Comparing Types of Functions

Investigation

GOAL: Classify functions as *linear, exponential growth or decay,* or *quadratic*, by looking at their equations, graphs or tables.

<u>INTRODUCTION</u>: In this activity you will be investigating four different types of functions by comparing their equations and their graphs. You will be learning about *linear functions, quadratic functions, exponential growth functions,* and *exponential decay functions.*

You will be asked to:

a) **Graph functions using Desmos**
b) **Compare graphs to equations to begin to recognize relationships between equations and types of graphs**
c) **Make tables and analyze the first difference, second difference and ratio of successive *y*-values to decide what type of function is represented.**

1. <u>GRAPH</u>: Use DESMOS graphing calculator to graph the following functions, one at a time. Take a screen shot of each graph and paste it under the correct equation.

a) $y = 3x + 7$ **b)** $y = 2x^2 - 4x + 3$ **c)** $y = 2^x$

d) $y = -x^2 + 3x - 1$

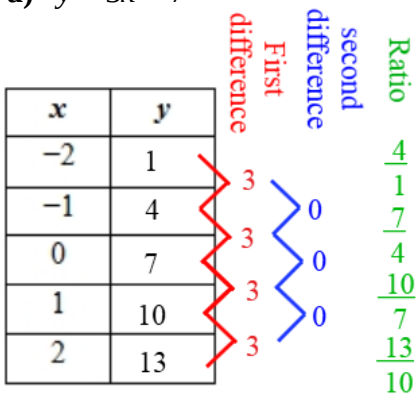
e) $y = \left(\frac{1}{2}\right)^x$

f) $y = -2x - 4$

2. <u>COMPARE</u>: Compare the graph of each function to its equation. What commonalities do you notice between the type of function and the shape of its graph?

3. <u>TABLE</u>: Create an input/output table for each of the following functions, then look at either the *first difference*, *second difference*, or *ratio*, of successive *y*-values. What do you notice about these characteristics compared to the original equation?

a) $y = 3x + 7$



b) $y = 2x^2 - 4x + 3$

x	*y*
−2	
−1	
0	
1	
2	

c) $y = 2^x$

x	*y*
−2	
−1	
0	
1	
2	

d) $y = -x^2 + 3x - 1$

x	y
−2	
−1	
0	
1	
2	

e) $y = \left(\frac{1}{2}\right)^x$

x	y
−2	
−1	
0	
1	
2	

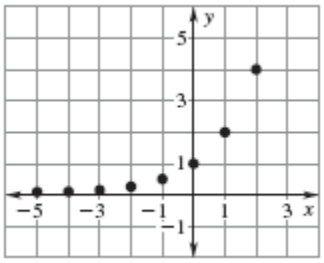
f) $y = -2x - 4$

x	y
−2	
−1	
0	
1	
2	

4. <u>ATTEMPT</u>: Use the information given below to identify each function as either *linear*, *exponential growth or exponential decay*, or *quadratic*, based on the given table, graph or function.

A) Use the given graph provided to determine if the function represented is *linear*, *quadratic*, or *exponential*.

1.



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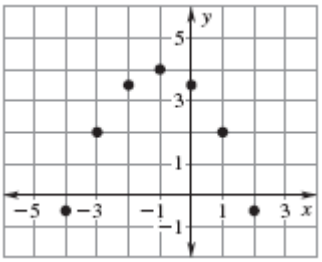

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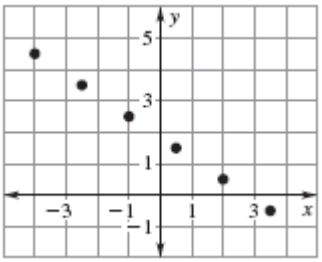

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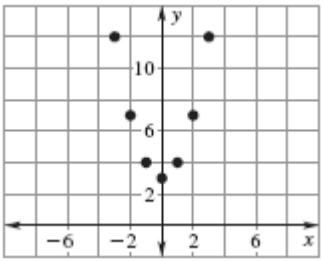

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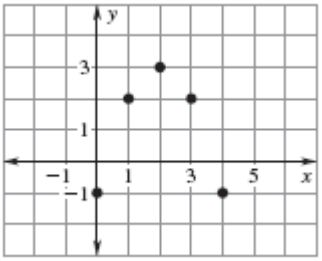

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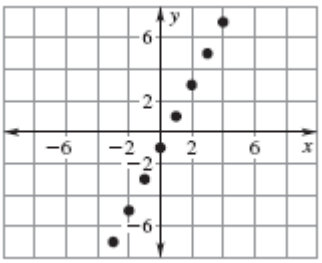
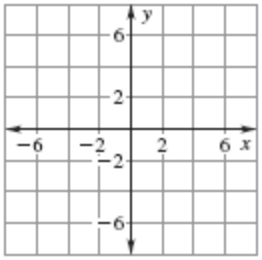
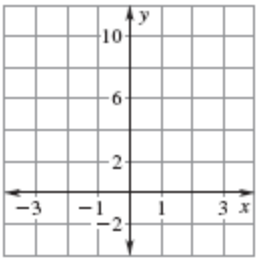


B) Graph the ordered pairs provided to determine if the function represented is *linear*, *quadratic*, or *exponential*.

7. (–4, –7), (–2, –4), (0, –1), (2, 2), (4, 5)



8. (–2, 8), (–1, 4), (0, 2), (1, 1), $\left(2, \frac{1}{2}\right)$



C) Given the table of values, use the differences or ratios to determine if the function represented is *linear*, *quadratic*, or *exponential*.

1.

x	−8	−4	0	4	8
y	−1	0	1	2	3

2.

x	−3	−2	−1	0	1
y	625	125	25	5	1

3.

x	−4	−3	−2	−1	0
y	7	4	3	4	7

4.

x	−1	0	1	2	3
y	−3	0	1	0	−3