

Notes: T3-46 Linear vs. Exponential

Bill received a letter from his Aunt Mabel.

Dear Bill,

Today is my 55th birthday. I have decided to give away some of my money each year to my relatives. You may choose from one of the following options:

1. \$100 now, \$90 next year, then \$80 the year after that, and so on.
2. \$10 now, \$20 next year, then \$30 the year after that and so on.
3. \$1 now, \$2 next year, \$4 the year after that, and so on, doubling each year.

You will only receive money until I retire. Write to me soon and tell me how you want your money.

With love, Aunt Mabel

1. Bill starts to figure out how much he will receive from the first five payments of each of these three options. Fill in the table below to show each option.

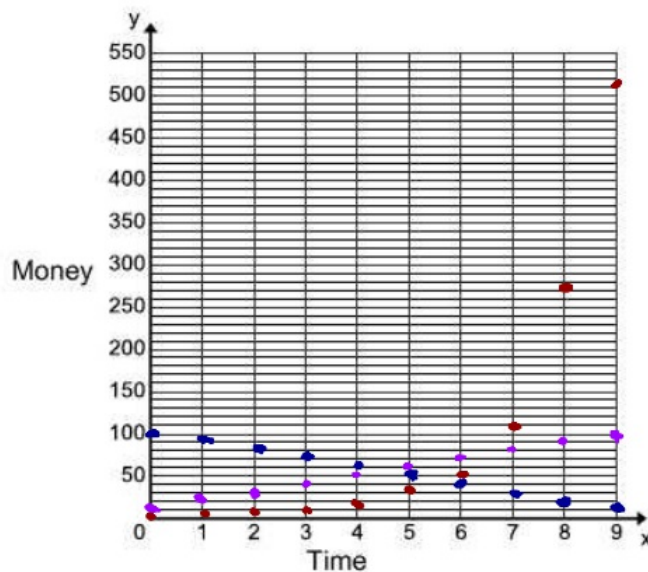
Aunt Mabel's Age	55	56	57	58	59	Total of 5 Payments
Option 1	\$100	\$90	\$80	\$70	\$60	\$400
Option 2	\$10	\$20	\$30	\$40	\$50	\$150
Option 3	\$1	\$2	\$4	\$8	\$16	\$31

2. Based on the first five payments, which option do you think Bill should choose? Why?

Option #1, \$400

3. Bill thinks that his Aunt Mabel is unlikely to retire until she is at least 65 years old. Fill in the table to show the amount of money Bill will get. Then create a graph to show the 3 different options.

Time	0	1	2	3	4	5	6	7	8	9
Option 1	\$100	\$90	\$80	70	60	50	40	30	20	10
Option 2	\$10	\$20	\$30	40	50	60	70	80	90	100
Option 3	\$1	\$2	\$4	8	16	32	64	128	256	512



Linear vs. Exponential

	Linear	Exponential																								
Context	You owe your sister 5 dollars to your sister . She makes a deal to let you earn 2 dollars for each time you do her dishes.	You tweet that you have the best math teacher ever. Each day the number of likes you get on your tweet doubles.																								
Table	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-5</td> </tr> <tr> <td>1</td> <td>-3</td> </tr> <tr> <td>2</td> <td>-1</td> </tr> <tr> <td>3</td> <td>1</td> </tr> <tr> <td>4</td> <td>3</td> </tr> </tbody> </table>	x	y	0	-5	1	-3	2	-1	3	1	4	3	<table border="1"> <thead> <tr> <th>x</th> <th>y</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>1</td> </tr> <tr> <td>1</td> <td>2</td> </tr> <tr> <td>2</td> <td>4</td> </tr> <tr> <td>3</td> <td>8</td> </tr> <tr> <td>4</td> <td>16</td> </tr> </tbody> </table>	x	y	0	1	1	2	2	4	3	8	4	16
x	y																									
0	-5																									
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Graph																										

Decide if each context, table, or graph is linear or exponential. — factor

1.

You have a 20 dollars iTunes gift card. You decide to buy some songs for 1 dollar per song.

Linear
 $m = \$1/\text{song}$

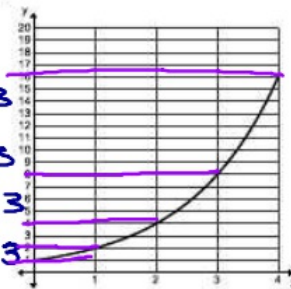
2.

$\Delta x = m \cdot \Delta t$
 $\Delta x = m \cdot \Delta t$
 showing Δt change

x	y
0	1
1	3
2	9
3	27
Exp.	81

Factor 3

3.



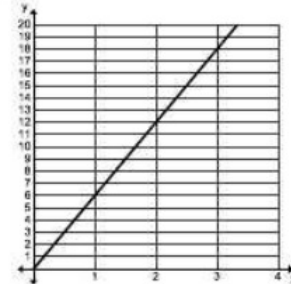
4.

x	y
0	8
1	13
2	18
3	23
4	28

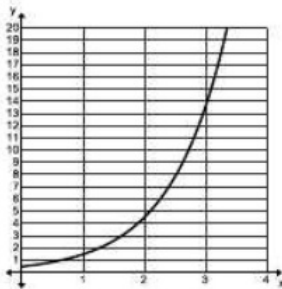
5.

You wake up with 2 chicken pox and each day the number of chicken pox you have triples.

6.



7.



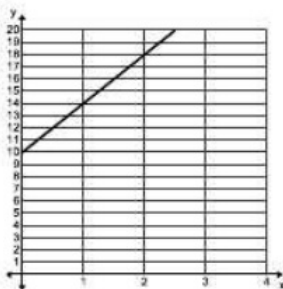
8.

You buy 3 dozen donuts and each day your family eats half of them until they are gone.

9.

x	y
0	20
1	24
2	28
3	32
4	36

10.



11.

x	y
0	4
1	20
2	100
3	500
4	2,500

12.

Your cell phone plan is 20 dollars a month plus 10 cents for each minute over your allowance.

13. The BioHealth Company is trying to eliminate the flu. In their research they have come across 2 different strands of the flu. The first strand attacks cells at a rate of 50 cells per hour. The second strand attacks cells at a rate that triples every hour. Complete the table and graph for each strand of the flu.

Strand A

Time (hours)	Cells
0	0
1	50
2	
3	
4	
5	
6	
7	
8	
9	
10	

Strand B

Time (hours)	Cells
0	1
1	3
2	
3	
4	
5	
6	
7	
8	
9	
10	

