Name _____ Date _____

4.4 Scatter Plots and Lines of Fit
For use with Exploration 4.4

Essential Question How can you use a scatter plot and a line of fit to make conclusions about data?
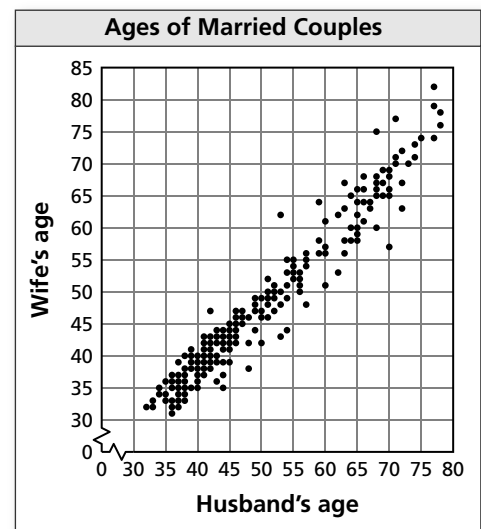
A **scatter plot** is a graph that shows the relationship between two data sets. The two data sets are graphed as ordered pairs in a coordinate plane.

1 EXPLORATION: Finding a Line of Fit

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

Work with a partner. A survey was taken of 179 married couples. Each person was asked his or her age. The scatter plot shows the results.

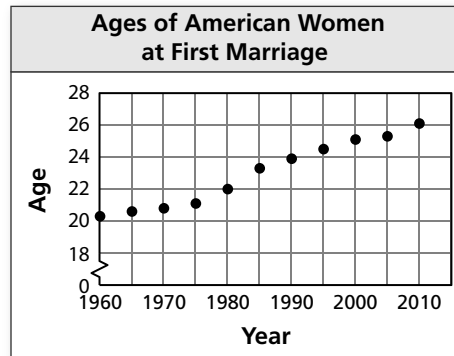a. Draw a line that approximates the data. Write an equation of the line. Explain the method you used.

Ages of Married Couples

Wife's age (y-axis: 0, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80, 85)

Husband's age (x-axis: 0, 30, 35, 40, 45, 50, 55, 60, 65, 70, 75, 80)

b. What conclusions can you make from the equation you wrote? Explain your reasoning.

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2 **EXPLORATION:** Finding a Line of Fit

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

Work with a partner. The scatter plot shows the median ages of American women at their first marriage for selected years from 1960 through 2010.

Ages of American Women at First Marriage

a. Draw a line that approximates the data. Write an equation of the line. Let x represent the number of years since 1960. Explain the method you used.

b. What conclusions can you make from the equation you wrote?

c. Use your equation to predict the median age of American women at their first marriage in the year 2020.

Communicate Your Answer

3. How can you use a scatter plot and a line of fit to make conclusions about data?

4. Use the Internet or some other reference to find a scatter plot of real-life data that is different from those given above. Then draw a line that approximates the data and write an equation of the line. Explain the method you used.

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4.4 Practice
For use after Lesson 4.4

Core Concepts

Scatter Plot

A **scatter plot** is a graph that shows the relationship between two data sets. The two data sets are graphed as ordered pairs in a coordinate plane. Scatter plots can show trends in the data.

Notes:

Using a Line of Fit to Model Data

Step 1 Make a scatter plot of the data.

Step 2 Decide whether the data can be modeled by a line.

Step 3 Draw a line that appears to fit the data closely. There should be approximately as many points above the line as below it.

Step 4 Write an equation using two points on the line. The points do not have to represent actual data pairs, but they must lie on the line of fit.

Notes:

Worked-Out Examples

Example #1

INTERPRETING A SCATTER PLOT The scatter plot shows the hard drive capacities (in gigabytes) and the prices (in dollars) of 10 laptops.

a. What is the price of the laptop with a hard drive capacity of 8 gigabytes?

b. What is the hard drive capacity of the $1200 laptop?

c. What tends to happen to the price as the hard drive capacity increases?

a. The laptop with a hard drive capacity of 8 gigabytes costs $1100.

b. The $1200 laptop has a hard drive capacity of 12 gigabytes.

c. The price tends to increase as the hard drive capacity increases.

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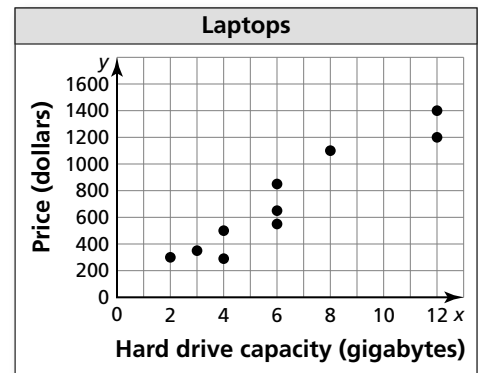
Example #2

MODELING WITH MATHEMATICS The table shows the total earnings *y* (in dollars) of a food server who works *x* hours.

x	0	1	2	3	4	5	6
y	0	18	40	62	77	85	113

a. Write an equation that models the server's earnings as a function of the number of hours the server works.

b. Interpret the slope and *y*-intercept of the line of fit.

Sample answer:

a. Use (0, 0) and (1, 18).

The slope of the line is $m = \dfrac{18 - 0}{1 - 0} = \dfrac{18}{1}$, or 18.

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

$y - 0 = 18(x - 0)$

$y = 18x$

An equation of the line of fit is $y = 18x$.

b. The slope of the line is 18. This means that the server earns about \$18 per hour. The *y*-intercept is 0, which means that if the server does not work any hours, then the server will not make any money.

Working in Food Service
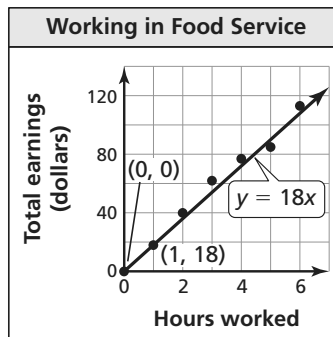
Practice A

1. The scatter plot shows the weights (in pounds) of a baby over time.

Weight of a Baby

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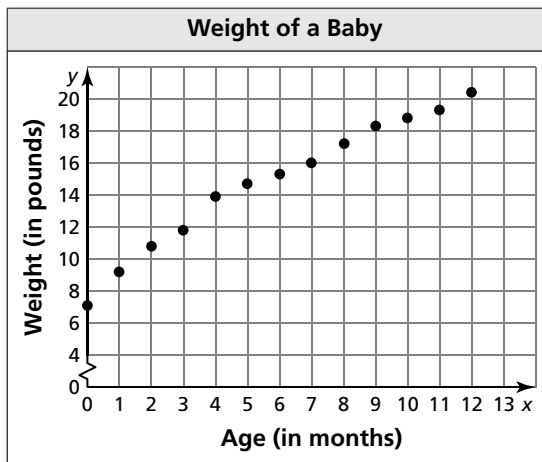
a. What is the weight of the baby when the baby is four months old?

b. What is the age of the baby when the baby weighs 17.2 pounds?

c. What tends to happen to weight of the baby as the age increases?

In Exercises 2–5, tell whether x and y show a positive, a negative, or no correlation.

2.

3.

4.

5.
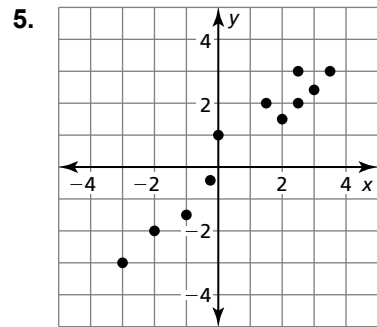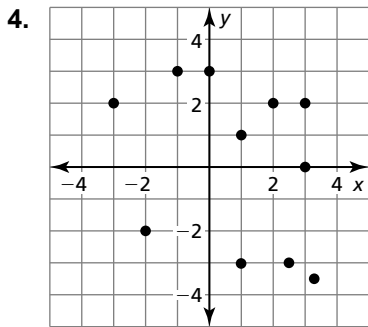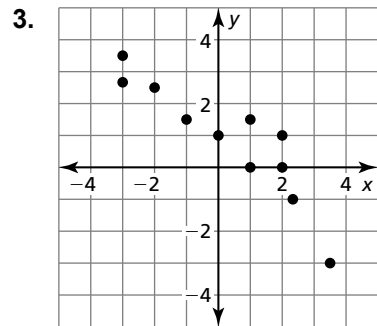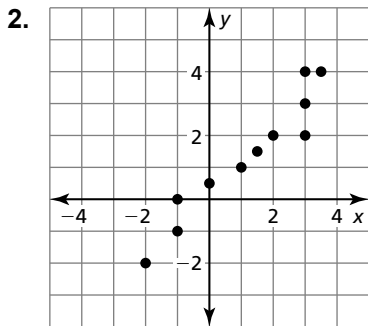
6. The table shows the depth y (in centimeters) of water filling a bathtub after x minutes.

Time (minutes), x	0	2	4	6	8	10	12
Depth (centimeters), y	6	8	11	14	17	20	24

a. Write an equation that models the depth of the water as a function of time.

b. Interpret the slope and y-intercept of the line of fit.

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Practice B

1. The scatter plot shows the prior bowling averages of competitors at the bowling tournament and their highest scores during the tournament.
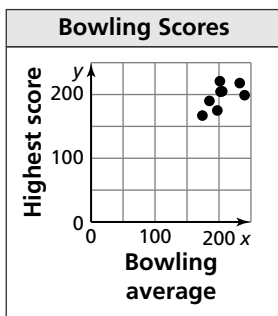
Bowling Scores

a. How many competitors bowled above their average during the tournament?

b. Did any bowler(s) bowl their average as their highest score? Explain.

c. What are the scores of the competitors with the greatest difference between their bowling average and their highest score?

In Exercises 2 and 3, tell whether *x* and *y* show a *positive*, a *negative*, or *no* correlation.

2.

3.
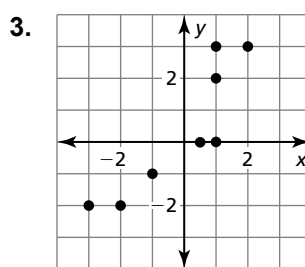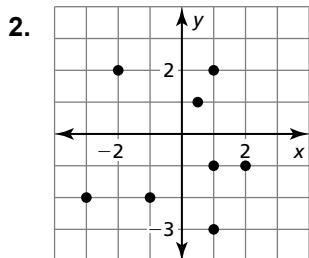
4. The table shows the total number y of rolls of wrapping paper sold by a student after x weeks.

x	1	2	3	4	5	6
y	3	5	9	12	17	24

a. Write an equation that models the number of rolls of wrapping paper as a function of the number of weeks.

b. Interpret the slope and y-intercept of the line of fit.