

**LESSON**  
**4.6**

# Study Guide

For use with the lesson "Fit a Line to Data"

**GOAL** Make scatter plots and write equations to model data.

## Vocabulary

A **scatter plot** is a graph used to determine whether there is a relationship between paired data.

### Correlation

If  $y$  tends to increase as  $x$  increases, the paired data are said to have a **positive correlation**.

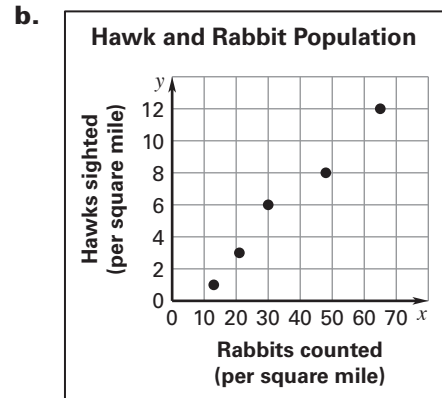
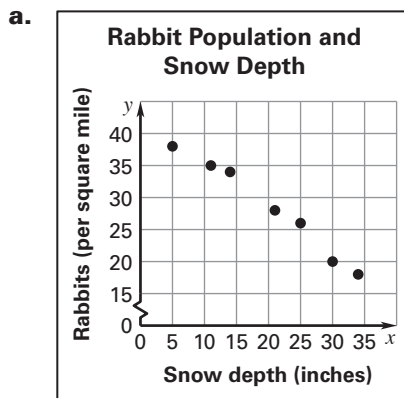
If  $y$  tends to decrease as  $x$  increases, the paired data are said to have a **negative correlation**.

If  $x$  and  $y$  have no apparent relationship, the paired data are said to have **relatively no correlation**.

When data show a positive or negative correlation, you can model the trend in the data using a **line of fit**.

**EXAMPLE 1** Describe the correlation of data

**Describe the correlation of the data graphed in the scatter plot. The data on the graph shows the results of a forest ranger's annual survey on rabbit and red-tail hawk populations.**



### Solution

- a. The scatter plot shows a negative correlation between the depth of snow cover during the winter and the number of rabbits counted in the spring. This means that as the depth of the snow increased, the number of rabbits counted decreased.
- b. The scatter plot shows a positive correlation between the number of hawks sighted and the number of rabbits counted. This means that as the number of rabbits increased, the number of hawks increased.

LESSON  
4.6**Study Guide** *continued*  
For use with the lesson "Fit a Line to Data"**EXAMPLE 2** **Make a scatter plot**

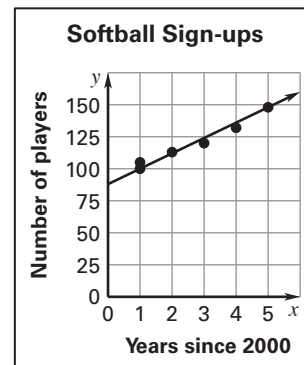
**Softball** The table shows the number of girls signed up for a summer softball league each year for 5 years.

Year	2001	2002	2003	2004	2005
Players	105	113	120	132	148

- Make a scatter plot of the data.
- Describe the correlation of the data.
- Write an equation that models the number of girls signed up for a summer softball league as a function of the number of years since 2000.

**Solution**

- Treat the data as ordered pairs. Let  $x$  represent the number of years since 2000. Let  $y$  represent the number of softball players. Plot the ordered pairs as points in a coordinate plane.
- The scatter plot shows a positive correlation, which means that more players have signed up each year since 2000.
- Draw a line that appears to fit the points in the scatter plot closely. Write an equation using two points on the line. Use  $(1, 100)$  and  $(5, 148)$ . Find the slope of the line.



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{148 - 100}{5 - 1} = \frac{48}{4} = 12$$

Find the intercept of the line. Use the point  $(5, 148)$ .

$$y = mx + b \quad \text{Write slope-intercept form.}$$

$$148 = 12(5) + b \quad \text{Substitute 12 for } m, 5 \text{ for } x, \text{ and } 148 \text{ for } y.$$

$$88 = b \quad \text{Solve for } b.$$

An equation of the line of fit is  $y = 12x + 88$ .

**Exercise for Example 1 and 2**

- Make a scatter plot of the data in the table.

<b>x</b>	1	2	2	3	3	4	4	5
<b>y</b>	9	7	6	4	3	3	2	1

- Describe the correlation of the data.
- Use the data in the table to write an equation that models  $y$  as a function of  $x$ .