

Name: _____

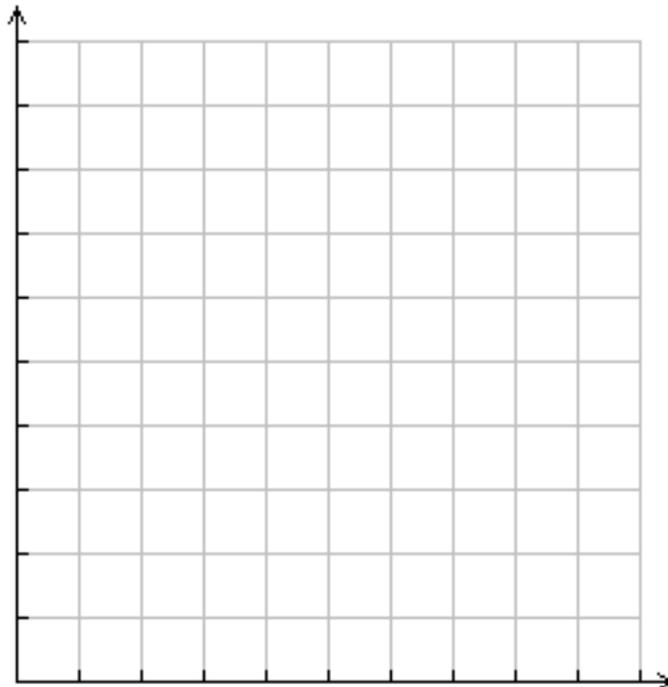
Exponential and Logarithmic Functions

Situation 1: The total area of the world's tropical rainforests has been declining at a rate of approximately 8% every ten years. Put another way, 92% of the total area of rainforests will be retained 10 years from now. For illustration, consider a 10000 square kilometer area of rainforest. (Source: World Resources Institute)

1. Assume that the given trend will continue. Fill in the following table to see how much of this rainforest will remain in 90 years.

<i>Years in the future</i>	<i>Forest acreage (km²)</i>
0	10000
10	
20	
30	
40	
50	
60	
70	
80	
90	
100	

2. Plot the points in the table above, using the number of years in the horizontal axis and the total acreage in the vertical axis. What do you observe?



Situation 2: In 1990, the residential energy use in the US was responsible for 962 million metric tons of carbon dioxide emissions. By the year 2000, that number had risen to 1182 million metric tons. The following function models carbon dioxide emissions, where C is the number of million metric tons of carbon dioxide and t is years since 1990.

$$C = 962(10)^{0.0089t}$$

7. If the emissions grow exponentially and continue at the same rate, what will the emissions grow to by 2050?

8. When will the emissions grow to 3000 million metric tons? (*Hint: Use a logarithm to find the answer.*)

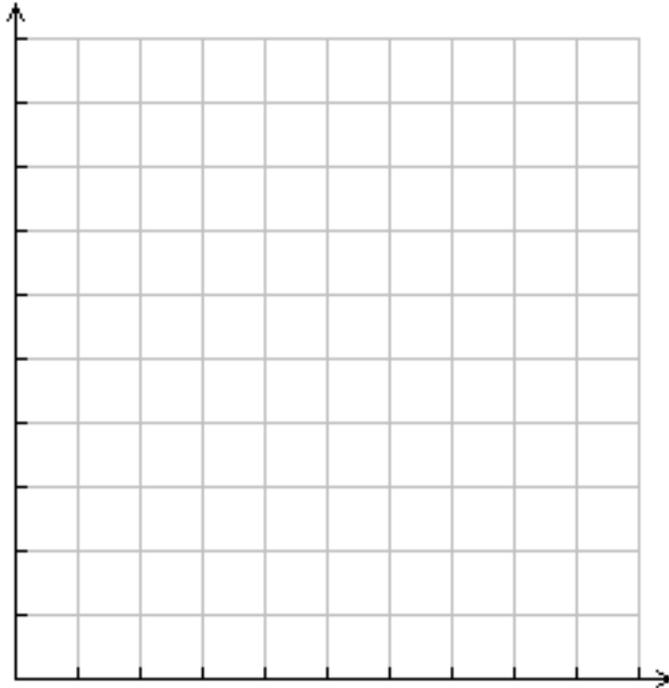
9. Suppose through conservation methods and strict regulations placed on power plants we could slow down the growth of these emissions. The new function modeling the emissions would be as follows.

$$C = 962(10)^{0.0049t}$$

How much would this **reduce** the carbon dioxide emissions in 2020?

Situation 3: Suppose that you have a bowl of 500 M&Ms and each day you eat $\frac{1}{4}$ of the M&Ms you still have.

10. Plot the number of candies remaining in the bowl after 1 day, 2 days, 3 days, etc.



11. Is the number of candies remaining changing linearly or exponentially? How do you know?

12. Write an equation to model the number of candies remaining after t days.

13. Write a paragraph describing what you learned about modeling real world phenomena. What do the data and the mathematical models you worked with in class tell you about the rate at which our rainforests are disappearing or carbon dioxide emissions are growing?