Name _____ Date _____
Mr. Schlansky Algebra II

Irregular Time (Half Life)

1. The half-life of mendelevium-258 is 51.5 days. Write an equation for the amount of mendelevium-258 remaining from an initial amount of 4000 grams after d days. To the *nearest hundredth of a gram*, how much mendelevium-258 will remain after 12 days?

2. The amount of ants in a colony doubles every 8 days. If there are initially 275 ants, write an equation for $a(t)$, the amount of ants in the colony after t days. How many ants, to the nearest ant, will be in the colony after 30 days?

3. Phil is trying to get himself back into shape and wants to ease his way back into distance running. He will start by running 2 miles each day but every four days, he will increase his distance by 60%. Create an equation to represents how many *m* miles Phil will be running after *d* days. After how many days, to the *nearest day*, will Phil be running 6.2 miles?

4. The half life of an element is 27 hours. If there were initially 4.2 kg of the substance, how much will remain after 2 days? Round your answer to the nearest hundredth of a kg.

5. Jabba went to the movies on Friday night and bought a large popcorn. Every 20 minutes, Jabba eats 40% of the remaining amount of popcorn in his bucket. If there were 967 pieces of popcorn initially in Jabba's bucket, write an equation for $a(t)$, the amount of popcorn left in Jabba's bucket after t minutes. How many pieces of popcorn, to the *nearest piece of popcorn*, will be left an hour and a half into the movie?

6. The amount of views of a YouTube video triples every 5 days. If it currently has 1120 views, how many full views will the video have two weeks from now?

7. A payday loan company makes loans between \$100 and \$1000 available to customers. Every 14 days, customers are charged 30% interest with compounding. In 2013, Remi took out a \$300 payday loan. Which expression can be used to calculate the amount she would owe, in dollars, after one year if she did not make payments?

1) $300(.30)^{\frac{14}{365}}$ 2) $300(1.30)^{\frac{14}{365}}$ 3) $300(.30)^{\frac{365}{14}}$ 4) $300(1.30)^{\frac{365}{14}}$

8. Jay borrowed \$50,000 from Aaron and they came to an agreement regarding how the interest will be paid. Every week, the loan will accumulate 2% interest. If Jay repays the loan after 21 days, how much money will he have to repay Aaron rounded to the *nearest cent*?

9. One of the medical uses of Iodine–131 (I–131), a radioactive isotope of iodine, is to enhance x-ray images. The half-life of I–131 is approximately 8.02 days. A patient is injected with 20 milligrams of I–131. Determine, to the *nearest day*, the amount of time needed before the amount of I–131 in the patient's body is approximately 7 milligrams.

10. The half-life of carbon-15 is 2.449 seconds. If Jackie has 17500 grams of carbon-15, write an equation that will represent the amount of grams of carbon-15 remaining after t seconds. After how much time will there be 500 grams of carbon-15 remaining? Round your answer to the *nearest tenth of a second*.

11. Jessica deposits $2000 into a bank account where 4% interest is given every 2.4 years. To the *nearest tenth of a year*, how long will it take for Jessica's investment to reach $5000?

12. The value of a stock doubles every 12 days. If the initial value of the stock was $1500, how many full days will it take the stock to increase by 60%?

13. Christopher and Nolan are both preparing for the Nassau County Spelling Bee. There are a total of 5000 words that they are responsible for knowing how to spell. Currently, Christopher knows 1200 words and Nolan knows 1000 words. Every 4 days, Christopher will learn 20% of the remaining words. Every 6 days, Nolan will learn 25% of the remaining words.
Create two functions to represent how many words Christopher and Nolan will be able to spell after *d* days. After how many days will they be able to spell the same nmber of words rounded to the nearest day.

14. A radioactive substance has a mass of 140 g at 3 p.m. and 100 g at 8 p.m. Write an equation in the form $A = A_0\left(\frac{1}{2}\right)^{\frac{t}{h}}$ that models this situation, where *h* is the constant representing the number of hours in the half-life, A_0 is the initial mass, and *A* is the mass *t* hours after 3 p.m. Using this equation, solve for *h*, to the *nearest ten thousandth*. Determine when the mass of the radioactive substance will be 40 g. Round your answer to the *nearest tenth of an hour*.