Algebra 2
Chapter 7 - Chapter Review Solutions

39. $\log_2 5 - \log_2 3 = \log_2 \frac{5}{3}$

Quotient Property

40. $4 \log_3 x + \log_3 7 = \log_3 x^4 + \log_3 7$

$= \log_3 7x^4$

Power and Product Properties

41. $\log x - \log y = \log \frac{x}{y}$

Quotient Property

42. $\log 5 - 2 \log x = \log 5 - \log x^2$

$= \log \frac{5}{x^2}$

Power and Quotient Properties

43. $3 \log_4 x + 2 \log_4 x = \log_4 x^3 + \log_4 x^2$

$= \log_4 \left(x^3 \cdot x^2\right)$

$= \log_4 x^5$

Power and Product Properties

44. $\log_4 x^2y^3 = \log_4 x^2 + \log_4 y^3$

$= 2 \log_4 x + 3 \log_4 y$

Product and Power Properties

45. $\log 4s^4t = \log 4 + \log s^4 + \log t$

$= \log 4 + 4 \log s + \log t$

Product and Power Properties

46. $\log_3 \frac{2}{x} = \log_3 2 - \log_3 x$

Quotient Property

47. $\log (x+3)^2 = 2 \log (x+3)$;

Power Property

48. $\log_2(2y-4)^3 = 3 \log_2(2y-4)$

$= 3 \log_2 2(y-2)$

$= 3 \log_2 2 + 3 \log_2 (y-2)$

Power and Product Properties

49. $\log \frac{z^2}{5} = \log z^2 - \log 5$

$= 2 \log z - \log 5$

Power and Quotient Properties

50. $\log_2 7 = \frac{\log 7}{\log 2}$

≈ 2.8

51. $\log_3 10 = \frac{\log 10}{\log 3}$

≈ 2.1

52. $25^{2x} = 125$

$\left(5^2\right)^{2x} = 5^3$

$5^{4x} = 5^3$

$4x = 3$

$x = \frac{3}{4} = 0.75$

53. $3^x = 36$

$\log 3^x = \log 36$

$x \log 3 = \log 36$

$x = \frac{\log 36}{\log 3}$

$x \approx 3.2619$

54. $7^{x-3} = 25$

$\log 7^{x-3} = \log 25$

$(x-3) \cdot \log 7 = \log 25$

$x - 3 = \frac{\log 25}{\log 7}$

$x = 3 + \frac{\log 25}{\log 7}$

$x \approx 4.6542$

55. $5^x + 3 = 12$

$5^x = 9$

$\log 5^x = \log 9$

$x \log 5 = \log 9$

$x = \frac{\log 9}{\log 5}$

$x \approx 1.3652$

56. $\log 3x = 1$

$3x = 10^1$

$x = \frac{10}{3}$

$x \approx 3.3333$

57. $\log_2 4x = 5$

$4x = 2^5$

$4x = 32$

$x = 8$

58. $\log x = \log 2x^2 - 2$

$\log x = \log 2 + 2\log x - 2$

$2 - \log 2 = \log x$

$x = 10^{2-\log 2}$

$x = 50$

59. $2\log_3 x = 54$

$\log_3 x = 27$

$x = 3^{27}$

$x = 7.6256 \times 10^{12}$

60. $5^{2x} = 20$

$\log 5^{2x} = \log 20$

$2x \log 5 = \log 20$

$2x = \dfrac{\log 20}{\log 5}$

$x = \dfrac{\frac{\log 20}{\log 5}}{2}$

$x \approx 0.9307$

61. graph $y_1 = 3^{7x}$ and $y_2 = 160$

point of intersection is about $(0.6599,\ 160)$

$x \approx 0.6599$

62. graph $y_1 = 6^{3x+1}$ and $y_2 = 215$

point of intersection is about $(0.6658,\ 215)$

$x \approx 0.6658$

63. graph $y_1 = 0.5^x$ and $y_2 = 0.12$

point of intersection is about $(3.0589,\ 0.12)$

$x \approx 3.0589$

64. $3{,}000{,}000 = 10(2)^x$

$300{,}000 = 2^x$

$\log 300{,}000 = \log 2^x$

$\log 300{,}000 = x \log 2$

$x = \dfrac{\log 300{,}000}{\log 2}$

$x \approx 18.2$

There will be 3,000,000 bacteria in about 18.2 hours.

65. $e^{3x} = 12$

$\ln e^{3x} = \ln 12$

$3x = \ln 12$

$x = \dfrac{\ln 12}{3}$

$x \approx 0.83$

66. $\ln x + \ln(x+1) = 2$

$\ln x(x+1) = 2$

$x(x+1) = e^2$

$x^2 + x - e^2 = 0$

$x = \dfrac{-1 \pm \sqrt{1^2 - 4(1)(-e^2)}}{2(1)}$

$x \approx \dfrac{-1 + 5.5278}{2}$

$x \approx 2.26$

67. $2\ln x + 3\ln 2 = 5$

$\ln x^2 + \ln 2^3 = 5$

$\ln 8x^2 = 5$

$8x^2 = e^5$

$8x^2 \approx 148.4132$

$x^2 \approx 18.5516$

$x \approx 4.31$

68. $\ln 4 - \ln x = 2$

$\ln \dfrac{4}{x} = 2$

$\dfrac{4}{x} = e^2$

$\dfrac{4}{x} \approx 7.389$

$x \approx 0.54$

69. $4e^{(x-1)} = 64$

$e^{x-1} = 16$

$\ln e^{x-1} = \ln 16$

$x - 1 = \ln 16$

$x = 1 + \ln 16$

$x \approx 3.77$

70. $3\ln x + \ln 5 = 7$

$\ln x^3 + \ln 5 = 7$

$\ln 5x^3 = 7$

$5x^3 = e^7$

$x^3 = \dfrac{e^7}{5}$

$x = \left(\dfrac{e^7}{5}\right)^{\frac{1}{3}}$

$x \approx 6.03$

71. $A = Pe^{rt}$

$429.20 = 350e^{6r}$

$e^{6r} = \dfrac{429.20}{350}$

$\ln\ e^{6r} = \ln\dfrac{429.20}{350}$

$6r = \ln\dfrac{429.20}{350}$

$r = \dfrac{1}{6}\cdot\ln\dfrac{429.20}{350}$

$r \approx 0.034,$ or about 3.4%