Step 4 Test two points other than (0, 120).

$y = 120 \cdot 0.84^3$ $\qquad$ $y = 120 \cdot 0.84^4$

$y \approx 71$ $\qquad$ $y \approx 60$

The point (3, 71) is close to the data point (3, 72). The predicted value (4, 60) matches the corresponding data point. The equation $y = 120 \cdot 0.84^x$ models the data.

Quick Check

3 The profits of a small company are shown in the table at the right. Let $x = 0$ correspond to the year 2000.

a. Determine which kind of function best models the data.

b. Write an equation to model the data.

Year	Profit (dollars)
0	0
1	5,000
2	20,000
3	44,000
4	79,000

EXERCISES

For more exercises, see *Extra Skill and Word Problem Practice.*

Practice and Problem Solving

A Practice by Example

Example 1 (page 597)

GO for Help

Graph each set of points. Which model is most appropriate for each set?

1. $(-2, -3), (-1, 0), (0, 1), (1, 0), (2, -3)$

2. $(-2, -8), (0, -4), (3, 2), (5, 6)$

3. $(-3, 6), (-1, 0), (0, -1), (1, -1.5)$

4. $(-2, 5), (-1, -1), (0, -3), (1, -1), (2, 5)$

5. $\left(-2, -5\frac{8}{9}\right), \left(-1, -5\frac{2}{3}\right), (0, -5), (2, 3)$

6. $(-3, 8), (-1, 6), (0, 5), (2, 3), (3, 2)$

Example 2 (page 599)

Which kind of function best models the data in each table? Write an equation to model the data.

7.

x	y
0	0
1	1.5
2	6
3	13.5
4	24

8.

x	y
0	−5
1	−3
2	−1
3	1
4	3

9.

x	y
0	0
1	2.8
2	11.2
3	25.2
4	44.8

10.

x	y
0	1
1	1.2
2	1.44
3	1.728
4	2.0736

11.

x	y
0	5
1	2
2	0.8
3	0.32
4	0.128

12.

x	y
0	2
1	1.5
2	1
3	0.5
4	0

Example 3 (page 600)

13. The table at the right shows the end-of-the-month balance in a checking account.

a. Graph the data. Does the graph suggest a linear, exponential, or quadratic model?

b. Find the differences of consecutive terms. Are they roughly the same?

c. Estimate a common difference based on your answer to part (b).

d. Write an equation to model the data.

Month	Balance (dollars)
1	58
2	123
3	187
4	251

Age (years)	Value (dollars)
0	16,500
1	14,500
2	12,750
3	11,200
4	9900

14. Car Value The value of a car over several years is shown in the table at the left.
- **a.** Determine which model is most appropriate for the data.
- **b.** Write an equation to model the data.

15. Physics Your class collected the data in the table at the right by rolling a ball down a ramp. The ramp had the same angle throughout.
- **a.** Find the differences of consecutive terms.
- **b.** Find the second differences.
- **c.** Write an equation to model the data. Let t be the time in seconds and d be the distance in centimeters.
- **d.** Based on your equation, how far would the ball have rolled down the ramp in 2.5 seconds?

Time (seconds)	Distance (centimeters)
0	0
1	41
2	164
3	370

B Apply Your Skills

16. The table below shows the projected population of a small town. Let $t = 0$ correspond to the year 2020.
- **a.** Graph the data. Does the graph suggest a linear, exponential, or quadratic model?
- **b.** What is the difference in years?
- **c.** Find the differences of consecutive terms. Divide by the difference in years to find possible common differences.
- **d.** Write a linear equation to model the data based on your answer to part (c).

Year	Population
0	5100
5	5700
10	6300
15	6900

Year	Population (millions)
0	4457
5	4855
10	5284
15	5691
20	6080

Sources: U. S. Census Bureau. Go to **www.PHSchool.com** for a data update.
Web Code: atg-9041

17. Population The table at the left shows the world population in millions from 1980 to 2000. The year $t = 0$ corresponds to 1980.
- **a.** What is the difference in years?
- **b.** Find the differences of consecutive terms. Divide by the difference in years to find possible common differences.
- **c.** Find the average of the common differences you found in part (b).
- **d.** Write a linear equation to model the data based on your answer to part (c).
- **e.** Use your equation to predict the world population in 2010.

18. Writing Explain in writing to a classmate how to decide whether a linear, exponential, or quadratic function is the most appropriate equation to model a set of data.

Use LinReg, ExpReg, or QuadReg to find an equation to model the data. The greatest value of r^2 indicates the best model for the data.

19.

x	y
0	1.7
1	1.4
2	4.7
3	7.9

20.

x	y
0	2.0
1	1.5
2	1.2
3	0.9

21.

x	y
0	2.8
1	1.4
2	2.7
3	9.8

22.

x	y
−1	4.3
0	5.1
1	4.3
2	2.2
3	1.3

23.

x	y
−1	4.6
0	3.5
1	2.4
2	1.3
3	0.2

24.

x	y
−1	0.04
0	0.10
1	0.26
2	0.68
3	1.76

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