Name: Period: Date:

Practice Worksheet: Applications of Exponential Growth and Decay

True or False. If the statement is false, correct the error to make it true.

_____ 1] Interest that is compounded monthly produces a greater return on an investment than interest that is compounded continuously.

_____ 2] $A = 2345\left(\frac{7}{6}\right)^{x}$ is an example of exponential growth.

_____ 3] Calculating the depreciation of the value of a new motorcycle over a given number of years is an example of exponential growth.

_____ 4] The ending balance of a savings account that is calculated using the formula $A = 40{,}000\left(1 + \frac{0.025}{52}\right)^{52x}$ is compounding the interest weekly at a rate of 0.025%.

_____ 5] In 1985, there were 285 cell phone subscribers in Centerville. The number of subscribers increased by 75% per year until 1998. The formula $A = 285(1.75)^{9}$ approximates the number of subscribers in 1994.

_____ 6] Each year the local country club sponsors a tennis tournament. Play starts with 128 participants and during each round, half of the players are eliminated. The formula $A = 128(1 + 0.5)^{5}$ approximates the number of players remaining after 5 rounds.

_____ 7] After x years, the value of a car that originally cost $13,500 depreciates so that each year it is worth 4/5 of is value the previous year. The formula $A = 13{,}500\left(\frac{1}{5}\right)^{10}$ would approximate its value after 10 years.

Show all work for the problems below and give units for all answers.

8] In 1999, the amount of federal budget outlays for Medicare was $190.4 billion. During the next 5 years, the amount increased by about 7% each year. Write an exponential growth model giving the amount *M* (in billions of dollars) of outlays for Medicare *t* years after 1999. About how much was given to Medicare in 2001?	9] In 1990, the population of a town was 2200. During the next 15 years, the population of the town increased by about 3% each year. Write an exponential growth model giving the number *p* of people in the town *t* years after 1990. About how many people were in the town in 2003?

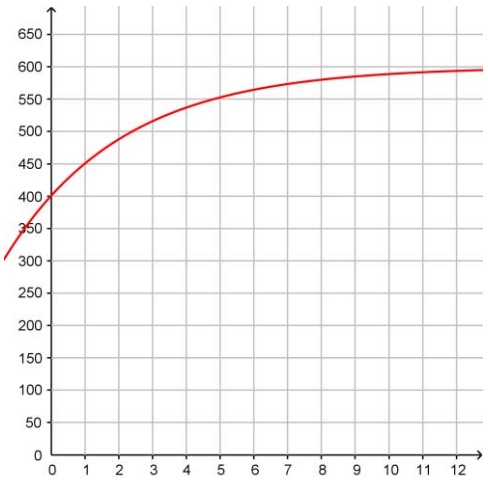
10] A deposit of $5000 is made in a trust fund that pays 7.5% interest, compounded continuously. It is specified that the balance will be given to the college in which the donor graduated after the money has earned interest for 50 years. How much will the college receive?

11] You buy a new stereo for $640. The value of the stereo decreases by 7% each year. Write an exponential decay model giving the stereo system's value y (in dollars) after t years. Estimate the value after five years.

12] In 1998, the number of newly reported cases of tuberculosis (TB) was about 21,210 and decreased by about 4.73% each year from 1998 to 2002. Write an exponential decay model giving the number of newly reported cases of TB y (in thousands), t years after 1998. Suppose the model for the number of newly reported cases of TB can be used for the years1998 to 2010. Estimate the number of newly reported cases of TB in 2010.

13] Immediately following an injection, the concentration of a drug in the bloodstream is 300 mg/mL. After t hours, the concentration is 75% of the level of the previous hour. Write an exponential model to represent this and determine the concentration of the drug after 8 hours. (Hint: Double check the rate you used!)

The population of two-toed sloths in Costa Rica was being threatened by logging, deforestation, and natural terrestrial predators such as eagles, boas, and cats. However, in the past several years, the population has started to rebound due to the disappearance of the harpy eagle. The population of two-toed sloths in a wildlife refuge that opened in 2012 in Costa Rica can be modeled by $y = -0.15(0.75)^{x-25} + 600$.



14] What is the maximum population of sloths the wildlife refuge can sustain? How do you know?

15] How many sloths were living in the area when the land was designated as a wildlife refuge? How do you know?

16] Approximatly how many sloths will be living in the refuge in 2016? Show your work.