**Creating and Solving Exponential Equations Using Logarithms**

1. The number of students infected with the flu doubles every 3 days at Clayton High School. If 1 student is initially infected, write an equation to find the total number of infected students, y, after x days.
   1. Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. How many sick students will there be after 15 days? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. If there are 1,500 students at CHS, to the nearest thousandth, how many days will it take for every student to catch the flu? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The half-life of radioactive uranium is 14 days. If a sample of the uranium exists with 450 grams, how much of the substance will remain after x days?
   1. Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. How much of the substance remains after 30 days? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. To the nearest tenth, how many days will have passed if 90 grams remains? \_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. The NCAA basketball tournament consists of 64 teams with half of the teams being eliminated each round (much like a half-life). Write an equation to find the number of teams remaining after x rounds.
   1. Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. How teams are left after 3 rounds? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. If 1 team is left, how many rounds have passed? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. The number of bacteria in a petri dish doubles every 4 hours. Write an equation to model the total number of bacteria in the dish after x hours if there are 50 bacteria to stat.
   1. Equation: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. How many bacteria will be in the dish after 20 hours? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. To the nearest hundredth, how many hours have passed when 6000 bacteria are present? \_\_\_\_\_
5. The equation represents the population of a town in North Dakota x year after 2000.
   * 1. Does the equation represent growth or decay? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     2. What was the town’s population in 2000? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     3. By what percent is the function increasing/decreasing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
     4. Find the town’s population in 2015: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. The function represents the population of the state of Alaska x years after 2010.
   1. Does the equation represent growth or decay? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   2. What was the state’s population in 2010? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   3. By what percent is the function increasing/decreasing? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
   4. Find the state’s population in 2018: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
7. A botanist predicts that the height of a certain tree will increase by 2% every year. The height of the tree is now 50 feet.
8. Write an equation to model the growth of the tree over time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
9. Find the height of the tree, to the nearest tenth, 6 years from now: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
10. How long will it take for the trees height to double? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
11. Albert invested $2,500 into an account that earns 4.5% compound annually.
12. Write an equation to model the amount in Albert’s account over time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
13. How much money will Albert have in his account after 4 years? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
14. When will Albert’s account reach $4,000? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
15. According to a 2016 census, Utah is the country’s fastest growing state with a current population of 3 million increasing at a rate of 3% annually.
16. Write an equation to model the growth of Utah’s population over time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
17. Find the population of Utah in ten years: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
18. When will the population of Utah double if the growth rate continues? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
19. Giant Pandas are considered a highly endangered species with only about 2,000 giant pandas left in the wild in 2000. Despite conservation efforts, their population continues to decreases by roughly 1.5% each year.
20. Write an equation to model the giant panda’s population over time: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
21. If this decline continues, how many giant pandas will remain in 20 years? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
22. When will the population of Giant Pandas reach ½ of their 2000 population: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_