Name ____ Date __________

6.7 Modeling with Exponential and Logarithmic Functions

For use with Exploration 6.7

Essential Question How can you recognize polynomial, exponential, and logarithmic models?

1 EXPLORATION: Recognizing Different Types of Models

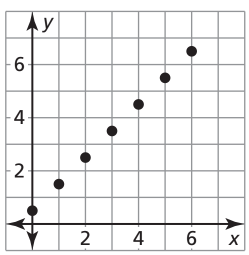
Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Match each type of model with the appropriate scatter plot. Use a regression program to find a model that fits the scatter plot.

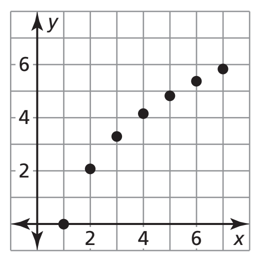
a. linear (positive slope) **b.** linear (negative slope) **c.** quadratic

d. cubic **e.** exponential **f.** logarithmic

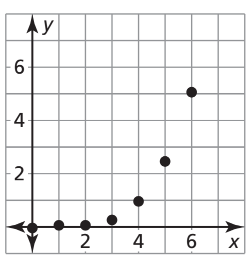
A.



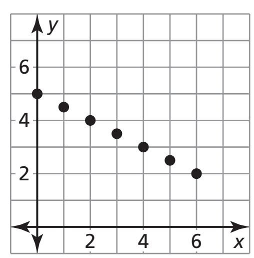
B.



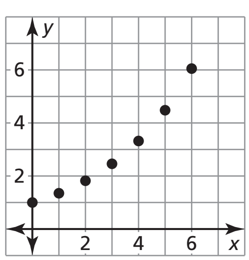
C.



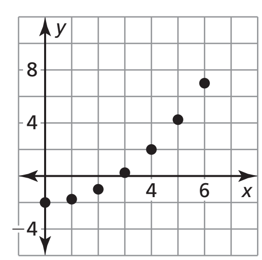
D.



E.



F.



2 EXPLORATION: Exploring Gaussian and Logistic Models

Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. Two common types of functions that are related to exponential functions are given. Use a graphing calculator to graph each function. Then determine the domain, range, intercept, and asymptote(s) of the function.

a. Gaussian Function: $f(x) = e^{-x^2}$

b. Logistic Function: $f(x) = \dfrac{1}{1 + e^{-x}}$

Communicate Your Answer

3. How can you recognize polynomial, exponential, and logarithmic models?

4. Use the Internet or some other reference to find real-life data that can be modeled using one of the types given in Exploration 1. Create a table and a scatter plot of the data. Then use a regression program to find a model that fits the data.

Name ____ Date __________

6.7 Notetaking with Vocabulary

For use after Lesson 6.7

In your own words, write the meaning of each vocabulary term.

finite differences

common ratio

point-slope form

Notes:

Extra Practice

In Exercises 1 and 2, determine the type of function represented by the table. Explain your reasoning.

1.

x	6	7	8	9	10	11
y	34	47	62	79	98	119

2.

x	-5	-3	-1	1	3	5
y	$\frac{1}{5}$	$\frac{3}{5}$	$\frac{9}{5}$	$\frac{27}{5}$	$\frac{81}{5}$	$\frac{243}{5}$

In Exercises 3–6, write an exponential function $y = ab^x$ whose graph passes through the given points.

3. $(1, 12), (3, 108)$

4. $(-1, 2), (3, 32)$

5. $(2, 9), (4, 324)$

6. $(-2, 2), (1, 0.25)$

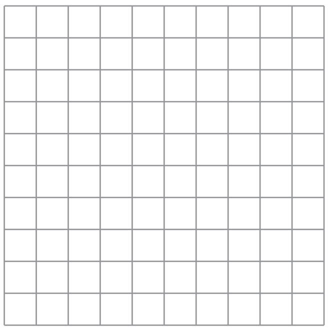
Name ____ Date __________

6.7 Notetaking with Vocabulary (continued)

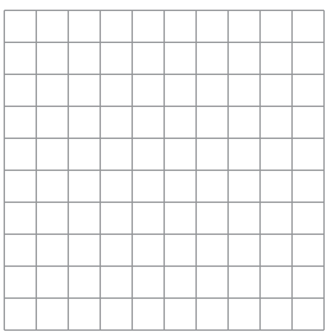
7. An Olympic swimmer starts selling a new type of goggles. The table shows the number y of goggles sold during a 6-month period.

Months, x	1	2	3	4	5	6
Goggles sold, y	28	47	64	79	97	107

a. Create a scatterplot of the data.



b. Create a scatterplot of the data pairs $(x, \ln y)$ to show that an exponential model should be a good fit for the original data pairs (x, y). Write a function that models the data.



c. Use a graphing calculator to write an exponential model for the data.

d. Use each model to predict the number of goggles sold after 1 year.