

$$y = a(e)^{rt}$$

Name \_\_\_\_\_

Date \_\_\_\_\_

1. The population of a city can be modeled by  $P = 125,000e^{0.02t}$ , where  $t$  is the number of years since 1900.

a. What was the population in the year 2000?

b. What is the population of the city today?

2. The growth of a certain type of bacteria can be modeled by the equation  $y = 250e^{0.46t}$ , where  $t$  represents the number of hours.

a. How many bacteria will be present after 6 hours?

b. How many bacteria will be present after 10 days?

10x24

Compound Interest Formula

$$y = a(1 + \frac{r}{n})^{t \cdot n}$$

Growth Formula

$$y = a(1 + r)^t$$

Continuous Compound Interest

$$y = p(e)^{r \cdot t}$$

Decay Formula

$$y = a(1 - r)^t$$

y = final amount  
t = time

p and a = starting amount  
n = # times the money will be compounded each year

r = interest rate (in decimal form)

5. What great luck! You have won \$18,000 with a winning lottery ticket, You want to invest your money with one of these financial institutions. Which option will give you the greatest balance if they all promise "continuous compounding"?

Bank A will pay you interest at a rate of <del>6 1/2%</del> if you leave your money for 10 years.	Bank B will pay you interest at a rate of 6.35% if you leave your money for 8 years.
Bank C will pay you interest at a rate of 8% if you leave your money for 30 years	Bank D will pay you interest at a rate of 7.12% if you leave your money for 20 years.

6. So you have bed bugs? If you start with 10 bedbugs and the infestation increases at an average rate of 67% each week, how many bedbugs will you expect to have at the end of the year?  
*growth*

The bank of Hybart is advertising 3.25% interest compounded continuously. If you invest your \$15,000 you found on the sidewalk, how much money would you have at the end of 10 years?  
*continuously compounded*

8. You have finally saved the \$28,000 you needed to put a down payment on a new Tesla car. If your money has been in an account that paid 6% interest compounded monthly for the last 10 years, how much money did you initially invest?  
*Compound interest*

*Divide*

*n=12*

9. A \$500 Xbox OneX is estimated to lose its value at a rate of approximately 13.2% each year. What will its value be after 10 years?  
*decay*