



UNIVERSITY OF DETROIT JESUIT

HIGH SCHOOL AND ACADEMY

Geometry Summer Packet

- The following set of problems are designed to reinforce skills and to provide practice with fundamental concepts learned in prior grades.
- This will be collected on the first day of school in the fall.
- Show your work for these problems in the packet.
- Pace yourself working on these throughout the summer. These should not be completed the evening before the first day of school!

Have a good summer and we will see you in August!

1. $-28+13x+16$

9. $\frac{12x^2y^0}{4} \div \frac{x^2y^4}{3}$

2. $10x - (-3x + 5)$

3. $(2y^2 - 9y + 16) - (5y^2 + 3y - 3)$

10. $(2x)(3x^3 - 5x)$

4. $(6x^2 + 7x + 1) + (-2x^2 - 8)$

11. $\frac{x^2y}{3y^3x^3} \cdot \frac{18x^4y^2}{xy^6}$

5. $4y(2 - y) + 3y^2$

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

6. $2x^2(x + 1) + 3x(-2 + y)$

13. $(-2x + 3)(5x - 1)$

7. $\frac{4x^8}{6x^{-5}}$

14. $(x + 5)^2$

8. $\frac{3x + 2}{2x} + \frac{-x + 7}{2x}$

15. $(x - 1)(x^2 - 4x + 7)$

Solve the equations. Leave exact answers.

16. $x - 18 = -3$

21. $5(2x - 3) = -15 + 10x$

17. $\frac{2}{3}x = 18$

22. $-6x^2 = -216$

18. $5x - 3 = 12$

23. $\frac{x}{9} = \frac{3}{x}$

19. $16x + 24 = 7(x + 6)$

20. $-4(2x - 1) = 3 - 8x$

24. $\frac{x + 6}{4} = \frac{-4x}{16}$

Solve using any method (square roots, quadratic formula, factoring)

25. $x^2 - 5x + 6 = 0$

26. $3x^2 + 1x - 4 = 0$

27. $2x^2 = 9x + 5$

28. $2x^2 - 50 = 0$

29. $(x+2)^2 = 36$

30. Factor $x^2 - 5x + 6$

31. Factor $x^2 - 16$

Factor Completely

32. $-4x^3 - 20x^2 - 16x$

33. $3x^5y^2 - 21x^2y^7$

For 34-36, solve the system of equations using substitution or elimination.
Write your answer as an ordered pair.

$$34. \quad \begin{cases} y = x - 7 \\ x = 2y + 6 \end{cases}$$

$$35. \quad \begin{cases} 4x - 4y = 12 \\ 3x + 2y = 4 \end{cases}$$

$$36. \quad \begin{cases} y = 2x + 3 \\ y = 4x + 4 \end{cases}$$

Write a system of equations and solve. Do NOT just use “guess and check” (create two equations from the word problems and solve using substitution or elimination)

37. The sum of two numbers is eight. One number is three times the other. Find the value for each number.
38. Ryan collects football and baseball cards. His uncle has an old collection of 360 cards that he gave to Alex. His collection has 30 more baseball cards than twice the number of football cards. How many of each type did he give Alex?
39. Carrie is in charge of decorating for the homecoming dance. She purchases 10 bags of balloons and 6 rolls of streamers for \$20.10. She realizes that this is not enough, so she goes back. This time, she spends \$12.80 on 4 bags of balloons and 8 rolls of streamers. What was the price for each item?

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

$$y = mx + b$$

Write the slope-intercept form.

$$4 = 3m + 5$$

Substitute 5 for b, 3 for x, and 4 for y.

$$-1 = 3m$$

Subtract 5 from each side.

$$\frac{-1}{3} = m$$

Divide each side by 3.

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

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

40. (2,1) $b = 5$

41. (7,0) $b = 13$

42. (-3, -3) $b = -2$

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

$$m = \frac{1-8}{3-4}$$

Substitute values.

$$m = \frac{-7}{-1} = 7$$

Simplify.

$$1 = 7(3) + b$$

Substitute values into $y = mx + b$.

$$1 = 21 + b$$

Multiply.

$$-20 = b$$

Solve for b.

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

43. (6, -3), (1, 2)

44. (-2, 4), (3, -6)

45. (1, 2), (-1, -4)

Solve each proportion:

$$46. \quad \frac{y}{50} = \frac{3}{100}$$

$$47. \quad \frac{6}{45} = \frac{2z + 10}{15}$$

$$48. \quad \frac{r}{3r + 1} = \frac{2}{3}$$

$$49. \quad \frac{3w + 6}{28} = \frac{3}{4}$$

$$50. \quad \frac{w}{4} = \frac{9}{w}$$

$$51. \quad \frac{1}{18} = \frac{5}{-4(x - 1)}$$

$$52. \quad \frac{3}{8} = \frac{3}{2d}$$

Simplifying rational expressions:

Examples:

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

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

Simplify each expression:

$$53. \quad \frac{5x}{10x^2}$$

$$54. \quad \frac{16a^3}{8a}$$

$$55. \quad \frac{-5h + 1}{h + 1}$$

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

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

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

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

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

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

Write the expression or equation. Solve the equations.

62. Half of a number plus three times the number

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

64. Sixteen less than twice a number is 10.

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

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

67. Three less than six times a number is five times the same number plus 5.

Simplifying Radicals:

Example:

Simplify the expression $\sqrt{20}$

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

Simplify each radical expression:

68. $\sqrt{121}$

69. $\sqrt{40}$

70. $\sqrt{243}$

71. $\sqrt{52}$

72. $\sqrt{27}$

73. $\sqrt{288}$

74. $\sqrt{45}$

75. $\sqrt{80}$

76. $\sqrt{320}$

77. $\sqrt{72}$

78. $\sqrt{50}$

79. $\sqrt{225}$

Simplifying radical expressions:

Examples:

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

Quotients With Radicals:

Example: Simplify the quotient $\frac{6}{\sqrt{5}}$

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

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

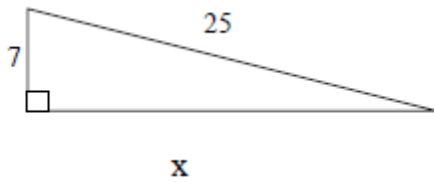
101. $\frac{\sqrt{27}}{\sqrt{45}}$

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

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

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

The Pythagorean Theorem



$$\begin{aligned} a^2 + b^2 &= c^2 \\ 7^2 + x^2 &= 25^2 \\ 49 + x^2 &= 625 \\ -49 \quad -49 & \\ x^2 &= 576 \\ \sqrt{x^2} &= \sqrt{576} \\ x &= 24 \end{aligned}$$

Solve for the variable:

