Name_____ Date _____

1.3 Modeling with Linear Functions

For use with Exploration 1.3

Essential Question How can you use a linear function to model and analyze a real-life situation?

1 EXPLORATION: Modeling with a Linear Function

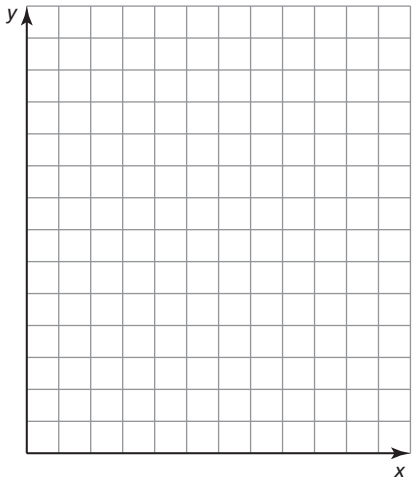
Go to *BigIdeasMath.com* for an interactive tool to investigate this exploration.

Work with a partner. A company purchases a copier for $12,000. The spreadsheet shows how the copier depreciates over an 8-year period.

	A	B
1	**Year, *t***	**Value, *V***
2	0	$12,000
3	1	$10,750
4	2	$9,500
5	3	$8,250
6	4	$7,000
7	5	$5,750
8	6	$4,500
9	7	$3,250
10	8	$2,000
11		

a. Write a linear function to represent the value V of the copier as a function of the number t of years.

b. Sketch a graph of the function. Explain why this type of depreciation is called *straight line depreciation.*



c. Interpret the slope of the graph in the context of the problem.

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2 EXPLORATION: Modeling with Linear Functions

Work with a partner. Match each description of the situation with its corresponding graph. Explain your reasoning.

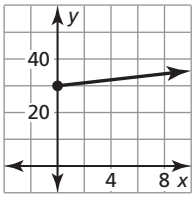
a. A person gives $20 per week to a friend to repay a $200 loan.

b. An employee receives $12.50 per hour plus $2 for each unit produced per hour.

c. A sales representative receives $30 per day for food plus $0.565 for each mile driven.

d. A computer that was purchased for $750 depreciates $100 per year.

A.



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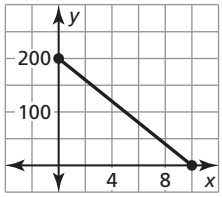

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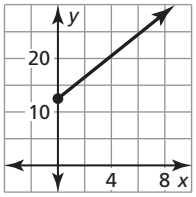

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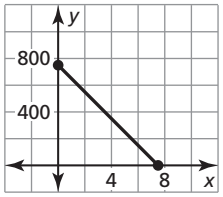


Communicate Your Answer

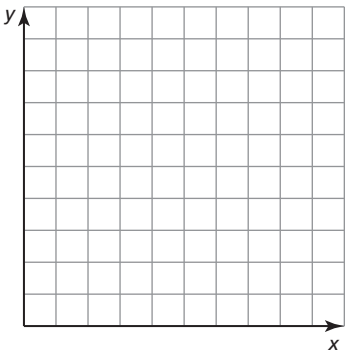
3. How can you use a linear function to model and analyze a real-life situation?

4. Use the Internet or some other reference to find a real-life example of straight line depreciation.

a. Use a spreadsheet to show the depreciation.

b. Write a function that models the depreciation.

c. Sketch a graph of the function.



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1.3 Notetaking with Vocabulary

For use after Lesson 1.3

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

line of fit

line of best fit

correlation coefficient

Core Concepts

Writing an Equation of a Line

Given slope *m* and *y*-intercept *b*

Use slope-intercept form:

$$y = mx + b$$

Given slope *m* and a point (x_1, y_1)

Use point-slope form:

$$y - y_1 = m(x - x_1)$$

Given points (x_1, y_1) and (x_2, y_2)

First use the slope formula to find m. Then use point-slope form with either given point.

Notes:

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1.3 Notetaking with Vocabulary (continued)

Finding a Line of Fit

Step 1 Create a scatter plot of the data.

Step 2 Sketch the line that most closely appears to follow the trend given by the data points. There should be about as many points above the line as below it.

Step 3 Choose two points on the line and estimate the coordinates of each point. These points do not have to be original data points.

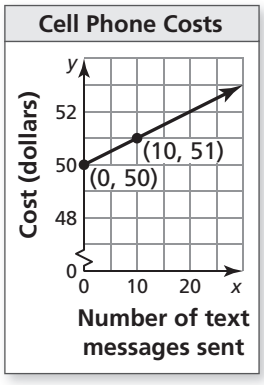
Step 4 Write an equation of the line that passes through the two points from Step 3. This equation is a model for the data.

Notes:

Extra Practice

In Exercises 1–3, use the graph to write an equation of the line and interpret the slope.

1.



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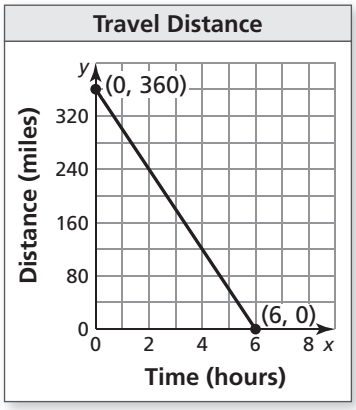

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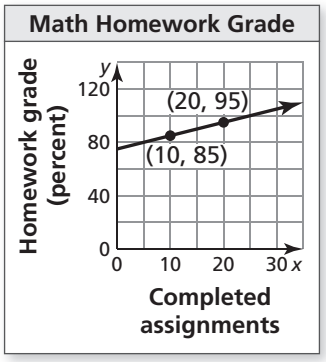

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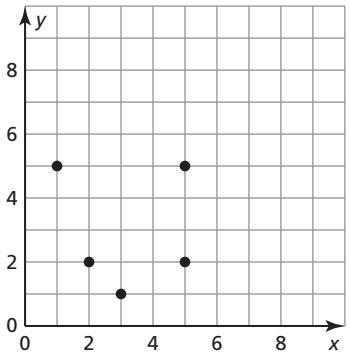
1.3 Notetaking with Vocabulary (continued)

4. The cost of parking in a parking garage in Chicago is represented by the equation $y = 15x + 20$ where y is the total cost (in dollars) and x is the time (in hours). The table shows the total cost to park in a parking garage in Denver. Which city's parking garage charges more per hour and by how much more? After how many hours would parking in both cities cost the same?

Hours, *x*	2	3	4	5
Cost, *y*	43	51	59	67

In Exercises 5–7, use the *linear regression* feature on a graphing calculator to find an equation of the line of best fit for the data. Find and interpret the correlation coefficient.

5.



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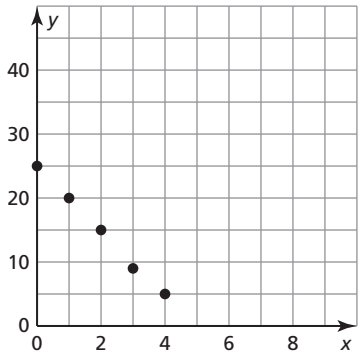

7.