2 Which equation represents the line that passes through the point (2, 3) and is parallel to the graph of $y = 2x + 1$?

A. $y = 4x + 4$

B. $y = 4x + 2$

C. $y = 2x + 2$

D. $y = 2x - 1$

☑ **5-Minute Check**   **Over Lesson 4–4**

2 **Which equation represents the line that passes through the point (2, 3) and is parallel to the graph of $y = 2x + 1$?**

A. $y = 4x + 4$

B. $y = 4x + 2$

C. $y = 2x + 2$

→ D. $y = 2x - 1$

3 **Which equation represents the line that passes through the point (1, 2) and is perpendicular to the graph of** $y = -\frac{1}{2}x - 3$**?**

A. $y = 2x$

B. $y = 2x - 3$

C. $y = \frac{1}{2}x - 3$

D. $y = \frac{1}{2}x + 3$

slope!

ConceptSummary Scatter Plots

Positive Correlation	Negative Correlation	No Correlation

Real-World Example 1 — Evaluate a Correlation

TECHNOLOGY The graph shows the average number of students per computer in Maria's school. Determine whether the graph shows a *positive correlation*, a *negative correlation*, or *no correlation*. If there is a positive or negative correlation, describe its meaning in the situation.
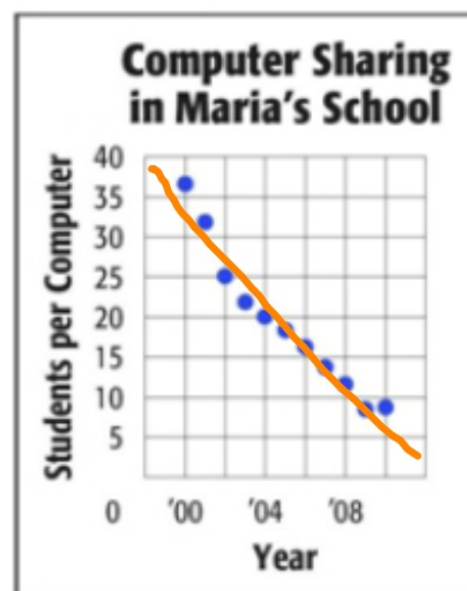

Computer Sharing in Maria's School

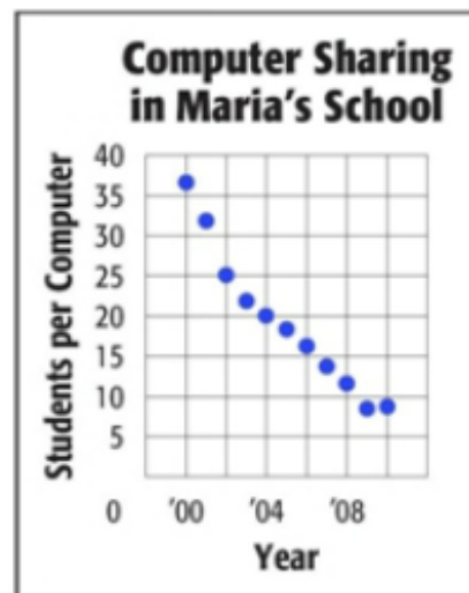**Real-World Example 1** **Evaluate a Correlation**

TECHNOLOGY The graph shows the average number of students per computer in Maria's school. Determine whether the graph shows a *positive correlation*, a *negative correlation*, or *no correlation*. If there is a positive or negative correlation, describe its meaning in the situation.

Computer Sharing in Maria's School

Students per Computer

40
35
30
25
20
15
10
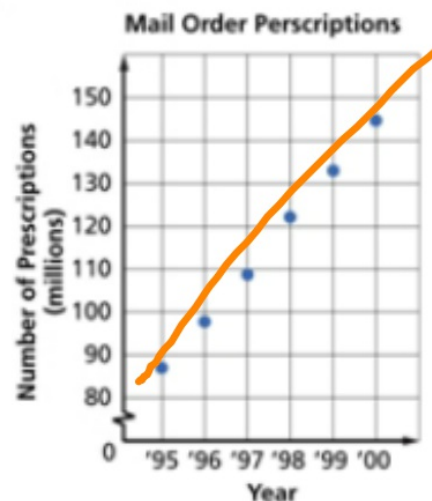5
0   '00   '04   '08

Year

Sample Answer: The graph shows a negative correlation. Each year, more computers are in Maria's school, making the students-per-computer rate smaller.

Real-World Example 1 ✓ Check Your Progress

The graph shows the number of mail-order prescriptions. Determine whether the graph shows a *positive correlation*, a *negative correlation*, or *no correlation*. If there is a positive or negative correlation, describe it.

Mail Order Perscriptions

A. Positive correlation; with each year, the number of mail-order prescriptions has increased.

B. Negative correlation; with each year, the number of mail-order prescriptions has decreased.

C. no correlation

D. cannot be determined

🌐 Real-World Example 1 | **✓ Check Your Progress**

The graph shows the number of mail-order prescriptions. Determine whether the graph shows a *positive correlation*, a *negative correlation*, or *no correlation*. If there is a positive or negative correlation, describe it.
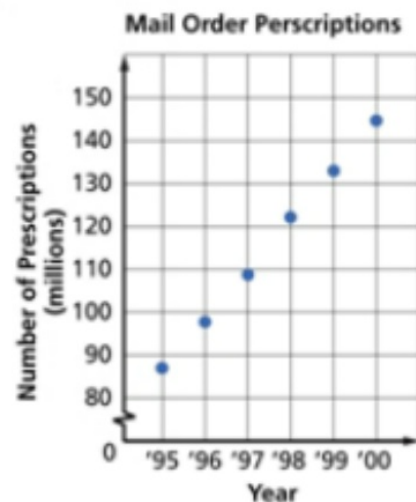
Mail Order Perscriptions

A. Positive correlation; with each year, the number of mail-order prescriptions has increased.

B. Negative correlation; with each year, the number of mail-order prescriptions has decreased.

C. no correlation

D. cannot be determined

🌐 **Real-World Example 2**   **Write a Line of Fit**

POPULATION The table shows the world population growing at a rapid rate. Identify the independent and dependent variables. Make a scatter plot and determine what relationship, if any, exists in the data.

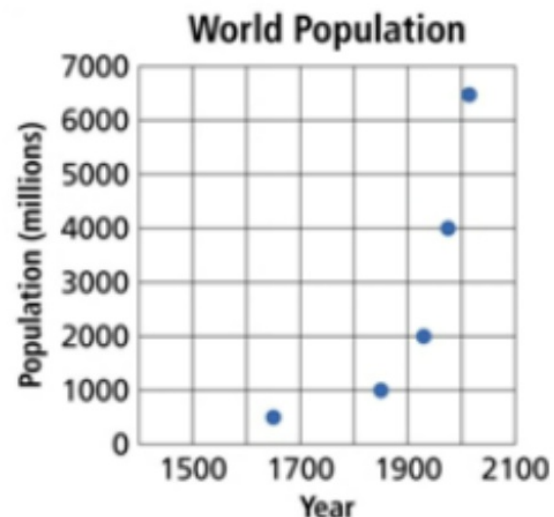| Year	Populations (millions)
1650	500
1850	1000
1930	2000
1975	4000
2004	6400

🌐 Real-World **Example 2** / **Write a Line of Fit**

Step 1 Make a scatter plot.

The independent variable is the year, and the dependent variable is the population (in millions).

As the years increase, the population increases. There is a positive correlation between the two variables.
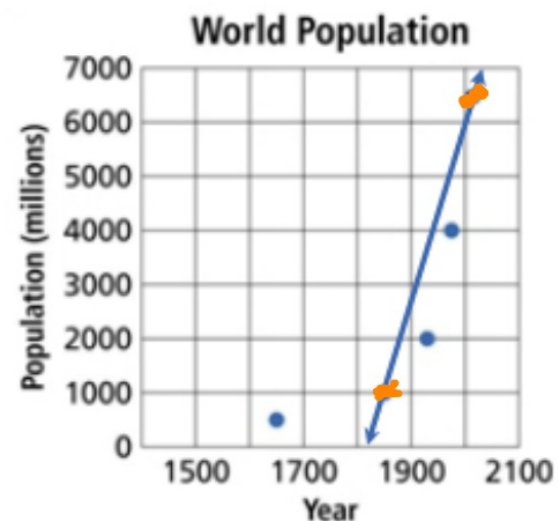
World Population

Real-World Example 2 — Write a Line of Fit

Step 2 Draw a line of fit.

No one line will pass through all of the data points. Draw a line that passes close to the points. A line of fit is shown.

World Population

Real-World **Example 2** / **Write a Line of Fit**

Step 3 Write the slope-intercept form of an equation for the line of fit.

The line of fit shown passes through the points (1850, 1000) and (2004, 6400).

Find the slope.

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

Slope formula

$$m = \frac{6400 - 1000}{2004 - 1850}$$

Let $(x_1, y_1) = (1850, 1000)$ and $(x_2, y_2) = (2004, 6400)$.

$$m = \frac{5400}{154}$$

Simplify.

🌐 Real-World **Example 2** — **Write a Line of Fit**

Use $m = \dfrac{5400}{154}$ and either the point-slope form or the

slope-intercept form to write the equation of the line of fit.

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

$$y - 1000 = \frac{5400}{154}(x - 1850)$$

$$y - 1000 \approx 35.1x - 64{,}870$$

$$y \approx 35.1x - 63{,}870$$

🌐 Real-World **Example 2** / **Write a Line of Fit**

Use $m = \dfrac{5400}{154}$ and either the point-slope form or the

slope-intercept form to write the equation of the line of fit.

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

$$y - 1000 = \frac{5400}{154}(x - 1850)$$

$$y - 1000 \approx 35.1x - 64{,}870$$

$$y \approx 35.1x - 63{,}870$$

Answer: The equation of the line is $y = 35.1x - 63{,}870$.
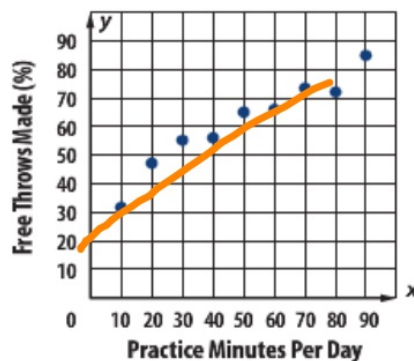
Glencoe ALGEBRA 1 CCSS
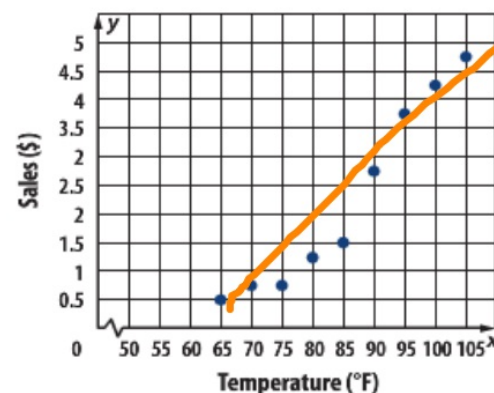
Check Your Understanding

= Step-by-Step Solutions begin on page R13.

Example 1   Determine whether each graph shows a *positive*, *negative*, or *no* correlation. If there is a positive or negative correlation, describe its meaning in the situation.

1. **Free Throws**

2. **Lemonade Sales**

1. Positive; the longer you practice free throws, the more free throws you will make.
2. Positive; the warmer the temperature, the the more lemonade you sell.

Example 2   3. **CCSS SENSE-MAKING** The table shows the median age of females when they were f...

Year	Age
1996	24.8

250

1. Positive; the longer you practice free throws, the more free throws you will make.
2. Positive; the warmer the temperature, the the more lemonade you sell.

Example 2

3. **CCSS SENSE-MAKING** The table shows the median age of females when they were first married.

a. Make a scatter plot and determine what relationship exists, if any, in the data. Identify the independent and the dependent variables. **a–b. See margin.**

b. Draw a line of fit for the scatter plot.

c. Write an equation in slope-intercept form for the line of fit.

Example 3

d. Predict what the median age of females when they are first married will be in 2016. **Sample answer: 27.0**

e. Do you think the equation can give a reasonable estimate for the year 2056? Explain.
Yes, according to the equation, the median age would be 31.4, which is likely.

3c. Sample answer: Using (1996, 24.8) and (2006, 25.9) and rounding, $y = 0.11x - 194.8$

Year	Age
1996	24.8
1997	25.0
1998	25.0
1999	25.1
2000	25.1
2001	25.1
2002	25.3
2003	25.3
2004	25.3
2005	25.5
2006	25.9

Source: U.S. Bureau of Census

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Practice and Problem Solving

Extra Practice is on page R4
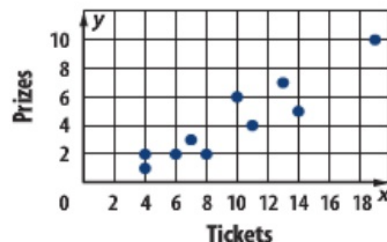
31.4, which is likely.

3c. Sample answer: Using (1996, 24.8) and (2006, 25.9) and rounding, $y = 0.11x - 194.8$

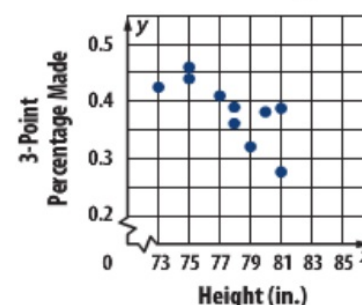## Practice and Problem Solving   Extra Practice is on page R

Example 1   Determine whether each graph shows a *positive*, *negative*, or *no* correlation. If there is a positive or negative correlation, describe its meaning in the situation.

4.   **Game Tickets at the Fair**

5   **NBA 3-Point Percentage**

4. Positive; the more tickets you buy, the more game prizes you will win.

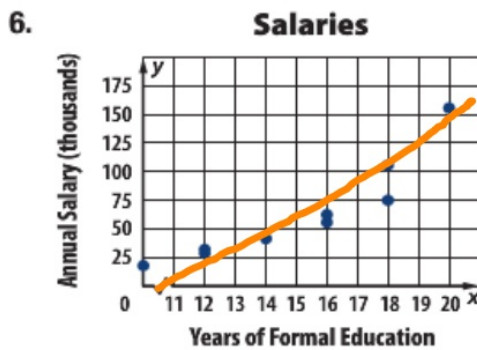**5. Negative; the talle the NBA player, th lower his 3-point shooting percentage.**

250

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6.

Salaries

Annual Salary (thousands)

175 150 125 100 75 50 25

0 11 12 13 14 15 16 17 18 19 20 x

Years of Formal Education

7

Gas Mileage of Various Vehicles

Miles per Gallon
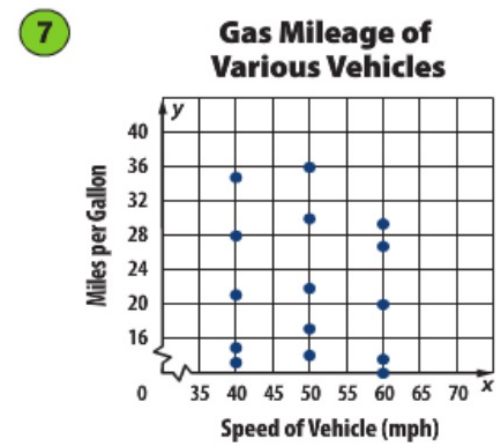
40 36 32 28 24 20 16

0   35 40 45 50 55 60 65 70 x

Speed of Vehicle (mph)

6. Positive; the more years of formal education you receive, the higher your salary will be.

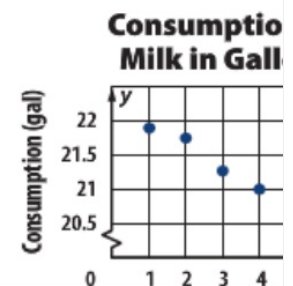**7. No; various vehicles give too many varying results for there to be a correlation.**

Examples 2–3   **8.** **MILK** Refer to the scatter plot of gallons of milk consumption per person for selected years.

a. Use the points (2, 21.75) and (4, 21) to write the slope-intercept form of an equation for the line of fit. $y = -0.375x + 22.5$

b. Predict the milk c̶o̶n̶ al

c. Predict in what y̶

Consumptio
Milk in Gall

Consumption (gal)

22 21.5 21 20.5

0   1   2   3   4

251

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0   35 40 45 50 55 60 65 70   x
Speed of Vehicle (mph)

6. Positive, the more years of formal education you receive, the higher your salary will be.
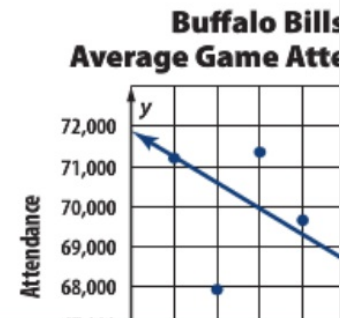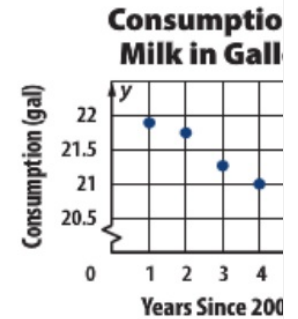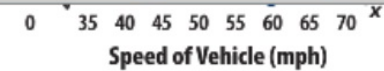**7.** No; various vehicles give too many varying results for there to be a correlation.

Examples 2–3   **8. MILK** Refer to the scatter plot of gallons of milk consumption per person for selected years.

Consumptio
Milk in Gall

a. Use the points (2, 21.75) and (4, 21) to write the slope-intercept form of an equation for the line of fit. $y = -0.375x + 22.5$

b. Predict the milk consumption in 2020. **about 15 gal**

c. Predict in what year milk consumption will be 10 gallons. **2033**

d. Is it reasonable to use the equation to estimate the consumption of milk for any year? Explain.
Yes; if the current trend continues, the consumption of milk will continue to decrease.

9. FOOTBALL Use the scatter plot.

a. Use the points (5, 71,205) and (9, 68,611) to write the slope-intercept form of an equation for the line of fit shown in the scatter plot. $y = -648.5x + 74,447.5$

b. Predict the averag

Consumption (gal)
22
21.5
21
20.5
0   1   2   3   4
Years Since 200

Buffalo Bills
Average Game Atte

Attendance
72,000
71,000
70,000
69,000
68,000

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d. Is it reasonable to use the equation to estimate the consumption of milk for any year? Explain.
Yes; if the current trend continues, the consumption of milk will continue to decrease.

9. FOOTBALL Use the scatter plot.

a. Use the points (5, 71,205) and (9, 68,611) to write the slope-intercept form of an equation for the line of fit shown in the scatter plot. $y = -648.5x + 74{,}447.5$
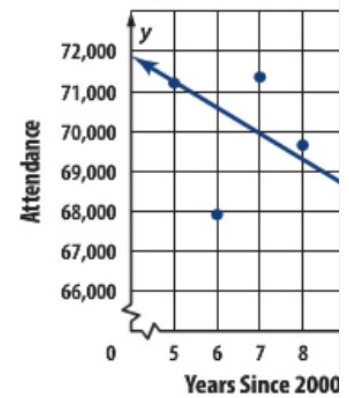
b. Predict the average attendance at a game in 2020. **61,478**

c. Can you use the equation to make a decision about the average attendance in any given year in the future? Explain.
No; the average attendance will fluctuate with other variables such as how good the team is that year.

B **10. CCSS SENSE-MAKING** The Body Mass Index (BMI) is a measure of body fat using height and weight. The heights and weights of twelve men with normal BMI are given in the table at the right. **a–b. See Ch. 4 Answer Appendix.**

a. Make a scatter plot comparing the height in inches to the weig...

**Buffalo Bills
Average Game Atte**

Height (in.)	Weight (
62	115
63	124
65	120
67	134
67	140

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Stand

in 2020. **61,478**

c. Can you use the equation to make a decision about the average attendance in any given year in the future? Explain.
No; the average attendance will fluctuate with other variables such as how good the team is that year.

B **10.** (CCSS) **SENSE-MAKING** The Body Mass Index (BMI) is a measure of body fat using height and weight. The heights and weights of twelve men with normal BMI are given in the table at the right. **a–b. See Ch. 4 Answer Appendix.**

a. Make a scatter plot comparing the height in inches to the weight in pounds.

b. Draw a line of fit for the data.

c. Write the slope-intercept form of an equation for the line of fit. **Sample answer: $y = 4.57x - 168.33$**

d. Predict the normal weight for a man who is 84 inches tall. **Sample answer: 215.6 lb**

e. A man's weight is 188 pounds. Use the equation of the line of fit to predict the height of the man.
Sample answer: about 78 in.

67,000
66,000

0   5   6   7   8
Years Since 2000
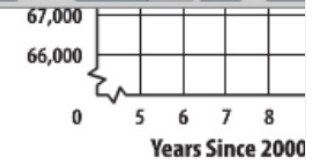
Height (In.)	Weight
62	115
63	124
65	120
67	134
67	140
68	138
68	144
68	152
69	147
72	155
73	168
73	166

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