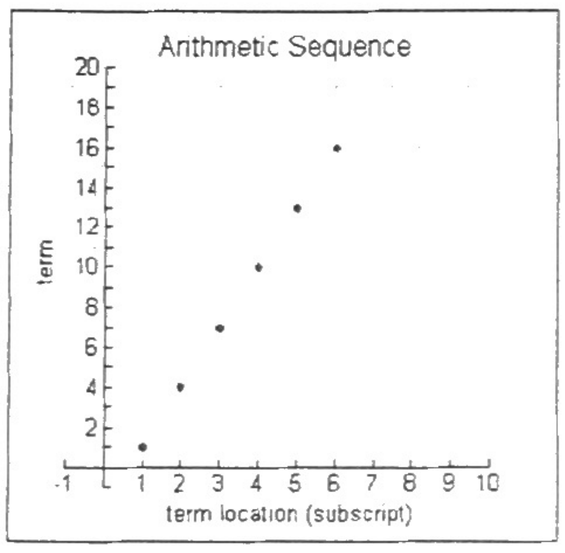
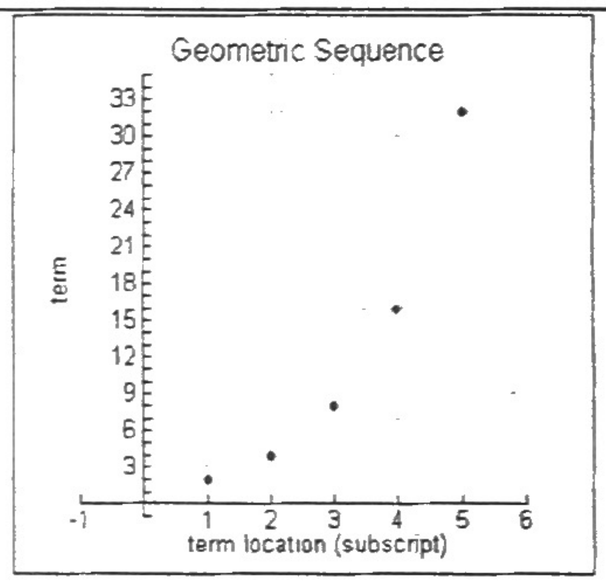
AMDM Day 7 Linear vs. Exponential Name Key

	Linear	Exponential
Vocabulary	Common Difference(d): difference between terms (add or subtract)	Common Ratio(r): successive ratio (multiply)
Explicit Formula:	$a_n = dn + a_0$	$a_n = a_0(r)^n$
Recursive Formula: (Must have two parts)	$a_0 =$ — $a_n = a_{n-1} + d$	$a_0 =$ — $a_n = r(a_{n-1})$
Graph		
Example 1:	a) Write the explicit and recursive rule for the following sequence: 3, 10, 17, 24, .. $a_0 = -4$, $a_n = 7n - 4$ $a_0 = -4$, $a_n = a_{n-1} + 7$ b) Find the 29th term $a_{29} = 7(29) + 4 = 207$	a) Write the explicit and recursive rule for the following sequence: $a_0 = 5400$, 1800, 600, 200, … $a_n = \frac{1}{3}(a_{n-1})$ $a_n = 5400(\frac{1}{3})^n$ b) Find the 14th term $a_{14} = 5400(\frac{1}{3})^{14} = 0.001$
Example 2:	Write the explicit and recursive rule for the following table. $a_n = -2n + 2$ $a_0 = 12$, $a_n = a_{n-1} - 2$	Write the explicit and recursive rule for the following table. $a_n = 90(\frac{1}{3})^n$ $a_0 = 90$, $a_n = \frac{1}{3}(a_{n-1})$

x	y
0	12
1	10
2	8
3	6

x	y
0	90
1	30
2	10
3	$\frac{10}{3}$

AMDM Day 7 Linear vs. Exponential
SAS Activity Sheet 4

Name _____

1.10 (increasing)

Derrick is trying to save money for the down payment on a used car. His parents have said that, in an effort to help him put aside money, they will pay him 10% interest on the money Derrick accumulates each month. At the moment, he has saved $200.

n = # months, d = $ saved

1. Suppose Derrick does not add any money to the savings. Write a recursive rule and an explicit function rule that model the money Derrick will accumulate with only the addition of the interest his parents pay.

Recursive Rule: $d_n = (d_{n+1})(1.10)$, $d_0 = 200$

Explicit Rule: $d_n = 200(1.10)^n$

2. How long will it take Derrick to save at least $2,000 for the down payment if the only additions to his savings account are his parents' interest payments?

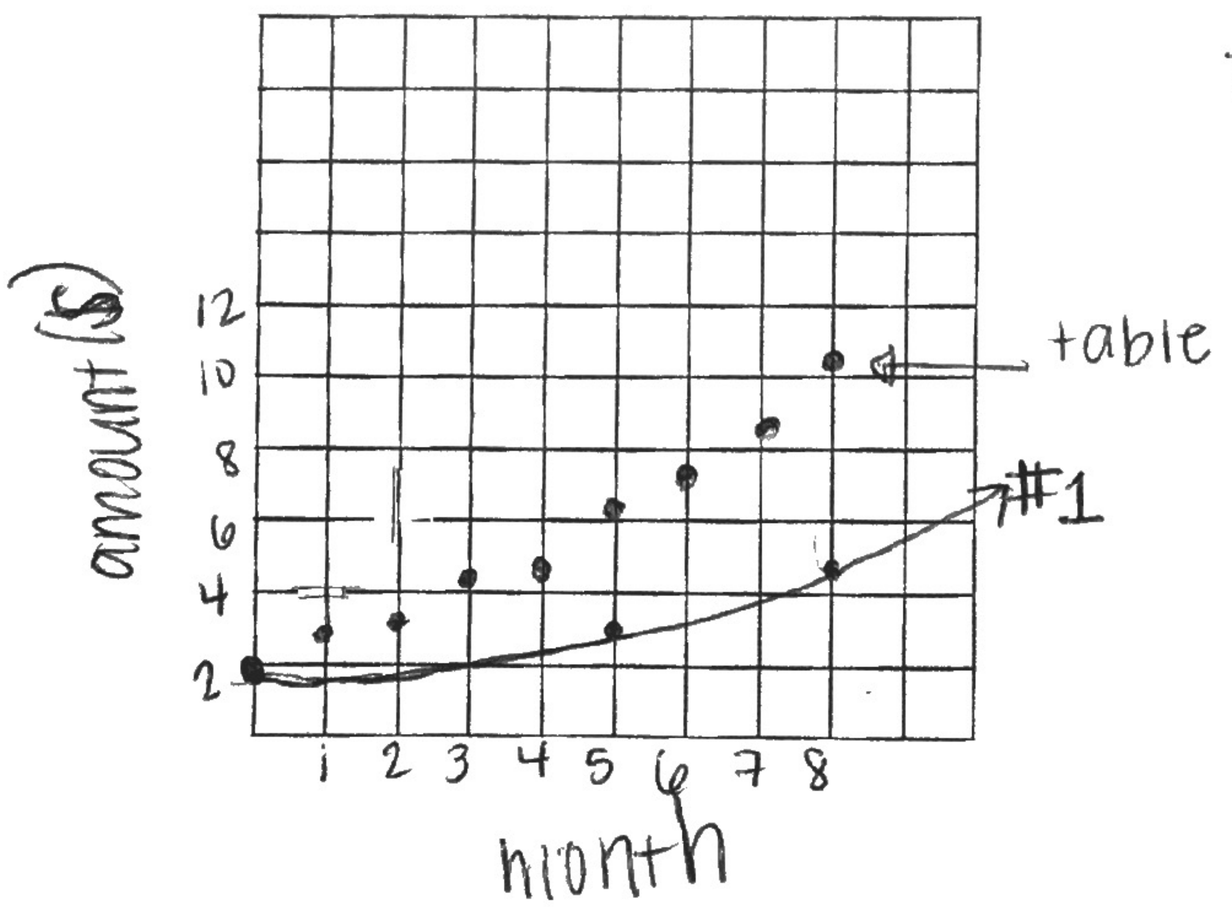
$2000 = 200(1.10)^n$ → plug into table in calculator to solve

$n = 25$ months (about)

3. In an effort to speed up the time needed to save $2,000, Derrick decides to take on some jobs in his community. Suppose he commits to adding $50 per month to his savings, starting with the initial deposit from his parents. Fill in the table, showing the amount of money Derrick will have over several months.

Months	Process	Dollars
0		200
1	$200(1.10) + 50$	270
2	$270(1.10)^2 + 50$	347
3	$347(1.10) + 50$	431.7
4	$431.7(1.10) + 50$	524.87
5	$524.87(1.10) + 50$	627.36
6	$627.36(1.10) + 50$	740.09
7	$740.09(1.10) + 50$	864.10
8	$864.10(1.10) + 50$	1000.51

4. Make a scatterplot of the data you generated in the table and compare the scatterplot to the function rule you found for Question 1. How does adding $50 per month to Derrick's savings change the way in which his money grows?



Adding $50/month greatly affects the overall time needed to save $2,000. This allows $ to increase at a faster rate.