Comparing Linear and Exponential Functions

Name: _____ Date: _____

1. Consider the following:
   - **Option 1**: You can be paid $20 an hour for 20 hours of work.
   - **Option 2**: You can get $1 the first hour, $2 the second hour, $4 the third hour, and $8 the fourth hour. Your hourly rate would continue to double every hour. You are working 20 hours.

   a. Write an explicit formula for each option.

   b. Which option would you choose, and why?

   c. If you only worked 10 hours would your answer be the same? Why?

---

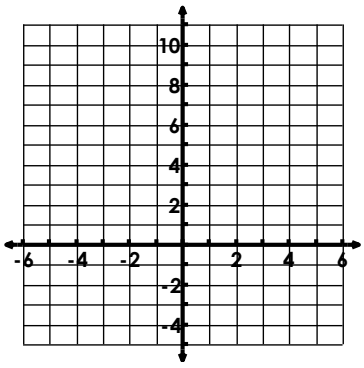
2. **Question**: Which function increases faster, $f(x) = 4x - 5$ or $g(x) = 4^x - 5$?

   a. Make a table of values to help you decide the answer. Find the rate of change of different intervals to help you decide.

x	f(x) = 4x - 5
-3	
-2	
-1	
0	
1	
2	
3	

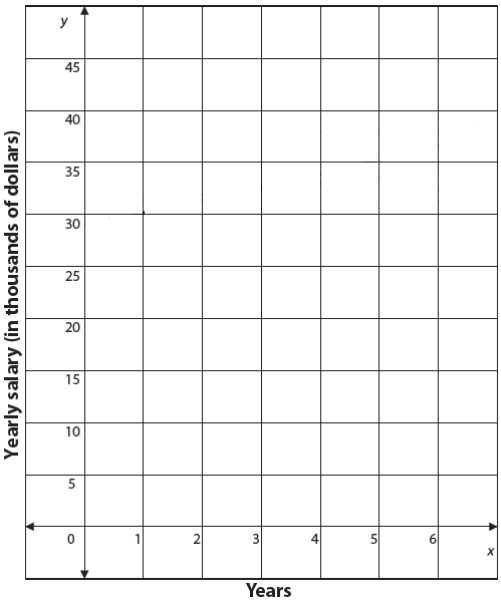
x	g(x) = 4^x - 5
-3	
-2	
-1	
0	
1	
2	
3	

   b. Make a graph to confirm your answer that you put in 2a.



Adapted from: Walch Education Resources: CCGPS Coordinate Algebra Teacher Resource Binder

3. Lena has been offered a job with two salary options. The first option is modeled by the function f(x) = 500x + 31,000, where f(x) is her salary in dollars after x years. The second option is represented by the function g(x) = 29,000(1.04)^x, where g(x) is her salary in dollars after x years. If Lena is hoping to keep this position for at least 5 years, which salary option should she choose? Support your answer with a graph and by finding the rate of change over the first 5 years.



---

4. The function f(x) represents the amount of air remaining in an exercise ball that originally had 4,500 cubic inches of air and is losing 6% of its air every minute, x. So, the function f(x) = 4,500(0.94)^x represents the remaining air in this ball. The function g(x) = 4500(0.97)^x represents the amount of air remaining in a second exercise ball.

   Which of the following statements is true about the functions f(x) and g(x)?
   a. The function f(x) has a greater rate of change than the function g(x) over the interval [2, 5].
   b. The function g(x) has a greater rate of change than the function f(x) over the interval [2, 5].
   c. The rates of change for both f(x) and g(x) are equal over the interval [2, 5].
   d. The rates of change cannot be determined.