Chapter 1: Patterns Notes

Objectives:

- 1. How to identify if a pattern represents a linear, quadratic, or exponential function.
- 2. How to identify if a graph represents a linear, quadratic, or exponential function.
- 3. How to write a function for a pattern.

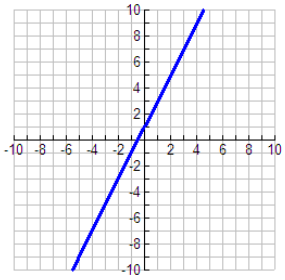
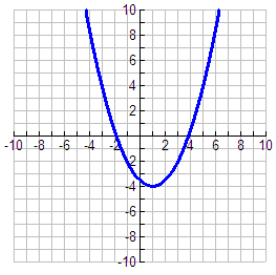
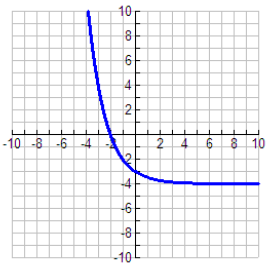
Identifying from an equation:

Linear	Quadratic	Exponential
Has an x with no exponent. $y = 5x + 1$ $y = \frac{1}{2}x$ $2x + 3y = 6$	Has an x^2 in the equation. $y = 2x^2 + 3x - 5$ $y = x^2 + 9$ $x^2 + 4y = 7$	Has an x as the exponent. $y = 3^x + 1$ $y = 5^{2x}$ $4^x + y = 13$

Examples: Are the following LINEAR, QUADRATIC or EXPONENTIAL?

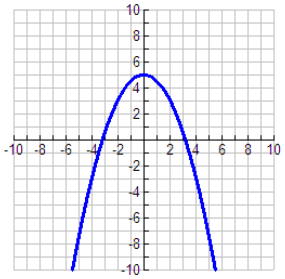
1. $y = 6^x + 3$ _____
2. $y = 7x^2 + 5x - 2$ _____
3. $9x + 3 = y$ _____
4. $4^{2x} = 8 + y$ _____

Identifying from a graph:

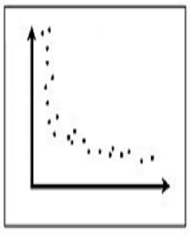
Linear	Quadratic	Exponential
Makes a straight line 	Makes a parabola 	Rises or falls quickly in one direction 

Examples: Are the following LINEAR, QUADRATIC, or EXPONENTIAL?

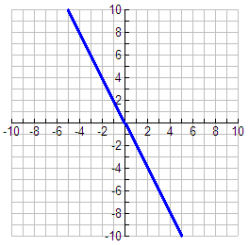
A.



B.



C.



_____ _____ _____

Identifying functions from a table and write the functions.

Linear	Quadratic	Exponential
• Never see the same *y* value twice. • 1st difference is the same	• See same *y* more than once. • 2nd difference is the same	• Common multiplication pattern in the *y* • Never see the same *y* value twice.
x | y -1 | -1 0 | 1 1 | 3 2 | 5	x | y -2 | 1 -1 | 0 0 | 1 1 | 4 2 | 9	x | y 0 | 1 1 | 2 2 | 4 3 | 8 4 | 16
Write the function for the table.	**Write the function for the table.**	**Write the function for the table.**

Name _____ Period _____ Date _____

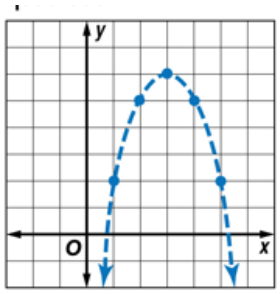
Practice Identifying Linear, Quadratic, and Exponential functions.

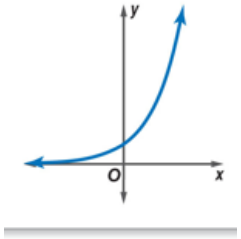
Are the following equations Linear, Quadratic, or Exponential?

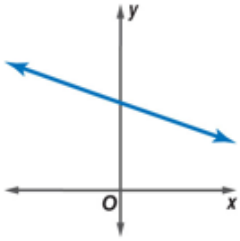
1. A. $2x+3y=10$ _____
   B. $(x-2)(x+4)=10$ _____
   C. $y=3^x+4$ _____

Are the following graphs Linear, Quadratic, or Exponential?

2. A. B. C.







A. _____ B. _____ C. _____

3. **Are the tables linear, quadratic or exponential? Write the equations.**

A.

x	y
1	5
2	9
3	13
4	17
5	21

B.

x	y
1	0
2	-1
3	0
4	3
5	8

C.

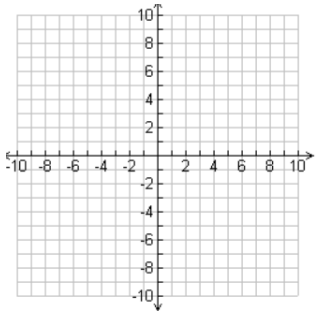
x	y
1	3
2	9
3	27
4	81
5	243

A. _____ B. _____ C. _____

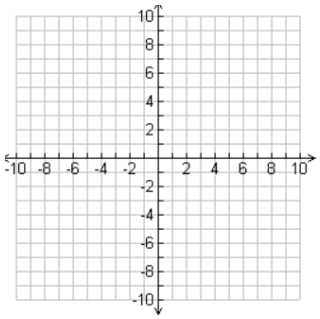
A. _____ B. _____ C. _____

4. Graph the ordered pairs. Determine whether the ordered pairs represent a *linear*, *quadratic*, or *exponential* function. **Write the equations**.

A. (-1, 0), (0, -3), (1, -4), (2, -3), (3,0)



B. (-2, .75), (-1, 1.5), (0, 3), (1, 6), (2, 12)



Write equations for Linear, quadratic, and exponential using tables.

5. KARATE: The table shows the number of children enrolled in a beginner's karate class for four consecutive years. Determine which model best represents the data. Then write a function that models that data.

Time (years)	0	1	2	3	4
Number Enrolled	8	11	14	17	20

Type of Function _____

Write the Function_____

6. WILDLIFE: The table shows the growth of prairie dogs in a colony over the years. Determine which model best represents the data. Then write a function that models the data.

Time (years)	0	1	2	3	4
Prarie Dogs	4	8	16	32	64

Type of Function _____

Write the Function_____

7. **Identify functions using differences or ratios. Then, write the equation.**

X	-2	-1	0	1	2
Y	-2	1	4	7	10

Type of Function _____

Write the Function_____

8. **Tell whether the table of values represents a *linear function*, an *exponential function*, or a *quadratic function*. Then, find the equation.**

X	-2	-1	0	1	2
Y	.08	.4	2	10	50

Type of Function _____

Write the Function_____

5. Consider the three scenarios given. Match each with the corresponding function, graph, and table.

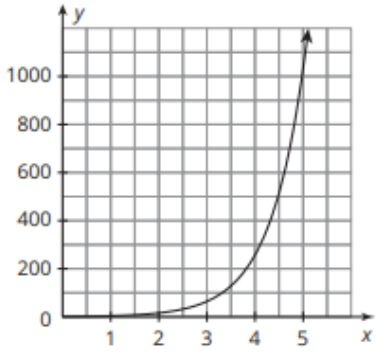
a. Juanita is driving home from her vacation spot at a constant rate. Which function, graph, and table represent her distance from home as a function of the number of hours she has traveled? Explain your reasoning.

b. A mechanic drops a wrench from a flying helicopter. Which function, graph, and table represent the height of the wrench above the ground as a function of the time since it was dropped? Explain your reasoning.

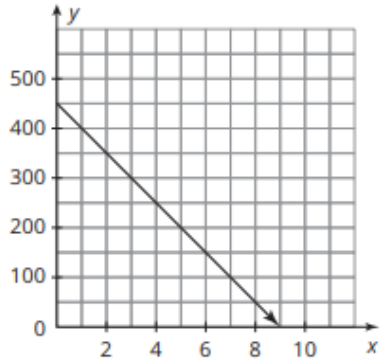
c. Scientists watch as a single cell divides into 4 cells over the course of an hour. During the next hour, each of the 4 new cells divides into 4 cells and the process continues. Which function, graph, and table represent the total number of cells as a function of time? Explain your reasoning.

$f(x) = -16x^2 + 1900$ $g(x) = 4^x$ $h(x) = -50x + 450$

Graph 1



Graph 2



Graph 3

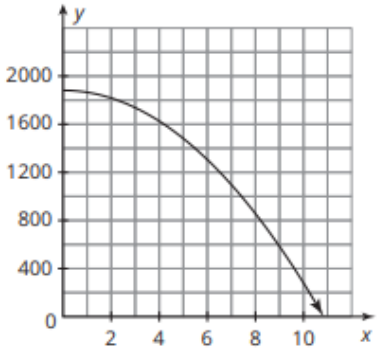


Table 1

x	y
0	1
1	4
2	16
3	64
4	256

Table 2

x	y
0	1900
2	1836
4	1644
6	1324
8	876

Table 3

x	y
0	450
2	350
4	250
6	150
8	50

a. Function _____ b. Function _____ c. Function _____

Graph _____ Graph _____ Graph _____

Table _____ Table _____ Table _____