 + 7x + 12 = 0$

49. $2x^2 - 3x + 1 = 0$

50. $3x^2 + 4x - 9 = 0$

51. $6x^2 - 3x + 1 = 0$

52. $x^2 - 8x = -12$

Find the discriminant of each of the equations in Problems 48-52 and show that the solutions are indicated by the discriminant.

48a.

49a.

50a.

51a.

52a.

53. A football was kicked into the air with an initial velocity of 16 meters/second.

- Write an equation which relates distance above where the ball was kicked with respect to time.
- After what time(s) will the ball be at a height of 12 meters?
- How high was the ball after 2 seconds? Was it on the way up or down. Justify your answer.
- How high was the ball after 3 seconds?
- How many seconds did it take the ball to fall back to the same level from which it was kicked?

Simplify. Write answers with no grouping symbols.

54. $7(3x - 14)$

55. $(2x - 3)^2$

56. $(x + 4)(2x - 5)$

57. $2x + 7 + 9(7 - 2x)$

58. $\frac{5}{6}y(-12)$

59. $2(x^2 - 3x + 4) - 5(x^2 + 2x - 3)$

60. $\frac{(6x^2 + 9x - 12)}{2}$

61. $6 + \frac{2^3(3)}{6-4}$

Evaluate for the given values of the variable.

62. $6x - 23$

a. $x = -2$

b. $x = 12$

63. $\frac{3}{4}x^2$

a. $x = 5$

b. $x = 0.2$

64. $8 - 2(3x - 5)$

a. $x = 0$

b. $x = -\frac{2}{3}$

65. $3y^2 - y - 4$

a. $x = 2$

b. $x = -6$

66. $\frac{|3x+4|}{7-x}$

a. $x = -3$

b. $x = 12$

State the axiom, property, or definition which justifies each of the following.

67. $2x + 3 = 3 + 2x$

68. $-x = -1(x)$

69. If $5 = x - 2$, the $x - 2 = 5$

70. $3(x - 12) = 3x - 36$

71. $2(3 \cdot 4) = (2 \cdot 3)4$

Factor.

72. $x^2 - 25$

73. $x^2 - 6x + 8$

74. $x^2 - x - 12$

75. $3x^2 + x - 2$

Solve and check.

76. $x + 3 = 7$

77. $2x - 5 = 18$

78. $0.3 - 2.5x = -0.7$

79. $4x + 3 = 8x - 5$

For each of the following systems of equations:

a. solve by graphing

b. solve by substitution.

c. solve by linear combination (addition-subtraction method).

80. $2x - y = -3$
 $3x + y = -2$

81. $x + 3y = 6$
 $2x - 3y = 3$

82. $5x - 2y = -10$
 $x + 2y = -2$

83. $y = 3x + 8$
 $y = -\frac{2}{3}x - 3$

84. $3x - 2y = -6$
 $x + y = 3$

Simplify.

85. $2x - (3x - 5) + (x + 1)^2$

86. $3x^2 - 2x + 7 - x^2 + 3x + 5$

87. $\frac{4x-6}{3}$

88. Evaluate $\left(\frac{2}{3}\right)x - \left(\frac{1}{2}\right)y$ if:

a. x is 6 and y is 4

b. x is 4 and y is -5

89. For the integers 12 and 18,

a. What is the greatest common factor?

b. What is the least common multiple?

Simplify. Leave no powers of variables in the denominator. Evaluate all powers of numbers. Do not use decimals. If the expression can't be simplified, so state.

90. x^2x^3

91. $(x^2)^3$

92. $\frac{x^2}{x^3}$

93. $x^2 + x^3$

94. $2x^4 \cdot 3x^3$

95. $(2x)^3$

96. $(x^3y^{-3})^5$

97. $\frac{8x^6}{2x^4}$

98. 3^{-2}

99. $(6x^{-2})(-3x^4)$

100. $(2x^2y^3)^3$

101. $\left(\frac{x^3}{y^2}\right)^4$

102. $\left(\frac{2x^{-3}}{y^3}\right)^{-2}$

103. $\frac{x^4y}{xy}$

104. $4x^3 \cdot 2x^3$

105. $4x^3 - 2x^3$

106. $(x^2y^{-4})^5$

107. $(-2x^4)^3$

108. $\frac{x^{-3}y^4}{x^5y^{-2}}$

109. $(5xy^8)^0$

Write in scientific notation:

110. 30405

111. 0.00091

112. 89.5×10^3

Write in standard notation:

113. 7.8×10^{-3}

114. 7.8×10^3

Express the product or quotient in scientific notation:

115. $(2 \times 10^3)(4 \times 10^{-2})$

116. $\frac{4 \times 10^{-2}}{2 \times 10^3}$

Factor completely.

117. $3x^2 + 6x - 9$

118. $x^4 - x^3 - 2x^2$

119. $5x^2 - 125$

120. $8x^2 - 28x + 12$

121. $x(2x + 3) - 5(2x + 3)$

122. $x^2(x - 2) - 4(x - 2)$

123. $8x(3x + 1) - (3x + 1)$

124. $(x^2 + 3x)(2x - 1) + 2(2x - 1)$

125. $2x^3 + 3x^2 + 2x + 3$

126. $x^3 + 3x^2 - 9x - 27$

127. $3x^3 + 3x^2 - 4x - 12$

128. $x^3 + 3x^2 - 4x - 12$

129. $6x^2 - x - 15$

130. $15x^2 + 22x - 5$

131. $9x^2 - 3x - 2$

Solve by factoring then using the converse of the multiplication property of zero. If prime, use the quadratic formula.

132. $x^2 + 7x + 12 = 0$

133. $x^2 - 7x - 12 = 0$

134. $x^2 - x = 20$

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

136. Find the GCF of the two polynomials $x^2 - 4$ and $2x^2 - 10x + 12$.

Perform the indicated operation. Write the result as a reduced fraction.

137. $\frac{3}{4} + \frac{4}{9}$

138. $\frac{3}{4} \cdot \frac{4}{9}$

139. $\frac{4}{3x} + \frac{2}{x}$

140. $\frac{5}{x} + \frac{x}{x+2}$

141. $\frac{2}{x} \cdot \frac{x}{x+2}$

142. $\frac{2x}{x+2} + \frac{4}{x+2}$

143. $\frac{3}{x^2-4} + \frac{4}{2x+4}$

144. $\frac{x^2-6x-7}{x-1} \cdot \frac{x^2-1}{x^2+4x+3}$

145. $\frac{4-x^2}{x^2+5x+6} \cdot \frac{x^2-10x+9}{x^2-3x+2}$

146. $\frac{2x^2-x-1}{9x^3} \div \frac{x^2+x-2}{6x^2}$

147. $\frac{3}{x+2} - \frac{x^2+4x+3}{x^2-4} \div \frac{1+x}{2-x}$

148. Evaluate the fraction $\frac{2x-6}{x+2}$ if x is:

- a. 2 b. 3 c. -2

For problems 149-151:

- State the restrictions on x .
- State the LCD of the denominators.
- Solve the equation.
- Check for extraneous solutions.

149. $\frac{5}{x+2} = \frac{3}{x}$

150. $\frac{x+2}{4x} - \frac{5}{8} = \frac{3}{2x}$

151. $\frac{4}{x+4} + \frac{x}{4+x} = 2$

152. Find x in the proportion $3:5 = 4:x$.

153. Two numbers are in a ratio of 8 to 12. If the larger number is 42, find the smaller number.

154. Two numbers are in a ratio of 12 to 17. If the sum of the numbers is 435, find the larger number.

155. It takes Frank 3 hours to do a job. If Eddie works with him, it takes him only two hours. What is Eddie's rate?

156. For the radical expression $\sqrt{x+4}$:

- Evaluate the expression if x is 8. Write the result in simple radical form. Is the result rational or irrational?
- Evaluate the expression if x is 12. Write the result in simple radical form. Is the result rational or irrational?
- Find the value of x if the expression is equal to 7.
- Find the value of x if the expression is equal to -1 .

Write in simple radical form.

157. $\sqrt{24}$

158. $\sqrt{128}$

159. $\sqrt{5} - 6\sqrt{5}$

160. $\sqrt{12} + 3\sqrt{12}$

161. $2\sqrt{24} - \sqrt{24}$

162. $3\sqrt{8} \cdot 4\sqrt{12}$

163. $\sqrt{27} + \sqrt{12}$

164. $\sqrt{6} + \sqrt{3}$

165. $(1 + \sqrt{2})^2$

166. $(1 + \sqrt{2})(1 - \sqrt{2})$

167. $\frac{6}{\sqrt{3}}$

168. $\sqrt{\frac{3}{8}}$

169. $(2 + \sqrt{3})(1 - \sqrt{6})$

170. $\sqrt{16+9}$

171. $\sqrt{24} \cdot \sqrt{18}$

172. $\frac{2}{1-\sqrt{3}}$

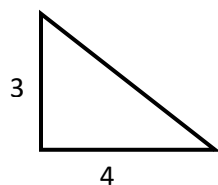
173. Write each of the following repeating decimals as fractions.

a. $0.5555555\dots$

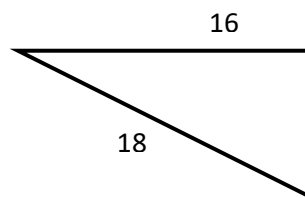
b. $0.05050505\dots$

174. Find the length of the third side of the following triangles.

a.



b.



175. Evaluate the radical $\sqrt[x]{81}$ if x is

a. 2

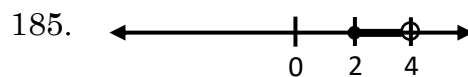
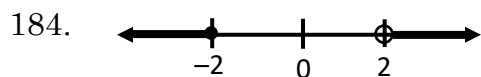
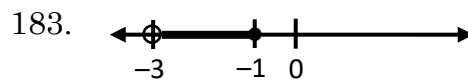
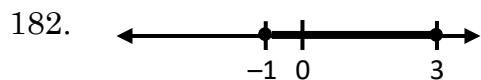
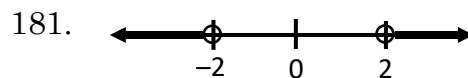
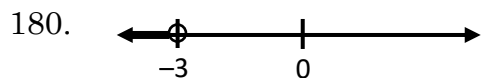
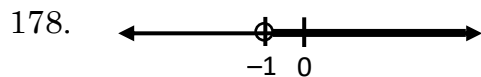
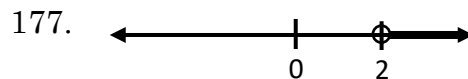
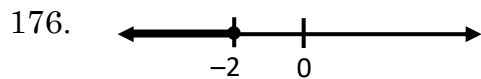
b. 3

c. 4

d. 5

e. Which of the results in a through d are rational?

Write an inequality which will describe the number line graph.



Solve the inequality and sketch a graph of the solution on a number line.

186. $2x + 3 \geq 5$

187. $5 - 3x \leq 8$

188. $x - 5 \leq -9$

189. $-5 < x + 3 < 9$

190. $-2 < x < 4$

191. $x \geq 5$ or $x \leq -4$

192. $0 \leq 2x + 1 \leq 9$

193. $-3 < 2 - x < 4$

194. $2x + 5 \geq 13$ or $3x - 1 < -4$

195. $x + 8 > 9$ or $2x - 3 < -9$

196. $|x| \geq 4$

197. $|x| < 5$

198. $|2x + 1| \leq 7$

199. $|3 + 4x| > 7$

200. $|8x - 5| \leq -5$

Draw a graph of the inequality on a Cartesian coordinate plane.

201. $2x - 3y \leq -12$

202. $y > 2x - 5$
 $x + y < 7$

203. For the quadratic function $y = x^2 + 2x - 3$

a. sketch the function by finding

- i. the x -intercepts. ii. the y -intercept. iii. the vertex.

b. If $y \geq 0$, sketch the result on a number line.

c. If $y < 0$, sketch the result on a number line.

204. Sketch each of the following functions using integer values of x between -4 and 4 , inclusive, to find the points which should be connected.

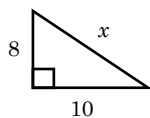
a. $y = 2x - 3$

b. $y = |2x - 3|$

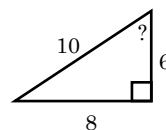
c. $y = (2x - 3)^2$

Find the missing values of the given right triangles.

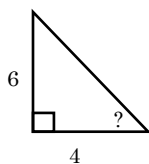
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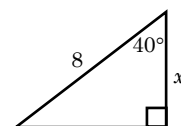
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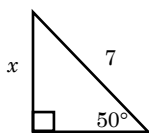
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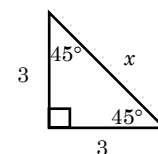
208.



209.



210.



211. The number of miles that you can drive in your car depends on the number of gallons of fuel in the tank. If you have 14 gallons in the tank, you can travel for 350 miles.

a. Write a proportion which shows this relationship and find the proportionality constant.

b. If the tank holds 14.6 gallons, how many miles can you drive?

c. You have 58 more miles to go to complete a trip. You have 1.3 usable gallons of fuel left in the tank. Can you complete the trip without having to get more fuel?

KEY

- 1a. $x = 2$ b. $\sqrt{x+2}$
2. quadratic trinomial
3. linear binomial
4. quadratic monomial
5. cubic polynomial with four terms
6. $x^2 + x - 6$
7. $6x^2 + 11x + 3$
8. $16x^2 - 8x + 1$
9. $36x^2 - 1$
10. $12x^2 - 11x - 15$
11. $x^2 + 2x + 1$
12. $x^2 - 2x + 1$
13. $x^2 - 1$
14. $7x^2 + 26x - 8$
15. $9x^2 - 12x + 4$
16. $(x + 3)(x - 2)$
17. $(2x + 1)(x - 4)$
18. $(5x + 1)(5x - 3)$
19. $(x - 2)(x - 3)$
20. $(x - 3)^2$
21. prime
22. $(x + 1)(x - 1)$
23. $(x - 1)^2$
24. prime
25. $(3x - 4)(3x + 4)$
26. $(2x - 1)(2x + 3)$
27. $(x + 10)(x - 1)$
28. prime
29. $(3x - 1)(2x + 1)$
30. $(4x - 1)(x - 5)$
31. $(x + 5)^2$
32. $(x + 5)(x - 5)$
33. $(x - 2)^2$
34. $(x + 2)(x - 2)$
35. $(x + 2)(x - 1)$
- 36 a. rational b. rational
 c. rational d. irrational
37. $\{-3, 15\}$
38. $\{-8.5, 8\}$
39. \emptyset
40. $\{15, 1\}$
41. $\{-8, 2\}$
42. $\{-2.33\dots, 3\}$
43. $\{-4, 8\}$
44. $\{-3.24, 1.24\}$
45. $\{-9, 1\}$
46. $\{4, 1\}$
47. $\{-5.16, 1.16\}$
48. $\{-4, -3\}$
49. $\{0.5, 1\}$
50. $\{-2.52, 1.19\}$
51. \emptyset
52. $\{6, 2\}$
- 48a. $D = 1$; rational;
- 49a. $D = 1$; rational;
- 50a. $D = 124$; irrational;
- 51a. $D = -15$; not real;
- 52a. $D = 16$; rational;
- 53a. $d = 16t - 5t^2$
 - b. after 2 seconds & 1.2 seconds
 - c. $12m$, going down, also at $12m$ @ 1.2 seconds
 - d. $3m$
 - e. 3.2 seconds
54. $21x - 98$
55. $4x^2 - 12x + 9$
56. $2x^2 + 3x - 20$
57. $-16x + 70$

58. $-10y$
59. $-3x^2 - 16x + 23$
60. $3x^2 + 4.5x - 6$
61. 18
62. a. -35 b. 49
63. a. $18\frac{3}{4}$ b. 0.03
64. a. 18 b. 22
65. a. 6 b. 110
66. a. $\frac{1}{2}$ b. -8
67. commutative addition
68. mult. prop. of -1
69. symmetric
70. distributive
71. associative mult.
72. $(x + 5)(x - 5)$
73. $(x - 2)(x - 4)$
74. $(x - 4)(x + 3)$
75. $(3x - 2)(x + 1)$
76. $x = 4$
77. $x = 11.5$
78. $x = 0.4$
79. $x = 2$
80. $\{(-1, 1)\}$
81. $\{(3, 1)\}$
82. $\{(-2, 0)\}$
83. $\{(-3, -1)\}$
84. $\{(0, 3)\}$
85. $x^2 + x + 6$
86. $2x^2 + x + 12$
87. $\frac{4x}{3} - 2$
88. a. 2 b. $5\frac{1}{6}$
89. a. 6 b. 36
90. x^5
91. x^6
92. x^{-1}
93. $x^2 + x^3$
94. $6x^7$
95. $8x^3$
96. $x^{15}y^{-15}$
97. $4x^2$
98. $\frac{1}{9}$
99. $-18x^2$
100. $8x^6y^9$
101. $x^{12}y^{-8}$
102. $\frac{1}{4}x^6y^6$
103. x^3
104. $8x^6$
105. $2x^3$
106. $x^{10}y^{-20}$
107. $-8x^{12}$
108. $x^{-8}y^6$
109. 1
110. 3.0405×10^4
111. 9.1×10^{-4}
112. 9.2185×10^3
113. 0.0078
114. 7800
115. 8×10^1
116. 2×10^{-5}
117. $3(x - 1)(x + 3)$
118. $x^2(x - 2)(x + 1)$
119. $5(x + 5)(x - 5)$
120. $4(2x - 1)(x - 3)$
121. $(x - 5)(2x + 3)$
122. $(x + 2)(x - 2)^2$
123. $(8x - 1)(3x + 1)$
124. $(x + 2)(x + 1)(2x - 1)$
125. $(x^2 + 1)(2x + 3)$
126. $(x - 3)(x + 3)^2$

127. prime
128. $(x + 2)(x - 2)(x + 3)$
129. $(3x - 5)(2x + 3)$
130. $(5x - 1)(3x + 5)$
131. $(3x + 1)(3x - 2)$
132. $\{-4, -3\}$
133. $\left\{\frac{7 \pm \sqrt{97}}{2}\right\}$
134. $\{5, -4\}$
135. $\{-1, 4\}$
136. $x - 2$
137. $\frac{43}{36}$
138. $\frac{1}{3}$
139. $\frac{10}{3x}$
140. $\frac{x^2 + 5x + 10}{x^2 + 2x}$
141. $\frac{2}{x + 2}$
142. 2
143. $\frac{2x - 1}{x^2 - 4}$
144. $\frac{x^2 - 6x - 7}{x + 3}$
145. $\frac{-x + 9}{x + 3}$
146. $\frac{4x + 2}{3x^2 + 6x}$
147. $\frac{x + 6}{x + 2}$
148. a. $\frac{1}{2}$ b. 0 c. undefined
149. a. $x \neq 0, -2$
 b. LCD = $x(x + 2)$
 c. $x = 3$
150. a. $x \neq 0$
 b. LCD = $8x$
 c. $x = -\frac{8}{3}$
151. a. $x \neq -4$
 b. LCD = $x + 4$
 c. \emptyset
152. $x = 6\frac{2}{3}$
153. 28
154. 255
155. 6 h per job
156. a. $2\sqrt{3}$, irrational
 b. 4, rational
 c. 45
 d. not real
157. $2\sqrt{6}$
158. $8\sqrt{2}$
159. $-5\sqrt{5}$
160. $8\sqrt{3}$
161. $2\sqrt{6}$
162. $48\sqrt{6}$
163. $5\sqrt{3}$
164. $\sqrt{3}(\sqrt{2} + 1)$
165. $3 + 2\sqrt{2}$
166. -1
167. $2\sqrt{3}$
168. $\frac{\sqrt{6}}{4}$
169. $2 - 2\sqrt{6} + \sqrt{3} - 3\sqrt{2}$
170. 5
171. $12\sqrt{3}$
172. $-1 - \sqrt{3}$
173. a. $\frac{5}{9}$ b. $\frac{5}{99}$
174. a. 5 b. 8.25
175. a. 9 b. 4.33 c. 3
 d. 2.41 e. a and c
176. $x \leq -2$
177. $x > 2$
178. $x > -1$
179. $x \leq 2.3$
180. $x < -3$
181. $x < -2$ or $x > 2$

182. $-1 \leq x \leq 3$

183. $-3 < x \leq -1$

184. $x \leq -2$ or $x > 2$

185. $2 \leq x < 4$

186. $x \geq 1$

187. $x > -1$

188. $x \leq -4$

189. $-8 < x$ or $x < 6$

190. $-2 < x < 4$

191. $x \leq -4$ or $x \geq 5$

192. $-\frac{1}{2} \leq x \leq 4$

193. $-2 < x < 5$

194. $x < -1$ or $x \geq 4$

195. $1 < x < -3$

196. $x \leq -4$ or $x \geq 4$

197. $-5 < x < 5$

198. $-4 \leq x \leq 3$

199. $1 < x < -2.5$

200. \emptyset

201. $y \geq \frac{2}{3}x + 4$ (see graph)

202. $y > 2x - 5$ and $y < -x + 7$ (see graph)

203. a. i. $(-3, 0)$, $(1, 0)$
 ii. $(0, -3)$ iii. $(-1, -4)$
 b. $x \leq -3$ or $x \geq 1$
 c. $-3 < x < 1$

204. a. through c. see graph

205. 12.81

206. 53.13°

207. 56.31°

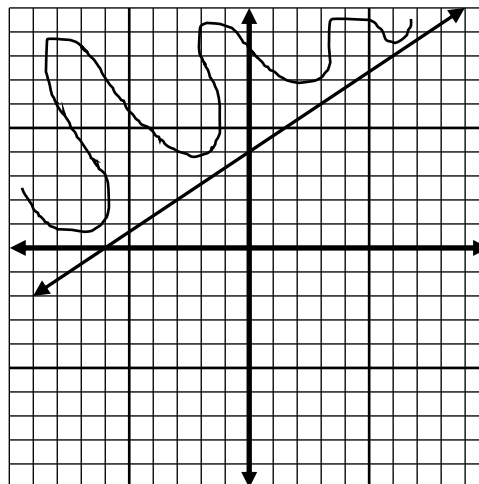
208. 6.13

209. 5.36

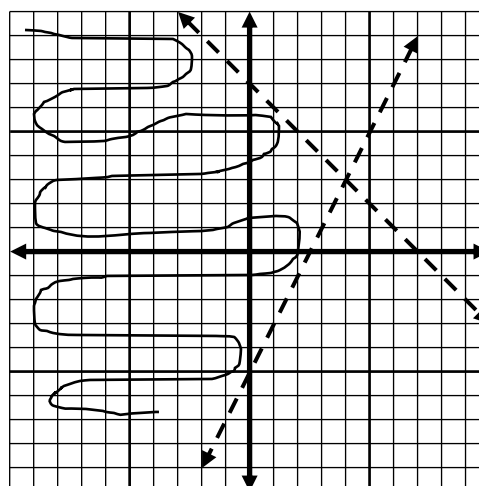
210. 4.24

211. a. $m = kg$, $k = 25$
 b. 365 mi
 c. No, you can only travel 32.5 mi. more.

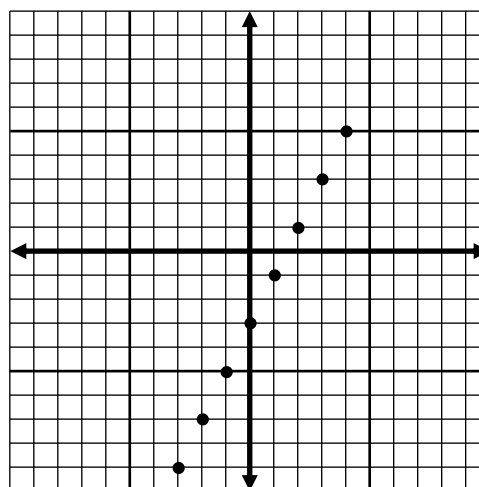
201.



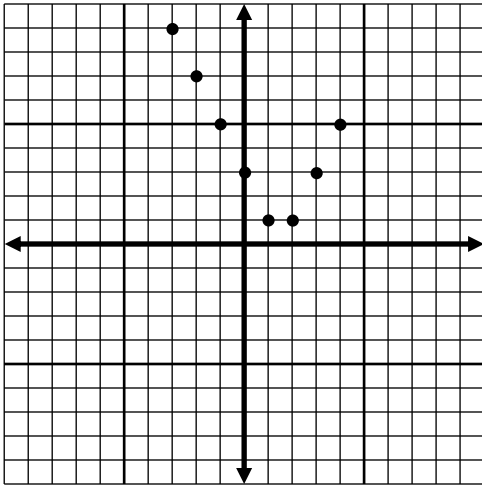
202.



204. a.



204. b.



204. c. Ordered pairs: $(-4, 121)$, $(-3, 81)$,
 $(-2, 49)$, $(-1, 25)$, $(0, 9)$, $(1, 1)$, $(2, 1)$,
 $(3, 9)$, $(4, 25)$