Name: _____ Date: _____ **Unit 7 Homework**

Determining Rates Homework

Directions: Be sure to show all work, communicate your thought process, and justify your reasoning. Remember to check that your answers are complete, correct, and reasonable. Do not forget to complete the "Throwback" problems! ☺

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1. A bank offers a certain type of savings account that compounds 2.3% interest, compounded semi-annually.

a. Write an expression to model the situation for any principle amount, P.

b. Rewrite your expression so that it accurately reflects the annual interest rate.

c. Rewrite your expression so that it accurately reflects the monthly interest rate.

2. During one year, the population of a certain insect decreased according to the model $P = P_0(0.88)^t$, where P is the total population, P_0 is the initial population, and t is the time in years.

a. Rewrite this equation in such a way that it can be used to model the approximate weekly decay rate.

b. Rewrite this equation in such a way that it can be used to model the approximate monthly decay rate.

3. A certain musical artist's music was first aired on XM radio on January 1st, 2015. By January 1st, 2016, the number of tickets sold to this musical artist's concert grew exponentially by 65%! Determine the monthly rate of increase, expressed as a percent rounded to one decimal place.

4. The half-life of a certain isotope is three days. Assume a sample contains 10.19 grams of this isotope.

a. Write a function M(t) to model the mass of the isotope after t days, using a fractional exponent.

b. Rewrite your model without a fractional exponent.

c. Complete the blank: The base of the exponential equation in part b can be interpreted to signify that _____ percent of the element remains from one day to the next.

d. By what percent does the mass of the element decrease by daily?

THROWBACK!

1. Two items are on a balance scale. Their masses in grams are m_1 and m_2 respectively. The first object is x inches away from the fulcrum (balance point), and the second item is 5 – x inches away from the fulcrum. For the scale to be in balance, $m_1d_1 = m_2d_2$. Write a function that could be used to determine the mass of the first item, given that the mass of the second item is 12 grams. Use the information in the table as a reference.

m_2	d_1	d_2
12	x	5 - x

Selected Solutions:

2. a. $P = P_0(0.9975)^{52t}$ b. $P = P_0(0.9894)^{12t}$

4. a. $M(t) = 10.19(0.5)^{t/3}$ b. $M(t) = 10.19(0.7937)^{t}$

c. 79.37% d. 20.63%

Throwback:

M1 = (60 – 12x) / x