



TIMOTHY  
CHRISTIAN SCHOOL

## Entering Geometry Summer Packet 2019

Please complete every problem and SHOW ALL WORK. No Work = No Credit. Write your final answers on the answer sheet at the end of the packet. This assignment will be graded for both accuracy on the answer (75%) and for showing work throughout the packet (25%). It is due on the first day you return to school. This packet will count as a test grade in the first marking period of the new school year.

### Suggested timeline for completing this packet.

Week of June 23 – #1 - 24

Week of June 30 – #25 - 48

Week of July 7 – #49 - 58

Week of July 14 – #59 - 79

Week of July 21 – #80 - 96

Week of July 28 – #97 - 118

Week of August 4 – #119 - 143

Week of August 11 – #144 - 174

Name \_\_\_\_\_

**SUMMER PACKET**  
**for Algebra students entering Geometry**

**DETERMINING WHETHER A POINT IS ON A LINE**

**Example 1**

Decide whether (3,-2) is a solution of the equation  $y = 2x - 8$

$$-2 = 2(3) - 8 \quad \text{Substitute 3 for } x \text{ and } -2 \text{ for } y.$$

$$-2 = -2 \quad \text{Simplify.}$$

The statement is true, so (3,2) is a solution of the equation  $y = 2x - 8$

**Exercises:** Decide whether the given ordered pair is a solution of the equation.

1.  $y = 6x + 4; (-2, 8)$  \_\_\_\_\_

4.  $y = \frac{3}{2}x + 10; (4, 12)$  \_\_\_\_\_

2.  $y = -10x - 2; (1, -12)$  \_\_\_\_\_

5.  $y = \frac{5}{9}x + 34; (-9, 27)$  \_\_\_\_\_

3.  $y = -\frac{1}{4}x - 18; (-4, -17)$  \_\_\_\_\_

6.  $y = \frac{2}{3}x - 6; (9, 0)$  \_\_\_\_\_

**CALCULATING SLOPE**

**Example 2**

Find the slope of a line passing through (3,-9) and (2,-1).

$$m = \frac{y_2 - y_1}{x_2 - x_1} \quad \text{Formula for slope}$$

$$m = \frac{-1 - (-9)}{2 - 3} = \frac{-1 + 9}{-1} \quad \text{Substitute values and simplify.}$$

$$m = \frac{8}{-1} = -8 \quad \text{Slope is } -8.$$

**Exercises:** Find the slope of the line that contains the points

7. (4,1), (3, 6) \_\_\_\_\_

9. (5, 6), (9,8) \_\_\_\_\_

11. (-1, 7), (-3, 18) \_\_\_\_\_

8. (-8, 0), (5, -2) \_\_\_\_\_

10. (0,-4), (7,3) \_\_\_\_\_

12. (-6, -4), (1, 10) \_\_\_\_\_

## 2 | Introduction to Geometry

### FINDING THE EQUATION OF A LINE

#### Example 3

Find an equation of the line that passes through the point (3, 4) and has a y-intercept of 5.

$$y = mx + b \quad \text{Write the slope-intercept form.}$$

$$4 = 3m + 5 \quad \text{Substitute 5 for } b, 3 \text{ for } x, \text{ and } 4 \text{ for } y.$$

$$-1 = 3m \quad \text{Subtract 5 from each side.}$$

$$\frac{-1}{3} = m \quad \text{Divide each side by 3.}$$

The slope is  $m = \frac{-1}{3}$ . The equation of the line is  $y = \frac{-1}{3}x + 5$

**Exercises:** Write the equation of the line that passes through the given point and has the given y-intercept.

13. (2, 1);  $b=5$  \_\_\_\_\_

16. (7, 0);  $b=13$  \_\_\_\_\_

14. (-5, 3);  $b=-12$  \_\_\_\_\_

17. (-3, -3);  $b=-2$  \_\_\_\_\_

15. (-3, 10);  $b=8$  \_\_\_\_\_

18. (-1, 4);  $b=-8$  \_\_\_\_\_

### FINDING THE EQUATION OF A LINE

#### Example 4

Write an equation of the line that passes through the points (4, 8) and (3, 1). Find the slope of the line.

$$m = \frac{1-8}{3-4} \quad \text{Substitute values.}$$

$$m = \frac{-7}{-1} = 7 \quad \text{Simplify.}$$

$$1 = 7(3) + b \quad \text{Substitute values into } y = mx + b.$$

$$1 = 21 + b \quad \text{Multiply.}$$

$$-20 = b \quad \text{Solve for } b.$$

**Exercises:** Write an equation of the line that passes through the given points.

19. (6, -3), (1, 2) \_\_\_\_\_

21. (5, -1), (4, -5) \_\_\_\_\_

23. (-3, -7), (0, 8) \_\_\_\_\_

20. (-7, 9), (-5, 3) \_\_\_\_\_

22. (-2, 4), (3, -6) \_\_\_\_\_

24. (1, 2), (-1, -4) \_\_\_\_\_

Name \_\_\_\_\_

**DISTANCE FORMULA****Example 5**

Find the distance between  
the points  $(-4, 3)$  and  $(-7, 8)$

$$\begin{aligned} d &= \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2} \\ &= \sqrt{(-7 - (-4))^2 + (8 - 3)^2} \\ &= \sqrt{(-3)^2 + (5)^2} \\ &= \sqrt{34} \end{aligned}$$

**Exercises:** Find the distance between the points

25.  $(3, 6), (0, -2)$  \_\_\_\_\_

27.  $(-3, 4), (1, 4)$  \_\_\_\_\_

29.  $(8, -2), (-3, -6)$  \_\_\_\_\_

26.  $(5, -2), (-6, 5)$  \_\_\_\_\_

28.  $(-6, -6), (-3, -2)$  \_\_\_\_\_

30.  $(-8, 5), (-1, 1)$  \_\_\_\_\_

**COMBINING LIKE TERMS****Example 6**

Simplify

$8x^2 + 16xy - 3x^2 + 3xy - 3x$

$8x^2 - 3x^2 + 16xy + 3xy - 3x$

$5x^2 - 3x + 19xy$

Group like terms

Simplify

**Exercises:** Simplify.

31.  $6x + 11y - 4x + y$

33.  $-3p - 4t - 5t - 2p$

35.  $3x^2y - 5xy^2 + 6x^2y$

32.  $-5m + 3q + 4m - q$

34.  $9x - 22y + 18x - 3y$

36.  $5x^2 + 2xy - 7x^2 + xy$

## 4 | Introduction to Geometry

### SOLVING EQUATIONS WITH VARIABLES ON BOTH SIDES

#### Example 7

Solve.

$$6a - 12 = 5a + 9$$

$$a - 12 = 9$$

*Subtract 5a from both sides*

$$a = 21$$

*Add 12 to each side*

Exercises: Solve the equation.

37.  $3x + 5 = 2x + 11$

38.  $8m + 1 = 7m - 9$

39.  $11q - 6 = 3q + 8q$

40.  $-14 + 3a = 10 - a$

41.  $-2t + 10 = -t$

42.  $-7x + 7 = 2x - 11$

### SOLVING INEQUALITIES

#### Example 8 Solve.

a.  $5x - 4 \geq 4x + 6$

b.  $10 - 7x < 24$

When you multiply or divide each side of an inequality by a *negative* number, you must *reverse* the inequality symbol to maintain a true statement.

a.  $5x - 4 \geq 4x + 6$

$$x - 4 \geq 6$$

$$x \geq 10$$

b.  $10 - 7x < 24$

$$-7x < 14$$

$$x > -2$$

Exercises: Solve the inequality.

43.  $-x + 2 > 7$

44.  $-5 + m < 21$

45.  $z + 6 > -2$

46.  $c - 18 < 10$

47.  $x - 5 < 4$

48.  $-3x + 4 \leq -5$

**WRITING AND SIMPLIFYING RATIOS**

**Example 9**

- a. Train A takes 35 minutes to travel its route. Train B, traveling the same route but making more stops, takes 47 minutes. What is the ratio of the time of Train A to Train B?
- b. Jennie’s height is 4 feet, 7 inches. Her younger sister’s height is 25 inches. Find the ratio of Jennie’s height to her sister’s.

**Solutions**

a.  $35 \text{ minutes to } 47 \text{ minutes} = \frac{35 \text{ minutes}}{47 \text{ minutes}} = \frac{35}{47}$

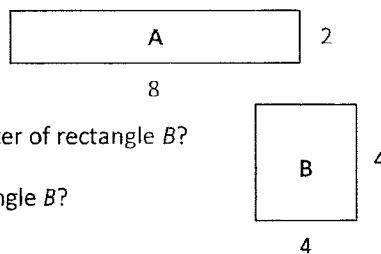
b. Convert 4 feet, 7 inches to inches:  $4(12) + 7 = 55$  inches

$55 \text{ inches to } 25 \text{ inches} = \frac{55 \text{ inches}}{25 \text{ inches}} = \frac{55}{25} = \frac{11}{5}$

**Exercises: Write the following ratios.**

49. Basmati rice needs to cook for 20 minutes, while quinoa (another grain) cooks for 25 minutes. What is the ratio of cooking times for rice to quinoa?
50. Jonathan caught 7 fish and Geogeanne caught 4. What is the ratio of fish caught of Jonathan to Geogeanne?
51. Two sunflowers' growth was measured daily. At the end of the experiment, Sunflower A had grown from 2 inches to 2 feet, 3 inches. Sunflower B had grown from 3 inches to 2 feet, 6 inches. Find the ratio of the growth in height of Sunflower A to Sunflower B.

Use the diagram at the right.



52. What is the ratio of length to width of rectangle A?
53. What is the ratio of the perimeter of rectangle A to the perimeter of rectangle B?
54. What is the ratio of the area of rectangle A to the area of rectangle B?

**DISTRIBUTIVE PROPERTY**

**Example 10**

Solve.

- a.  $4(x + 3) = 36$   
 $4x + 12 = 36$   
 $4x = 24$   
 $x = 6$

- b.  $6(x + 4) + 12 = 5(x + 3) + 7$   
 $6x + 24 + 12 = 5x + 15 + 7$   
 $6x + 36 = 5x + 22$   
 $x = -14$

## 6 | Introduction to Geometry

**Exercises: Solve.**

55.  $2(x + 7) = 20$

56.  $-10(y + 8) - 40$

57.  $7(2 - x) = 5x$

58.  $-4(x - 6) = 28$

### SOLVING PROPORTIONS

#### Example 11

Solve.

a.  $\frac{x}{8} = \frac{3}{4}$   
 $4x = 8 \cdot 3$   
 $4x = 24$   
 $x = 6$

b.  $\frac{6}{x+4} = \frac{1}{9}$   
 $6 \cdot 9 = x + 4$   
 $54 = x + 4$   
 $50 = x$

**Exercises: Solve.**

59.  $\frac{y}{50} = \frac{3}{100}$

62.  $\frac{3}{8} = \frac{3}{2d}$

65.  $\frac{3w + 6}{28} = \frac{3}{4}$

60.  $\frac{6}{45} = \frac{2z + 10}{15}$

63.  $\frac{1}{18} = \frac{5}{-4(x - 1)}$

66.  $\frac{3}{m + 4} = \frac{9}{14}$

61.  $\frac{3}{p - 6} = \frac{1}{p}$

64.  $\frac{r}{3r + 1} = \frac{2}{3}$

67.  $\frac{w}{4} = \frac{9}{w}$

### SIMPLIFYING RADICALS

#### Example 12

Simplify the expression  $\sqrt{20}$

$$\begin{aligned}\sqrt{20} &= \sqrt{4} \cdot \sqrt{5} \\ &= 2\sqrt{5}\end{aligned}$$

**Exercises: Simplify the expression.**

68.  $\sqrt{121}$

71.  $\sqrt{52}$

74.  $\sqrt{45}$

77.  $\sqrt{72}$

69.  $\sqrt{40}$

72.  $\sqrt{27}$

75.  $\sqrt{80}$

78.  $\sqrt{50}$

70.  $\sqrt{243}$

73.  $\sqrt{288}$

76.  $\sqrt{320}$

79.  $\sqrt{225}$

Name \_\_\_\_\_

**SIMPLIFYING RADICAL EXPRESSIONS****Example 13**

$$\begin{aligned} \text{a. } 5\sqrt{3} - \sqrt{3} - \sqrt{2} \\ = 4\sqrt{3} - \sqrt{2} \end{aligned}$$

$$\begin{aligned} \text{b. } (2\sqrt{2})(5\sqrt{3}) \\ = 2 \cdot 5 \cdot \sqrt{2} \cdot \sqrt{3} \\ = 10\sqrt{6} \end{aligned}$$

$$\begin{aligned} \text{c. } (5\sqrt{7})^2 \\ = 5^2 \sqrt{7^2} \\ = 25 \cdot 7 \\ = 175 \end{aligned}$$

**Exercises:** Simplify the radical expression.

80.  $\sqrt{75} + \sqrt{3}$

81.  $-\sqrt{147} - \sqrt{243}$

82.  $(5\sqrt{4})(2\sqrt{4})$

83.  $\sqrt{50} - \sqrt{18}$

84.  $(3\sqrt{14})(\sqrt{35})$

85.  $(6\sqrt{5})^2$

86.  $\sqrt{64} - \sqrt{28}$

87.  $(\sqrt{363})(\sqrt{300})$

88.  $(4\sqrt{2})^2$

89.  $\sqrt{44} + 2\sqrt{11}$

90.  $(\sqrt{32})(\sqrt{2})$

91.  $(8\sqrt{3})^2$

92.  $\sqrt{125} - \sqrt{80}$

93.  $(\sqrt{98})(\sqrt{128})$

94.  $(10\sqrt{11})^2$

95.  $\sqrt{242} + \sqrt{200}$

**SIMPLIFYING QUOTIENTS WITH RADICALS****Example 14**Simplify the quotient  $\frac{6}{\sqrt{5}}$ .

$$\begin{aligned} \frac{6}{\sqrt{5}} &= \frac{6}{\sqrt{5}} \cdot \frac{\sqrt{5}}{\sqrt{5}} \\ &= \frac{6\sqrt{5}}{\sqrt{5}\sqrt{5}} \\ &= \frac{6\sqrt{5}}{5} \end{aligned}$$

**Exercises:** Simplify the quotient.

96.  $\frac{4}{\sqrt{3}}$

97.  $\frac{2\sqrt{3}}{\sqrt{5}}$

98.  $\frac{\sqrt{32}}{\sqrt{5}}$

99.  $\frac{5}{\sqrt{7}}$

100.  $\frac{\sqrt{12}}{\sqrt{24}}$

101.  $\frac{\sqrt{27}}{\sqrt{45}}$

102.  $\frac{2\sqrt{3}}{\sqrt{6}}$

103.  $\frac{\sqrt{18}}{\sqrt{10}}$

104.  $\frac{\sqrt{50}}{\sqrt{75}}$



## 8 | Introduction to Geometry

### SOLVING LITERAL EQUATIONS

#### Example 16

Given the formula for the surface area of a right cylinder, solve for  $h$ .  $S = 2\pi r^2 + 2\pi rh$

$$S = 2\pi r(r + h)$$

$$\frac{S}{2\pi r} = r + h$$

$$\frac{S}{2\pi r} - r = h$$

or

$$S - 2\pi r^2 = 2\pi rh$$

$$\frac{(S - 2\pi r^2)}{2\pi r} = h$$

Exercises: Solve the literal equation for the indicated variable. Assume variables are positive.

105.  $V = \frac{4}{3}\pi r^3; r$

106.  $V = s^3; s$

107.  $V = \pi r^2 h; h$

108.  $A = \frac{1}{2}bh; h$

109.  $P = 2l + 2w; l$

110.  $S = 6s^2; s$

111.  $A = \frac{1}{2}h(b_1 + b_2); b_1$

112.  $V = lwh; h$

113.  $a^2 + b^2 = c^2; b$

### ALGEBRAIC EXPRESSIONS

#### Example 17

a. Write an expression for seven less than a number

$$x - 7$$

b. Write an equation for three times less than six times a number is five times the same number plus 5, then solve.

$$6x - 3 = 5x + 5$$

$$x - 3 = 5$$

$$x = 8$$

Exercises: Write the expression or equation. Solve the equations.

114. Half of a number plus three times the number

115. The product of five and a number decreased by seven equals thirteen.

116. Sixteen less than twice a number is 10.

117. Twice a number increased by the product of the number and fourteen results in forty-eight.

118. Half of a number is three times the sum of the number and five.

Name \_\_\_\_\_

**PERCENT PROBLEMS****Example 18**

- a. What number is 12% of 75?

$$x = 0.12(75)$$

$$x = 9$$

- b. 6 is what percent of 40?

$$6 = 40p$$

$$0.15 = p$$

$$p = 15\%$$

**Exercises:**

119. What number is 30% of 120?

120. 11 dogs is what percent of 50 dogs?

121. What distance is 15% of 340 miles?

122. 200 is what percent of 50?

123. 34 is what percent of 136?

124. 8 weeks is what percent of a year?

**SIMPLIFYING RATIONAL EXPRESSIONS****Example 19**

Simplify.

a. 
$$\frac{8x^2+12x}{4x^2+16x} = \frac{4x(2x+3)}{4x(x+4)} = \frac{2x+3}{x+4}$$

b. 
$$\frac{y^2-9}{y^2+6y+9} = \frac{(y+3)(y-3)}{(y+3)(y+3)} = \frac{y-3}{y+3}$$

**Exercises: Simplify.**

125. 
$$\frac{5x}{10x^2}$$

126. 
$$\frac{14d^2 - 2d}{6d^2 + 8d}$$

127. 
$$\frac{-5h + 1}{h + 1}$$

128. 
$$\frac{16a^3}{8a}$$

129. 
$$\frac{2y - 12}{24 - 2y}$$

130. 
$$\frac{t^2 - 1}{t^2 + 2t + 1}$$

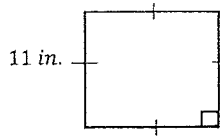
131. 
$$\frac{(5x^2 + x)}{(5x + 1)}$$

132. 
$$\frac{36s^2 - 4s}{4s^2 - 12s}$$

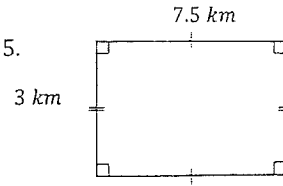
133. 
$$\frac{m^2 - 4m + 4}{m^2 - 4}$$

Find the perimeter and area of each figure.

134.



135.



136. A rectangle with a length of 7 inches and a width that is twice the length.

Evaluate the expression if  $a = 2$ ,  $b = -3$ ,  $c = -1$ , and  $d = 4$ .

137.  $2a + c$

138.  $\frac{bd}{2c}$

139.  $\frac{3b}{5a + c}$

140.  $5bc$

Evaluate the expression if  $x = 2$ ,  $y = -3$  and  $z = 1$

141.  $24 + |x - 4|$

142.  $13 + |8 + y|$

143.  $|y| - 7$

Find each sum or difference.

144.  $-4 - 5$

145.  $3 - 5$

146.  $-3 + 1$

147.  $-4 - (-2)$

Evaluate each expression.

148.  $|-4| - |6|$

149.  $|-5 + 2|$

Solve each equation.

150.  $r + 11 = 3$

151.  $\frac{8}{5}a = -6$

152.  $c - 14 = -11$

153.  $\frac{12}{5}f = -18$

154.  $b + 2 = -5$

155.  $5s = 30$

156.  $\frac{m}{10} + 15 = 21$

157.  $9n + 4 = 5n + 18$

158.  $-27 + 17 = -13$

159.  $9 - 4x = -15$

160.  $-2(n + 7) = 151$

161.  $\frac{7}{4}y - 2 = -5$

Find each product.

162.  $(3x^2)(x^5)$

163.  $\left(\frac{9}{2}c\right)(8c^5)$

164.  $(xy^8)(15x^2y)$

165.  $-2d^2(d^2 + 3)$

166.  $4m^2(-2m^2 + 7m - 5)$

167.  $(3m^3n^2)^2$

168.  $(-5wx^5)^3$

169.  $(x - 1)(x - 4)$

170.  $(5y + 3)(y - 4)$

171.  $(2x + 3)(5x + 2)$

Factor the following.

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

173.  $x^2 + 5x + 6$

174.  $x^2 - 11x + 30$

## ANSWER SHEET

- |           |           |           |           |
|-----------|-----------|-----------|-----------|
| 1. _____  | 25. _____ | 49. _____ | 73. _____ |
| 2. _____  | 26. _____ | 50. _____ | 74. _____ |
| 3. _____  | 27. _____ | 51. _____ | 75. _____ |
| 4. _____  | 28. _____ | 52. _____ | 76. _____ |
| 5. _____  | 29. _____ | 53. _____ | 77. _____ |
| 6. _____  | 30. _____ | 54. _____ | 78. _____ |
| 7. _____  | 31. _____ | 55. _____ | 79. _____ |
| 8. _____  | 32. _____ | 56. _____ | 80. _____ |
| 9. _____  | 33. _____ | 57. _____ | 81. _____ |
| 10. _____ | 34. _____ | 58. _____ | 82. _____ |
| 11. _____ | 35. _____ | 59. _____ | 83. _____ |
| 12. _____ | 36. _____ | 60. _____ | 84. _____ |
| 13. _____ | 37. _____ | 61. _____ | 85. _____ |
| 14. _____ | 38. _____ | 62. _____ | 86. _____ |
| 15. _____ | 39. _____ | 63. _____ | 87. _____ |
| 16. _____ | 40. _____ | 64. _____ | 88. _____ |
| 17. _____ | 41. _____ | 65. _____ | 89. _____ |
| 18. _____ | 42. _____ | 66. _____ | 90. _____ |
| 19. _____ | 43. _____ | 67. _____ | 91. _____ |
| 20. _____ | 44. _____ | 68. _____ | 92. _____ |
| 21. _____ | 45. _____ | 69. _____ | 93. _____ |
| 22. _____ | 46. _____ | 70. _____ | 94. _____ |
| 23. _____ | 47. _____ | 71. _____ | 95. _____ |
| 24. _____ | 48. _____ | 72. _____ | 96. _____ |

- |            |            |            |
|------------|------------|------------|
| 97. _____  | 122. _____ | 151. _____ |
| 98. _____  | 123. _____ | 152. _____ |
| 99. _____  | 124. _____ | 153. _____ |
| 100. _____ | 125. _____ | 154. _____ |
| 101. _____ | 126. _____ | 155. _____ |
| 102. _____ | 127. _____ | 156. _____ |
| 103. _____ | 128. _____ | 157. _____ |
| 104. _____ | 129. _____ | 158. _____ |
| 105. _____ | 130. _____ | 159. _____ |
| 106. _____ | 131. _____ | 160. _____ |
| 107. _____ | 132. _____ | 161. _____ |
| 108. _____ | 133. _____ | 162. _____ |
| 109. _____ | 134. _____ | 163. _____ |
| 110. _____ | 135. _____ | 164. _____ |
| 111. _____ | 140. _____ | 165. _____ |
| 112. _____ | 141. _____ | 166. _____ |
| 113. _____ | 142. _____ | 167. _____ |
| 114. _____ | 143. _____ | 168. _____ |
| 115. _____ | 144. _____ | 169. _____ |
| 116. _____ | 145. _____ | 170. _____ |
| 117. _____ | 146. _____ | 171. _____ |
| 118. _____ | 147. _____ | 172. _____ |
| 119. _____ | 148. _____ | 173. _____ |
| 120. _____ | 149. _____ | 174. _____ |
| 121. _____ | 150. _____ |            |