

**Accelerated Math 3**

Name \_\_\_\_\_

**Review Concepts**

Date \_\_\_\_\_ Period \_\_\_\_\_

**Simplify the expression. Assume all variables are positive.**

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

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

3.  $\sqrt{45}$

4.  $\sqrt{27xy} \sqrt{5y^3}$

5.  $\frac{4}{\sqrt{5}}$

6.  $\sqrt{5}(8\sqrt{10} + 1)$

7.  $\frac{1}{5 + \sqrt{3}}$

8.  $\sqrt{-25}$

9.  $\frac{3}{\sqrt[3]{9x}}$

10.  $\left(\frac{2m^3}{6m^{-5}n^2}\right)\left(\frac{-9n^{-2}}{m^4}\right)$

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

12.  $\sqrt[3]{27} \sqrt[3]{16}$

13.  $(\sqrt{6} \sqrt[3]{6})^6$

14.  $\frac{\sqrt[3]{64x^3y}}{4x^{-3}y}$

15.  $(x^{\sqrt{2}})^{3\sqrt{2}}$

16.  $\frac{3x}{x - \sqrt{2y}}$

17.  $y^3 \sqrt[3]{32x^4} - 7\sqrt[5]{x^4y^{15}}$

18.  $\frac{\frac{x-3}{2}}{\frac{4x+5}{5x}}$

**Write the expression as a complex number in standard form without using a calculator.**

19.  $(6 + 3i)^2$

20.  $4i(2 + i)(5 - 2i)$

21.  $\frac{2 - 7i}{3i}$

22.  $\frac{3 + 4i}{2 + 3i}$

23.  $\frac{(3 + 3i)}{(2 - 4i)^2}$

**Simplify the following powers of i without using a calculator.**

24.  $i^{10}$

25.  $i^{51}$

26.  $i^{2364}$

**Evaluate the expression without using a calculator.**

27.  $8^{\frac{2}{3}}$

28.  $16^{-\frac{3}{2}}$

29.  $(-32)^{\frac{3}{5}}$

30.  $\log_{25} 125$

31.  $\ln e^6$

32.  $\log_{27} \frac{1}{3}$

Find the indicated product, quotient, sum, or difference.

$$33. \frac{x^2 + 4x - 12}{x^2 + 7x + 10} \cdot \frac{x + 5}{2x - 4}$$

$$34. \frac{x + 2}{3x - 3} \div \frac{x^2 + 11x + 18}{x - 1}$$

$$35. \frac{8x}{x - 5} + \frac{3x}{x + 2}$$

$$36. \frac{1}{x^2 + 5x + 4} - \frac{1}{x^2 - 16}$$

Factor the following expressions completely.

$$37. m^2 - 10m + 24$$

$$38. a^2 - 3a - 40$$

$$39. 3y^2 + 5y - 12$$

$$40. 3r^2 + 17r + 10$$

$$41. 25p^2 - 144$$

$$42. t^3 + 12t^2 - 2t - 24$$

$$43. 8x^3 - 125$$

$$44. -4x^4 + 22x^2 - 24$$

Solve the following equations. Give exact answers. Check for extraneous solutions.

$$45. 9p^2 + 18p = 0$$

$$46. a^2 - 9a - 36 = 0$$

$$47. 2y^2 + y - 10 = 0$$

$$48. 8a^2 - 72 = 0$$

$$49. x^3 + 2x^2 - 25x - 50 = 0$$

$$50. x^4 + 45 = 14x^2$$

$$51. \sqrt{5x + 4} - 12 = -6$$

$$52. x = \sqrt{2x + 24}$$

$$53. x + 2 = \sqrt{2x + 7}$$

$$54. \sqrt{x + 8} = \sqrt{x} + \sqrt{3}$$

$$55. |4x - 5| - 3 = 6$$

$$56. |x + 5| + 4 = 2$$

$$57. |x - 5| = 2x - 4$$

$$58. \frac{8}{x - 4} = \frac{2}{x - 2}$$

$$59. \frac{7}{x - 2} - \frac{4}{x + 2} = \frac{3}{x^2 - 4}$$

$$60. (x + 4)^3 + 20 = -13$$

$$61. 2(x - 4)^4 - 16 = 22$$

$$62. 2(x - 1)^{\frac{1}{2}} - 3 = 7$$

$$63. (3x + 12)^{\frac{3}{2}} - 3 = 24$$

$$64. 2(4)^{x+2} - 5 = 7$$

$$65. 3e^{3-x} = 15$$

$$66. \log_3(x - 3) + 3 = 5$$

$$67. \log_3 x + \log_3(x + 8) = 2$$

Find all the exact roots of the following polynomials:

$$68. f(x) = 3x^4 + 14x^3 + 14x^2 - 8x - 8$$

$$69. f(x) = x^5 - x^4 - 7x^3 + 11x^2 + 16x - 20$$

$$70. f(x) = 3x^5 - 2x^4 + 6x^3 - 4x^2 - 24x + 16$$

**Solve the following system using any method you choose. Show what method you used.**

71.  $2x - 5y = 3$   
 $10y = 4x - 6$

72.  $4x + 3y = 4$   
 $-2x - 3y = 10$

73.  $x + 2y - z = 4$   
 $y = 3x + 4z + 2$   
 $5y + z = 10 - 6x$

$w + x + 2y + z = 2$   
 $2w + 2x + y + 3z = 0$   
 $2w - 4x - 2y - z = 7$   
 $-w + 2x + y - z = -2$

**Solve the following inequality algebraically. Graph the solution a number line. Write the solution in interval notation. Round to the nearest hundredth if necessary.**

75.  $|3x + 4| < 6$

76.  $|3x - 7| + 8 \leq 5$

77.  $2|x - 7| > -8$

78.  $|x + 2| - 6 \geq 5$

79.  $x^2 - 5x - 14 > 0$

80.  $x^2 - 3x < -5$

81.  $2x^2 + 44 \geq 0$

82.  $3x^2 + 6x + 33 \leq -17x + 3$

83.  $-3x^3 + 10x^2 \leq -8x$

84.  $x^3 - 3x^2 - x + 3 < 0$

85.  $\sqrt{2x - 3} - 15 \leq -8$

86.  $x < \sqrt{2x + 15}$

87.  $x + 2 \geq \sqrt{2x + 7}$

88.  $7^{3x-4} - 3 \geq 15$

89.  $\ln(x + 3) - 5 < -2$

**Find the inverse of the following functions. State the domain and range of each inverse.**

90.  $f(x) = 2x^3 + 4$

91.  $g(x) = \sqrt{x - 2} - 4$

92.  $f(x) = e^{x+2} + 5$

93.  $f(x) = \log_6(x + 2) - 9$

**Expand the following into multiple logs:**

94.  $\log_4\left(\frac{x^4 \sqrt[3]{y}}{3z^2}\right)$

**Condense the following into one log:**

95.  $\frac{1}{3} \log_5 w - 5 \log_5 x + \frac{2}{3} \log_5 y - 2 \log_5 z$

**Evaluate the piecewise functions for the following values.**

96.  $f(x) = \begin{cases} 2x^2 - 1 & \text{if } x < -2 \\ \frac{3x}{x - 6} & \text{if } -2 \leq x \leq 4 \\ 3 + 2x & \text{if } x > 4 \end{cases}$

a.  $f(2) =$   
 b.  $f(-2) =$   
 c.  $f(4) =$   
 d.  $f(6) =$

**Write the function as a piecewise function.**

97.  $f(x) = 2|x + 5| + 4$

98.  $f(x) = -3|x - 4| + 5$

**Graph the following piecewise functions.**

$$99. \quad f(x) = \begin{cases} -2x - 3 & \text{if } x < 0 \\ 3x - 3 & \text{if } x \geq 0 \end{cases}$$

$$100. \quad f(x) = \begin{cases} x + 4 & \text{if } x < -2 \\ x^2 & \text{if } x > -2 \end{cases}$$

**Understand how to graph the following parent functions using transformations, be able to identify domain and range using interval notation, identify any asymptotes, and describe end behavior.**

**Parent Functions**

$$f(x) = x$$

$$f(x) = |x|$$

$$f(x) = x^2$$

$$f(x) = x^3$$

$$f(x) = \sqrt{x}$$

$$f(x) = \frac{1}{x}$$

$$f(x) = \sqrt[3]{x}$$

$$f(x) = b^x$$

$$f(x) = \log_b x$$

$$f(x) = [x]$$

$$f(x) = e^x$$

$$f(x) = \ln x$$