Name:_____Date:_____Period:_____

EOC REVIEW: Exponential and Logarithmic Functions

Standards: A2.A.CED.A – Create equations that describe number relationships. A2.A.REI.A – Understand solving equations as a process of reasoning and explain the reasoning. A2.F.BF.A – Build a function that models a relationship between two quantities. A2.F.LE.B – Interpret expressions for functions in terms of the situations they model. A2. A. REI.B – Solve equations and inequalities in one variable.

Objectives: Students will be able to create and solve problems involving exponential and logarithmic functions, predict measurements, as well as use the functions interchangeably as inverses of each other

Exponential growth and decay For the function $y = ab^x$,	**To model exponential growth and decay:** $A(t) = a(1 + r)^t$ You invested $1000 in a savings account at the end of 6th grade. The account pays 5% annual interest. How much money will be in the account after six years?	**Continuously Compounded Interest** $A(t) = P \cdot e^{rt}$ Suppose you won a contest at the start of 5th grade that deposited $3000 in an account that pays 5% compounded continuously. How much will you have in the account when you enter high school 4 years later? Express your answer to the nearest dollar.	Rewrite the given logs using log properties: *$\log(xy)$: *$log\frac{x}{y}$: *$\log x^y$: Write $2^3 = 8$ in logarithmic form	Evaluate each log or ln in the calculator. *How do you enter logs with bases other than 10? $log_2 16$ ln 1

*Reminder: Compounding n times $A = P(1 + \frac{r}{n})^{nt}$

annually = 1
quarterly = 4
monthly = 12
weekly = 52

Independent Practice EXPONENTIAL AND LOGARITHMIC FUNCTION assignment

1. Sarah currently has $62,410 in her retirement account, and her goal is to have at least $100,000 in the account. The account earns 6.9% interest on the balance, compounded annually. Sarah does not make any additional withdrawals or deposits.

What is the fewest number of years it would take Sarah to reach her goal?

Choose an answer and show work or Explain how you got your answer.

a. 6 b. 7 c. 8 d. 9

2. Two bird populations were studied, and formulas were developed for each population's growth. The population $P1 = 30e^{kt}$ and $P2 = 60e^{0.2t}$, where k is a constant and t is the time in years since the start of the study. The two populations were equal 10 years after the start of the study. What is the approximate value of k?

Choose an answer and show work or Explain how you got your answer

a. 0.13 b. 0.27 c. 7.13 d. 8.93

3. Using the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$, Jamie deposits $627 into a savings account. The account has an interest rate of 3.5%, compounded quarterly. Write the function that gives the amount of money in dollars, J(t), in Jamie's account *t* years after the initial deposit.

$J(t) = 627\left(1 + \frac{0.035}{4}\right)^{4t}$ or $J(t) = 627(1.00875)^{4t}$

4. Ahmad opens a savings account with an initial deposit of $1500. The account has an interest rate of 2.5% compounded continuously. How much money will be in Ahmad's account at the end of 10 years? $A = 1500e^{0.025(10)} = 1926.04$

5. Expand $\log x^3 y^4 x^5$ completely using the logarithmic properties.

$3\log x + 4\log y + 5\log x = \boxed{8\log x + 4\log y}$

6. In 2009 there was an endangered population of 270 cranes in a western state. Due to wildlife efforts, the population is increasing at a rate of 5% per year.

*What exponential function would be a good model for this population of cranes? $A = 270(1+0.05)^t$

*If this trend continues, how many cranes will there be in this population in 2020? $A = 270(1+0.05)^{11}$

$\boxed{53}$

7. The equation $y = 281(1.01)^x$ is a model for the population of the United States *y*, in millions of people, *x* years after the year 2000. Estimate when the United States population will reach 400 million people. $281(1.01)^x = 400$

$x = 35.2$

$2000 + 35 \rightarrow \boxed{2035}$