REVIEW FOR TEST

NAME KEY PERIOD _____ DATE _____

Applications of Exponential Functions Pre-AP Algebra 2

1. How much money will you have in 8 years if you invest $4000 at 3 ½ % compounded quarterly?

$A = 4000\left(1 + \frac{.035}{4}\right)^{4(8)}$

$5286.08

2. What interest rate do you need for a $5000 investment to double in 10 years?

$10,000 = 5,000(1+r)^{10}$

$2 = (1+r)^{10}$

$2^{\frac{1}{10}} = 1 + r$

$r = 2^{\frac{1}{10}} - 1$

$r = .07$

7%

3. How much money do you need to invest at 2 ¾ % in order to have $12,000 after 7 years?

$12,000 = P(1.0275)^7$

$P = \frac{12,000}{(1.0275)^7}$

$9924.50

4. How much money will you have in 6 months if you invest $1000 at 3% compounded monthly?

$A = 1000\left(1 + \frac{.03}{12}\right)^{12(.5)}$

$1015.09

5. How much interest will you earn in 8 years if you invest $7500 at 4 ¼ % compounded semi-annually?

$A = 7500\left(1 + \frac{.0425}{2}\right)^{8(2)}$

$A = 10,499.64$

$2999.64

6. In 1910, the population of Math Valley was 15,000. If the population is increasing at an annual rate of 2.4%, what was the population in 1965?

$A = 15,000(1.024)^{55}$

55,283 people

7. A herd of elk increased from 75 in 1998 to 310 in 2005. Find the annual percent of increase for this herd.

$310 = 75(1+r)^7$ $\quad r = .2247$

$\left(\frac{310}{75}\right)^{\frac{1}{7}} - 1 = r$ $\quad$ **22.5%**

8. A certain species of bird is in danger of becoming extinct. There were 1500 birds in 2000 and they are decreasing at an annual rate of 6.5%.
   a) If this trend continues, how many birds will be left by 2010?

$A = 1500(1-.065)^{10}$

≈ 764 birds

   b) How many birds would there have been in 1990?

$A = 1500(1-.065)^{-10}$

≈ 2937 birds

9. You are investing $1500 at 5.2% compounded continuously. How much money will you have in 12 years?

$A = 1500e^{.052(12)}$

$2799.57

10. How much money do you need to invest at 2.8% compounded continuously in order to have $25,500 at the end of 8 years?

$25{,}500 = Pe^{.028(8)}$

$P = \frac{25{,}000}{e^{.028(8)}}$ $\quad$ **$19,982.88**

11. If you deposit $4500 at 5% annual interest compounded quarterly, how much money will be in the account after 10 years?

$A = 4500\left(1 + \frac{.05}{4}\right)^{4(10)}$

$7396.29

12. If you deposit $4000 into an account paying 9% annual interest compounded monthly, how long until there is $10000 in the account?

$$10{,}000 = 4{,}000\left(1 + \frac{.09}{12}\right)^{12t}$$
$$2.5 = \left(1 + \frac{.09}{12}\right)^{12t}$$
$$\ln 2.5 = 12t \cdot \ln\left(1 + \frac{.09}{12}\right)$$
$$t = \frac{\ln 2.5}{12\ln\left(1 + \frac{.09}{12}\right)}$$

≈ 10.2 years

13. If you deposit $2500 into an account paying 11% annual interest compounded quarterly, how long until there is $4500 in the account?

$$4500 = 2500\left(1 + \frac{.11}{4}\right)^{4t}$$
$$1.8 = \left(1 + \frac{.11}{4}\right)^{4t}$$
$$\ln 1.8 = 4t \cdot \ln\left(1 + \frac{.11}{4}\right)$$
$$t = \frac{\ln 1.8}{4\ln\left(1 + \frac{.11}{4}\right)}$$

≈ 5.4 years

14. How much money would you need to deposit today at 5% annual interest compounded monthly to have $20,000 in the account after 9 years?

$$20{,}000 = P\left(1 + \frac{.05}{12}\right)^{12(9)}$$
$$P = \frac{20{,}000}{\left(1 + \frac{.05}{12}\right)^{108}}$$

$\$12{,}764.49$

15. If you deposit $6000 into an account paying 6.5% annual interest compounded quarterly, how long until there is $12600 in the account?

$$12{,}600 = 6000\left(1 + \frac{.065}{4}\right)^{4t}$$
$$2.1 = \left(1 + \frac{.065}{4}\right)^{4t}$$
$$\ln 2.1 = 4t\ln\left(1 + \frac{.065}{4}\right)$$
$$t = \frac{\ln 2.1}{4\ln\left(1 + \frac{.065}{4}\right)}$$

≈ 11.5 years

16. If you deposit $5000 into an account paying 8.25% annual interest compounded semiannually, how long until there is $9350 in the account?

$$9350 = 5000\left(1 + \frac{.0825}{2}\right)^{2t}$$
$$1.87 = \left(1 + \frac{.0825}{2}\right)^{2t}$$
$$\ln 1.87 = 2t\ln\left(1 + \frac{.0825}{2}\right)$$
$$t = \frac{\ln 1.87}{2\ln\left(1 + \frac{.0825}{2}\right)}$$

≈ 7.7 years

1) $6\ln x + 3\ln y$

2) $\log_8 x + \log_8 y + 3\log_8 z$

3) $12\log_9 3 - 4\log_9 7$

4) $9\log_7 x - 3\log_7 y$

5) $6\log_8 a + 5\log_8 b$

6) $3\log_4 6 + 3\log_4 11$

7) $6\log_3 u - 2\log_3 v$

8) $\dfrac{\ln u}{3} + \dfrac{\ln v}{3} + \dfrac{\ln w}{3}$

9) $\log_6 3 + \log_6 2 + 6\log_6 5$

10) $\log_4 2 + \log_4 11 + 4\log_4 7$

11) $5\log_6 c + \dfrac{\log_6 a}{3}$

12) $10\ln 5 - 5\ln 2$

13) $18\log_5 x - 6\log_5 y$

14) $3\log_4 7 + \dfrac{\log_4 2}{3}$

15) $\log_2 u + \log_2 v + 2\log_2 w$

16) $18\log_9 12 + 6\log_9 7$

17) $5\log_9 c + \dfrac{\log_9 a}{3}$

18) $20\log_7 x + 4\log_7 y$

19) $2\log_7 z + \dfrac{\log_7 x}{2}$

20) $\log_8 u + \log_8 v + 5\log_8 w$

21) $\log_6 \dfrac{u^2}{v^8}$

22) $\log_5 \left(b^2 a^8\right)$

23) $\log_3 \left(5^2 \cdot 12^8\right)$

24) $\log_4 \dfrac{u^3}{v^{18}}$

25) $\log_5 \left(z^2\sqrt{x}\right)$

26) $\log_2 \dfrac{u^6}{v^{24}}$

27) $\log \dfrac{8^6}{11^{30}}$

28) $\log_9 \dfrac{11^4}{7^4}$

29) $\log \dfrac{x^3}{y^5}$

30) $\log_6 \dfrac{10^6}{3^{24}}$

31) $\ln \left(z\sqrt[3]{yx}\right)$

32) $\log_4 \left(y^9 x^3\right)$

33) $\log_4 \dfrac{a^5}{b^6}$

34) $\log_9 \left(z\sqrt{yx}\right)$

35) $\log_2 \dfrac{11^4}{6^6}$

36) $\log_7 \left(z\sqrt[3]{yx}\right)$

37) $\log_2 \left(y^{10} x^2\right)$

38) $\log_5 \left(w\sqrt[3]{vu}\right)$

39) $\log_3 \left(7\sqrt[3]{110}\right)$

40) $\log_9 \sqrt{wvu}$

41) $17^2 = 289$

42) $9^2 = 81$

43) $14^2 = 196$

44) $6^0 = 1$

45) $10^2 = 100$

46) $32^{-\frac{1}{5}} = \dfrac{1}{2}$

47) $6^{-2} = \dfrac{1}{36}$

48) $18^2 = 324$

49) $27^{-\frac{1}{3}} = \dfrac{1}{3}$

50) $2^4 = 16$

51) $64^{\frac{2}{3}} = 16$

52) $7^2 = 49$

53) $18^{-2} = \dfrac{1}{324}$

54) $81^{-\frac{1}{4}} = \dfrac{1}{3}$

55) $7^3 = 343$

56) $225^{\frac{1}{2}} = 15$

57) $11^2 = 121$

58) $14^0 = 1$

59) $3^3 = 27$

60) $324^{\frac{1}{2}} = 18$

61) $\log_{11} 1 = 0$

62) $\log_7 \dfrac{1}{49} = -2$

63) $\log_{15} 225 = 2$

64) $\log_{121} \dfrac{1}{11} = -\dfrac{1}{2}$

65) $\log_3 81 = 4$

66) $\log_7 49 = 2$

67) $\log_4 64 = 3$

68) $\log_{361} 19 = \frac{1}{2}$

69) $\log_7 343 = 3$

70) $\log_{11} \frac{1}{121} = -2$

71) $\log_3 27 = 3$

72) $\log_4 \frac{1}{16} = -2$

73) $\log_{64} 8 = \frac{1}{2}$

74) $\log_{11} 121 = 2$

75) $\log_{16} 256 = 2$

76) $\log_8 64 = 2$

77) $\log_{19} 361 = 2$

78) $\log_{225} 15 = \frac{1}{2}$

79) $\log_{12} \frac{1}{144} = -2$

80) $\log_{144} 12 = \frac{1}{2}$

81) $\{26\}$

82) $\{2\}$

83) $\left\{\frac{7}{6}\right\}$

84) $\{6\}$

85) $\{-6\}$

86) $\{3\}$

13) $\log(16+2b) = \log(b^2-4b)$

$\{8, -2\}$

14) $\ln(n^2+12) = \ln(-9n-2)$

$\{-2, -7\}$

15) $\log x + \log 8 = 2$

$\left\{\frac{25}{2}\right\}$

16) $\log x - \log 2 = 1$

$\{20\}$

17) $\log 2 + \log x = 1$

$\{5\}$

18) $\log x + \log 7 = \log 37$

$\left\{\frac{37}{7}\right\}$

19) $\log_8 2 + \log_8 4x^2 = 1$

$\{1, -1\}$

20) $\log_9(x+6) - \log_9 x = \log_9 2$

$\{6\}$

21) $\log_6(x+1) - \log_6 x = \log_6 29$

$\left\{\frac{1}{28}\right\}$

22) $\log_5 6 + \log_5 2x^2 = \log_5 48$

$\{2, -2\}$

23) $\ln 2 - \ln(3x+2) = 1$

$\left\{\frac{2-2e}{3e}\right\}$

24) $\ln(-3x-1) - \ln 7 = 2$

$\left\{\frac{-7e^2-1}{3}\right\}$

25) $\ln(x-3) - \ln(x-5) = \ln 5$

$\left\{\frac{11}{2}\right\}$

26) $\ln(4x+1) - \ln 3 = 5$

$\left\{\frac{3e^5-1}{4}\right\}$