**Algebra II Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_**

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| **Unit: 5** | **Homework**: 4 |
| **Standard**: **Analyze functions using different representations**  **MGSE9‐12.F.IF.8 Write a function defined by an expression in different but equivalent forms to reveal and explain different properties of the function. (Limit to exponential and logarithmic functions.)**  **MGSE9‐12.F.IF.8b Use the properties of exponents to interpret expressions for exponential functions. (Limit to exponential and logarithmic functions.)** | |
| **Essential Questions:** How can equations describe growth and decay situations? | |
| **Key Words**: **exponential function, logarithmic function, inverse function, logarithm , base, asymptote, exponential growth, exponential decay** | |
| **Bacteria in the Swimming Pool**  **Introduction: This is a problem that models exponential growth. It is solved using a numerical approach and a graphical approach.** | |
| 1. The bacteria count in a heated swimming pool is 1500 bacteria per cubic centimeter on Monday morning at 8 AM, and the count doubles each day thereafter.  What bacteria count can you expect on Wednesday at 8 AM? | |
| 2. Complete the table: | |
| 3. Suppose we want to know the expected bacteria count at 2 PM Thursday, 3.25 days after the initial count. Use the values in your table to estimate the number of bacteria. Explain your thinking. | |
| 4. To answer this question more precisely, it would be helpful if we can write a function for the number of bacteria count in terms of the number of days since Monday at 8 AM. To do this, it is helpful to look for a pattern. However, if you calculated the bacteria count for each number of day in the table, then the process you used to get the number is probably hard to see. Instead, consider writing the number of bacteria for each number of days in terms of 1500, the initial bacteria count.  Ask yourself: If you began with 1500 bacteria, how do you get the number of bacteria after 1 day? 1500∙2. Then the number after 2 days is found by doubling the number of bacteria after day 1: (1500∙2)∙2. Complete the pattern using the table. | |
| 5. Use the pattern from Problem 4 to write a function P that represents the number of bacteria per cc after t days. (Be sure your function gives you the same data you wrote in the table of Problem 2.) | |
| 6. How can you use the function to determine the number of bacteria present after 3.25 days? | |
| 7. If nothing is done and the bacteria continue to double, how long will it take for the count to reach 3 million bacteria? Write an equation to represent this situation. Find at least 2 different ways to solve the equation. | |