Secondary Math III   Name_____
Applications of Exponential/Logarithmic Functions   Period_____
Assignment 10.5

Compound Interest Formulas: $A = P\left(1+\dfrac{r}{n}\right)^{nt}$ $A = Pe^{rt}$

Must show set up of formulas and all work for each problem.

1. Alden invested $600 in a savings account at 5% interest compounded continuously. How many years will it take for the amount in the account to grow to $770? Round to 2 decimal places.

2. An investing group has $50,000 to invest. They put the money into an account that compounds monthly at a rate of 6%. How much money will the group have at the end of 10 years?

3. Six years ago, Manuel invested $10,000 in an account with continuous compound interest. If he has $12,000 in the account now, what is the interest rate of the account? Write answer as a percent.

4. Interest is compounded quarterly at Money Bank at a rate of 4.4%. Jay Westerley opens an account with $7200. How much money will be in the account at the end of six years?

5. Aubrey needs to save $10000 for her first year of college. She plans on depositing $5000 into an account that pays 4% compounded continuously. If she is attending college in 4 years, will she have enough to pay for it? If not how much will she be short?

6. Sasha wants to earn the maximum interest on her money. She deposits $500 in two different banks for 1 year to compare them before she deposits all her money. One bank compounds interest daily at 2.2% interest and another bank compounds interest quarterly at 4.3%. Determine how much money she will have at the end of the year in each account.

For problems 7-9, use the exponential model $y = Ce^{kt}$

7. The population of Beijing, China in 2012 was approximately 20,690,000 and is growing exponentially at a rate of about 5.5%. The equation that models this growth is $y = 20690000e^{0.055t}$, where $t = 0$ corresponds to 2012. What population could be predicted for the year 2020?

8. Carbon-14 is a radioactive isotope with half-life of about 5710 years. It is used in carbon dating to find the age of once-living materials containing carbon (bones, wood, etc).
   a. Calculate the decay constant (k) for Carbon-14. Round to 7 decimal places

   b. Write an exponential function modeling Carbon-14 decay.

   c. Calculate the amount of 6 grams of Carbon-14 that will remain after 22,000 years. (Round to one decimal place.)

   d. Determine the age of a bone fragment that contains 30% of the original amount of Carbon-14. (Round to the nearest year.)

9. Radium-226 is a radioactive isotope with a half-life of about 1622 years. Calculate the decay constant (k) for Radium-226 and round it to 7 decimal places. Then find the amount of 20 grams of Radium-226 remaining after 500 years and round it to 1 decimal place.

10. Find the magnitude R of the following earthquakes of intensity I. Round to 1 decimal place. (Remember: $R = \log I$)
    a. $I = 39,811,000$

    b. $I = 12,589,000$

    c. $I = 251,200$

11. Determine the intensity of an earthquake of magnitude 6.3. Round answer to the nearest joule. (Remember: $R = \log I$)

12. A grape has a pH of 3.5 and a lemon juice solution has a pH of 4.6. Find the hydrogen ion concentration of both. Round to 7 decimal places. (Remember: $pH = -\log x$)