

Chapter 6  
Exponential and Logarithmic Functions

Section 6-7  
Modeling with Exponential and Logarithmic Functions

## Classifying Data

You have analyzed *finite differences* of data with equally-spaced inputs to determine what type of polynomial function can be used to model the data. For exponential data with equally-spaced inputs, the outputs are multiplied by a constant factor. So, consecutive outputs form a constant ratio.

### EXAMPLE 1 Classifying Data Sets

Determine the type of function represented by each table.

a.

<b>x</b>	-2	-1	0	1	2	3	4
<b>y</b>	0.5	1	2	4	8	16	32


b.

<b>x</b>	-2	0	2	4	6	8	10
<b>y</b>	2	0	2	8	18	32	50

## SOLUTION

a. The inputs are equally spaced. Look for a pattern in the outputs.

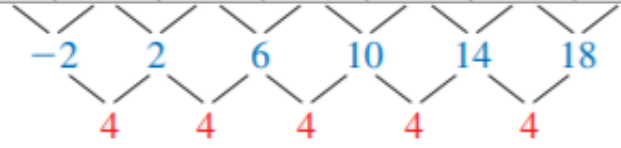
<b>x</b>	-2	-1	0	1	2	3	4
<b>y</b>	0.5	1	2	4	8	16	32



► As  $x$  increases by 1,  $y$  is multiplied by 2. So, the common ratio is 2, and the data in the table represent an exponential function.

b. The inputs are equally spaced. The outputs do not have a common ratio. So, analyze the finite differences.

<b>x</b>	-2	0	2	4	6	8	10
<b>y</b>	2	0	2	8	18	32	50



first differences  
second differences

► The second differences are constant. So, the data in the table represent a quadratic function.

## Writing Exponential Functions

You know that two points determine a line. Similarly, two points determine an exponential curve.

### **EXAMPLE 2** Writing an Exponential Function Using Two Points

Write an exponential function  $y = ab^x$  whose graph passes through (1, 6) and (3, 54).

Data do not always show an *exact* exponential relationship. When the data in a scatter plot show an *approximately* exponential relationship, you can model the data with an exponential function.

### EXAMPLE 3 Finding an Exponential Model

Year, $x$	Number of trampolines, $y$
1	12
2	16
3	25
4	36
5	50
6	67
7	96

A store sells trampolines. The table shows the numbers  $y$  of trampolines sold during the  $x$ th year that the store has been open. Write a function that models the data.

