Name: _____

F.LE.A.2: Modeling Exponential Functions 2

1 A rabbit population doubles every 4 weeks. There are currently five rabbits in a restricted area. If t represents the time, in weeks, and $P(t)$ is the population of rabbits with respect to time, about how many rabbits will there be in 98 days?

1) 56
2) 152
3) 3688
4) 81,920

2 If $5000 is put into a savings account that pays 3.5% interest compounded monthly, how much money, to the *nearest ten cents*, would be in that account after 6 years, assuming no money was added or withdrawn?

1) $5177.80
2) $5941.30
3) $6146.30
4) $6166.50

3 Sodium iodide-131, used to treat certain medical conditions, has a half-life of 1.8 hours. The data table below shows the amount of sodium iodide-131, rounded to the nearest thousandth, as the dose fades over time.

Number of Half Lives	1	2	3	4	5
Amount of Sodium Iodide-131	139.000	69.500	34.750	17.375	8.688

What approximate amount of sodium iodide-131 will remain in the body after 18 hours?

1) 0.001
2) 0.136
3) 0.271
4) 0.543

4 A population of 950 bacteria grows continuously at a rate of 4.75% per day. Write an exponential function, $N(t)$, that represents the bacterial population after t days and explain the reason for your choice of base. Determine the bacterial population after 36 hours, to the *nearest bacterium*.

5 Titanium-44 is a radioactive isotope such that every 63 years, its mass decreases by half. For a sample of titanium-44 with an initial mass of 100 grams, write a function that will give the mass of the sample remaining after any amount of time. Define all variables. Scientists sometimes use the average yearly decrease in mass for estimation purposes. Use the average yearly decrease in mass of the sample between year 0 and year 10 to predict the amount of the sample remaining after 40 years. Round your answer to the *nearest tenth*. Is the actual mass of the sample or the estimated mass greater after 40 years? Justify your answer.

F.LE.A.2: Modeling Exponential Functions 2
Answer Section

1 ANS: 1

$P(28) = 5(2)^{\frac{98}{28}} \approx 56$

REF: 011702aii

2 ANS: 4

$5000\left(1 + \frac{.035}{12}\right)^{12 \cdot 6} \approx 6166.50$

REF: 081917aii

3 ANS: 3

$y = 278(0.5)^{\frac{18}{1.8}} \approx 0.271$

REF: 011920aii

4 ANS:

$N(t) = 950e^{0.0475t}$ The base is e because growth is continuous. $N\left(\frac{36}{24}\right) \approx 1020$

REF: 081933aii

5 ANS:

$A(t) = 100(0.5)^{\frac{t}{63}}$, where t is time in years, and $A(t)$ is the amount of titanium-44 left after t years.
$\frac{A(10) - A(0)}{10 - 0} = \frac{89.58132 - 100}{10} = -1.041868$ The estimated mass at $t = 40$ is $100 - 40(-1.041868) \approx 58.3$. The actual mass is $A(40) = 100(0.5)^{\frac{40}{63}} \approx 64.3976$. The estimated mass is less than the actual mass.

REF: fall1517aii