HONORS ALGEBRA 2
SUMMER ASSIGNMENT

The following two pages are taken from the textbook you will be using in the fall for the Honors Algebra II course. You should have learned all of this material in Algebra I, and it is very important for you to refresh yourself on these topics before starting Honors Algebra II.

Complete Exercises #1-122 on pp. 50-51 (attached). These exercises must be completed in pencil, and on lined, loose-leaf paper. You must show all of your work to receive credit, and your work must be organized and legible. There will be heavy emphasis on these habits this year, so let's start off on the right foot.

You can access an electronic copy of these pages at this link: https://bit.ly/2kdCf80

All of these exercises should be completed before the first day of school because it will be **collected** then. If you need help completing any of the exercises, you may want to refer back to your notes from Algebra I. The internet can be an excellent source of help for algebra topics, too.

A note on calculators: You will need a scientific calculator, but I don't require any specific model. (The TI-30X IIS is very popular, and it is a great calculator.) You will not be allowed to use graphing calculators, such as the TI-89 or the TI-84, on tests and quizzes in this class.

I really look forward to working with everybody in September! Have a great summer!!

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EXERCISES

1–2 ■ Determine whether each number is rational or irrational. If it is rational, determine whether it is a natural number, an integer, or neither.

1. (a) 16 (b) -16 (c) $\sqrt{16}$ (d) $\sqrt{2}$
   (e) $\frac{8}{3}$ (f) $-\frac{8}{2}$
2. (a) -5 (b) $-\frac{25}{6}$ (c) $\sqrt{25}$ (d) 3π
   (e) $\frac{24}{16}$ (f) 10^{20}

3–6 ■ State the property of real numbers being used.

3. $3 + 2x = 2x + 3$
4. $(a + b)(a - b) = (a - b)(a + b)$
5. $A(x + y) = Ax + Ay$
6. $(A + 1)(x + y) = (A + 1)x + (A + 1)y$

7–10 ■ Evaluate each expression. Express your answer as a fraction in lowest terms.

7. (a) $\frac{5}{6} + \frac{2}{3}$ (b) $\frac{5}{6} - \frac{2}{3}$
8. (a) $\frac{7}{10} - \frac{11}{15}$ (b) $\frac{7}{10} + \frac{11}{15}$
9. (a) $\frac{15}{8} \cdot \frac{12}{5}$ (b) $\frac{15}{8} \div \frac{12}{5}$
10. (a) $\frac{30}{7} \div \frac{12}{35}$ (b) $\frac{30}{7} \cdot \frac{12}{35}$

11–14 ■ Express the interval in terms of inequalities, and then graph the interval.

11. $[-2, 6)$ 12. $(0, 10]$
13. $(-\infty, 4]$ 14. $[-2, \infty)$

15–18 ■ Express the inequality in interval notation, and then graph the corresponding interval.

15. $x \geq 5$ 16. $x < -3$
17. $-1 < x \leq 5$ 18. $0 \leq x \leq \frac{1}{2}$

19–22 ■ The sets A, B, C, and D are defined as follows:

$A = \{-1, 0, 1, 2, 3\}$ $B = \{\frac{1}{2}, 1, 4\}$
$C = \{x \mid 0 < x \leq 2\}$ $D = (-1, 1]$

Find each of the following sets.

19. (a) $A \cup B$ (b) $A \cap B$
20. (a) $C \cup D$ (b) $C \cap D$
21. (a) $A \cap C$ (b) $B \cap D$
22. (a) $A \cap D$ (b) $B \cap C$

23–34 ■ Evaluate the expression.

23. $|7 - 10|$ 24. $|-\frac{3}{2} - 5|$
25. $|3 - |-9||$ 26. $1 - |1 - |-1||$
27. $2^{-3} - 3^{-2}$ 28. $2^{1/2}8^{1/2}$
29. $216^{-1/3}$ 30. $64^{2/3}$
31. $\frac{\sqrt{242}}{\sqrt{2}}$ 32. $\sqrt[4]{4}\,\sqrt[4]{324}$
33. $\sqrt[3]{-125}$ 34. $\sqrt{2}\sqrt{50}$

35–36 ■ Express the distance between the given numbers on the real line using an absolute value. Then evaluate this distance.

35. (a) 3 and 5 (b) 3 and -5
36. (a) 0 and -4 (b) 4 and -4

37–44 ■ Write the expression as a power of x.

37. $\frac{1}{x^2}$ 38. $x\sqrt{x}$
39. $x^2x^m(x^3)^m$ 40. $((x^m)^2)^n$
41. $x^a x^b x^c$ 42. $((x^a)^b)^c$
43. $x^{c+1}(x^{2c-1})^2$ 44. $\frac{(x^2)^n x^5}{x^n}$

45–48 ■ Express the radical as a power with a rational exponent.

45. (a) $\sqrt[3]{7}$ (b) $\sqrt[5]{7^4}$ 46. (a) $\sqrt[3]{5^7}$ (b) $(\sqrt[4]{5})^3$
47. (a) $\sqrt[6]{x^5}$ (b) $(\sqrt{x})^9$ 48. (a) $\sqrt{y^3}$ (b) $(\sqrt[8]{y})^2$

49–58 ■ Simplify the expression.

49. $(2x^3y)^2(3x^{-1}y^2)$ 50. $(a^2)^{-3}(a^3b)^2(b^3)^4$
51. $\frac{x^4(3x)^2}{x^3}$ 52. $\left(\frac{r^2s^{4/3}}{r^{1/3}s}\right)^6$
53. $\sqrt[3]{(x^3y)^2y^4}$ 54. $\sqrt{x^2y^4}$
55. $\frac{x}{2 + \sqrt{x}}$ 56. $\frac{\sqrt{x} + 1}{\sqrt{x} - 1}$
57. $\frac{8r^{1/2}s^{-3}}{2r^{-2}s^4}$ 58. $\left(\frac{ab^2c^{-3}}{2a^2b^{-4}}\right)^{-2}$

59. Write the number 78,250,000,000 in scientific notation.
60. Write the number 2.08×10^{-8} in decimal notation.
61. If $a \approx 0.00000293$, $b \approx 1.582 \times 10^{-14}$, and $c \approx 2.8064 \times 10^{12}$, use a calculator to approximate the number ab/c.
62. If your heart beats 80 times per minute and you live to be 90 years old, estimate the number of times your heart beats during your lifetime. State your answer in scientific notation.

63–84 ■ Factor the expression.

63. $2x^2y - 6xy^2$ 64. $12x^2y^4 - 3xy^5 + 9x^3y^2$
65. $x^2 - 9x + 18$ 66. $x^2 + 3x - 10$
67. $3x^2 - 2x - 1$ 68. $6x^2 + x - 12$
69. $4t^2 - 13t - 12$ 70. $x^4 - 2x^2 + 1$
71. $25 - 16t^2$ 72. $2y^6 - 32y^2$
73. $x^6 - 1$ 74. $y^3 - 2y^2 - y + 2$

75. $x^{-1/2} - 2x^{1/2} + x^{3/2}$

76. $a^4b^2 + ab^5$

77. $4x^3 - 8x^2 + 3x - 6$

78. $8x^3 + y^6$

79. $(x^2 + 2)^{5/2} + 2x(x^2 + 2)^{3/2} + x^2\sqrt{x^2 + 2}$

80. $3x^3 - 2x^2 + 18x - 12$

81. $a^2y - b^2y$

82. $ax^2 + bx^2 - a - b$

83. $(x + 1)^2 - 2(x + 1) + 1$

84. $(a + b)^2 + 2(a + b) - 15$

85–108 ■ Perform the indicated operations.

85. $(2x + 1)(3x - 2) - 5(4x - 1)$

86. $(2y - 7)(2y + 7)$

87. $(2a^2 - b)^2$

88. $(1 + x)(2 - x) - (3 - x)(3 + x)$

89. $(x - 1)(x - 2)(x - 3)$

90. $(2x + 1)^3$

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

92. $x^3(x - 6)^2 + x^4(x - 6)$

93. $x^2(x - 2) + x(x - 2)^2$

94. $\dfrac{x^3 + 2x^2 + 3x}{x}$

95. $\dfrac{x^2 - 2x - 3}{2x^2 + 5x + 3}$

96. $\dfrac{t^3 - 1}{t^2 - 1}$

97. $\dfrac{x^2 + 2x - 3}{x^2 + 8x + 16} \cdot \dfrac{3x + 12}{x - 1}$

98. $\dfrac{x^3/(x - 1)}{x^2/(x^3 - 1)}$

99. $\dfrac{x^2 - 2x - 15}{x^2 - 6x + 5} \div \dfrac{x^2 - x - 12}{x^2 - 1}$

100. $x - \dfrac{1}{x + 1}$

101. $\dfrac{1}{x - 1} - \dfrac{x}{x^2 + 1}$

102. $\dfrac{2}{x} + \dfrac{1}{x - 2} + \dfrac{3}{(x - 2)^2}$

103. $\dfrac{1}{x - 1} - \dfrac{2}{x^2 - 1}$

104. $\dfrac{1}{x + 2} + \dfrac{1}{x^2 - 4} - \dfrac{2}{x^2 - x - 2}$

105. $\dfrac{\frac{1}{x} - \frac{1}{2}}{x - 2}$

106. $\dfrac{\frac{1}{x} - \frac{1}{x + 1}}{\frac{1}{x} + \frac{1}{x + 1}}$

107. $\dfrac{3(x + h)^2 - 5(x + h) - (3x^2 - 5x)}{h}$

108. $\dfrac{\sqrt{x + h} - \sqrt{x}}{h}$ (rationalize the numerator)

109–112 ■ Find the domain of the algebraic expression.

109. $\dfrac{x + 5}{x + 10}$

110. $\dfrac{2x}{x^2 - 9}$

111. $\dfrac{\sqrt{x}}{x^2 - 3x - 4}$

112. $\dfrac{\sqrt{x - 3}}{x^2 - 4x + 4}$

113–120 ■ State whether the given equation is true for all values of the variables. (Disregard any value that makes a denominator 0.)

113. $(x + y)^3 = x^3 + y^3$

114. $\dfrac{1 + \sqrt{a}}{1 - a} = \dfrac{1}{1 - \sqrt{a}}$

115. $\dfrac{12 + y}{y} = \dfrac{12}{y} + 1$

116. $\sqrt[3]{a + b} = \sqrt[3]{a} + \sqrt[3]{b}$

117. $\sqrt{a^2} = a$

118. $\dfrac{1}{x + 4} = \dfrac{1}{x} + \dfrac{1}{4}$

119. $x^3 + y^3 = (x + y)(x^2 + xy + y^2)$

120. $\dfrac{x^2 + 1}{x^2 + 2x + 1} = \dfrac{1}{2x + 1}$

121. If $m > n > 0$ and $a = 2mn$, $b = m^2 - n^2$, $c = m^2 + n^2$, show that $a^2 + b^2 = c^2$.

122. If $t = \dfrac{1}{2}\left(x^3 - \dfrac{1}{x^3}\right)$ and $x > 0$, show that

$$\sqrt{1 + t^2} = \frac{1}{2}\left(x^3 + \frac{1}{x^3}\right)$$