1.7 Tables and Graphs

Goal

Organize data using a table or graph.

Key Words

- data
- bar graph
- line graph

How much does it cost to make a movie?

Almost every day you have the chance to interpret *data* that describe real-life situations. In Example 3 you will interpret data about the average cost of making a movie.

Data are information, facts, or numbers that describe something. It is easier to see patterns when you organize data in a table.

EXAMPLE 1 Organize Data in a Table

The table shows the top three categories of food eaten by Americans.

Student Help

STUDY TIP
To find how much dairy was consumed in 1980, you go across the row labeled **Dairy** and stop at the column for **1980**.

Top Categories of Food Consumed by Americans (lb per person per year)							
Year	1970	1975	1980	1985	1990	1995	2000
Dairy	563.8	539.1	543.2	593.7	568.4	584.4	590.0
Vegetables	335.4	337.0	336.4	358.1	382.8	405.0	410.0
Fruit	237.7	252.1	262.4	269.4	273.5	285.4	290.0

INTERNET **DATA UPDATE** of U.S. Department of Agriculture at www.mcdougallittell.com; 2000 data are estimated by authors.

Make a table showing total dairy and vegetables consumed (pounds per person) per year. In which year did Americans consume the least dairy and vegetables? In which year did Americans consume the most dairy and vegetables?

Solution

To make the table, add the data for dairy and vegetables for the given year.

Year	1970	1975	1980	1985	1990	1995	2000
Total	899.2	876.1	879.6	951.8	951.2	989.4	1000.0

ANSWER ▶ The least consumption was in 1975 and the greatest in 2000.

Checkpoint Organize Data in a Table

1. Make a table showing the total dairy products, vegetables, and fruit consumed (pounds per person) per year. Which year had the least consumption? Which had the greatest consumption?

Student Help

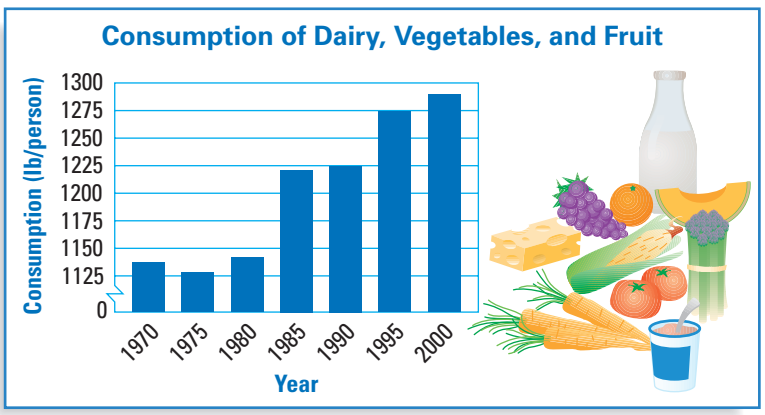
VOCABULARY TIP
Horizontal bars go across parallel with the *horizon*. Vertical bars go straight up and down.

BAR GRAPHS One way to represent the data in a table is with a **bar graph**. The bars can be either vertical or horizontal. Example 2 shows a vertical bar graph of the data from Example 1.

EXAMPLE 2 Interpret a Bar Graph

The bar graph shows the total amount of dairy products, vegetables, and fruit consumed by the average American in a given year. It appears that Americans ate about five times the amount of dairy products, vegetables, and fruit in 1995 as compared with 1970.

If you study the data in Example 1, you can see that the bar graph could be misinterpreted. Explain why the graph could be misinterpreted.



Solution

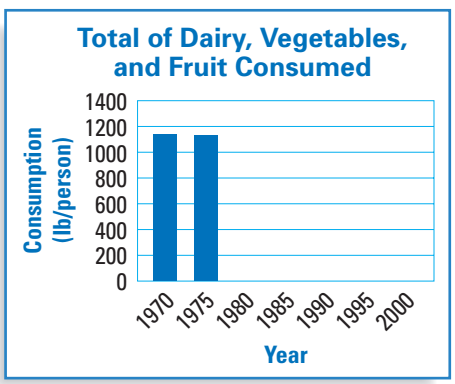
The bar graph could be misinterpreted because the vertical scale is not consistent. The zigzag line shows a break where part of the scale is not shown. Because of the break, the first tick mark on the vertical scale represents 1125 pounds of food consumed per person. The other tick marks on the vertical scale represent 25 pounds of food consumed per person.

To make a bar graph that could *not* be misinterpreted, you must evenly space the tick marks and make sure that each tick mark represents the same amount.

Checkpoint Make and Interpret a Bar Graph

2. The bar graph at the right is set up so that it is not misleading. The first two bars are drawn for you.

Copy and complete the bar graph using the data from Example 2. Describe the pattern from 1970 through 2000.



Student Help

SKILLS REVIEW
For help with drawing bar graphs, see p. 777.

Link to Careers

DIRECTORS OF PHOTOGRAPHY decide the type of film and equipment used and the composition of the movie.

INTERNET More about movie making is available at www.mcdougallittell.com

LINE GRAPHS As an alternative to a vertical bar graph, data is sometimes represented by a **line graph**. Here the vertical bars are replaced by a single point located at the top of the bar. These points are then connected by line segments. Line graphs are especially useful for showing changes in data over time.

EXAMPLE 3 Make and Interpret a Line Graph

MOVIE MAKING From 1983 to 1996, the average cost (in millions of dollars) of making a movie is given in the table. Draw a line graph of the data. Then determine in which three years did the cost decrease from the prior year.

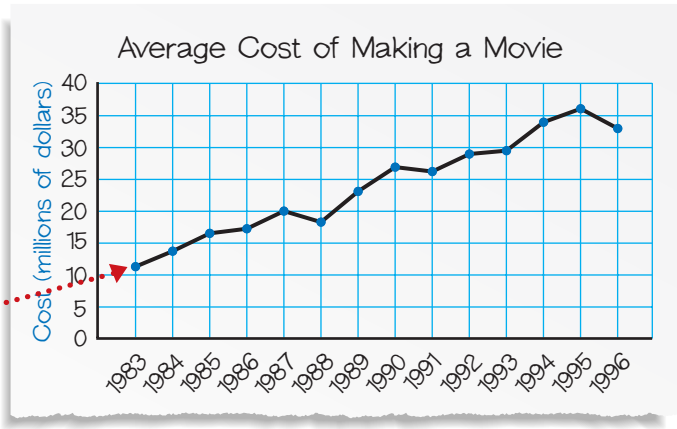
Average Cost of Making a Movie							
Year	1983	1984	1985	1986	1987	1988	1989
Cost (millions)	$11.8	$14.0	$16.7	$17.5	$20.0	$18.1	$23.3

Year	1990	1991	1992	1993	1994	1995	1996
Cost (millions)	$26.8	$26.1	$28.9	$29.9	$34.3	$36.4	$33.6

▶ Source: *International Motion Picture Almanac*

Solution

Draw the vertical scale from 0 to 40 million dollars. Mark the number of years on the horizontal axis starting with 1983. For each average cost in the table, draw a point on the graph. Then draw a line from each point to the next point.



Student Help

STUDY TIP
This point represents the year 1983 and the cost $11.8 million.

In 1988, 1991, and 1996 the average cost of making a movie decreased from the prior year.

Checkpoint **Make and Interpret a Line Graph**

3. Make a line graph of the data above changing the tick marks on the vertical scale to 0, 10, 20, 30, and 40. Which graph is easier to interpret? Why?

1.7 Exercises

Guided Practice

Vocabulary Check

1. Explain what data are. Give an example.

2. Name two ways to display organized data.

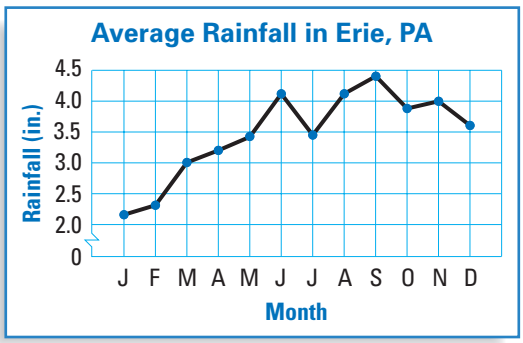
Skill Check

WEATHER **Use the graph to classify the statement as true or false.**

3. Rainfall increases each month over the previous month.

4. The amount of rainfall is the same in May and July.

5. The greatest amount of rainfall occurs in August.



▶ Source: National Oceanic and Atmospheric Administration

Practice and Applications

GOLF **In Exercises 6 and 7, use the table showing scores for two rounds of golf.**

	Player 1	Player 2	Player 3	Player 4
Round 1	90	88	79	78
Round 2	94	84	83	80

6. Make a table showing the average score of each player. *HINT:* Find each average by adding the two scores and dividing by the number of rounds.

7. Which player has the lowest average? Which one has the highest average?

8. **SCHOOL ENROLLMENT** The table shows the number of students (in millions) enrolled in school in the United States by age. Make a table showing the total number of students enrolled for each given year.

Age	1980	1985	1990	1995	2000
14–15 years old	7282	7362	6555	7651	8100
16–17 years old	7129	6654	6098	6997	7600
18–19 years old	3788	3716	4044	4274	4800

▶ Source: U.S. Bureau of the Census; 2000 data are estimated by authors.

9. Which year had the least number of students enrolled? Which had the greatest number of students enrolled?

10. Did the total enrollment increase for each 5 year period? Explain.

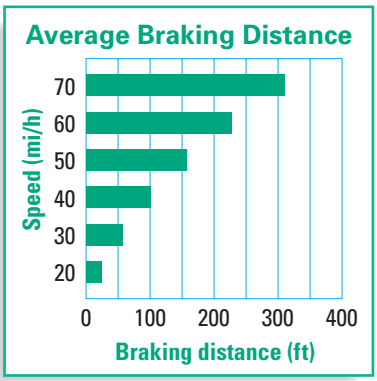
Student Help

▶ **HOMEWORK HELP**
Example 1: Exs. 6–10
Example 2: Exs. 11–14
Example 3: Exs. 15–18

Link to Driving

BRAKING DISTANCE is the distance it takes for a vehicle to come to a complete stop after the brakes have been activated. The length of a skid mark indicates the speed at which a vehicle was traveling.

BRAKING DISTANCE **In Exercises 11–13, use the bar graph showing average braking distances for medium sized cars.**



11. Estimate the braking distance for a car traveling 50 miles per hour.

12. Does it take twice as far to stop a car that is going twice as fast? Explain.

13. Explain why it would be dangerous to follow another car too closely when driving at 70 miles per hour.

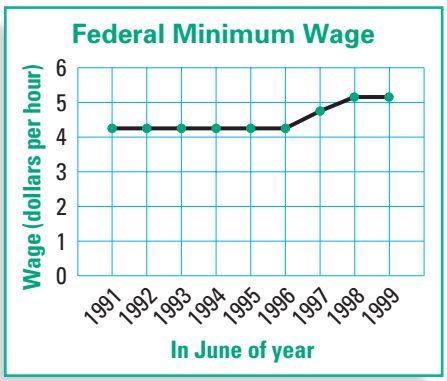
14. **Science Link** The table shows the number of gallons of water needed to produce one pound of some foods. Make a bar graph of the data.

Food (1 lb)	Lettuce	Tomatoes	Melons	Broccoli	Corn
Water (gallons)	21	29	40	42	119

▶ Source: Water Education Foundation

MINIMUM WAGE

In Exercises 15–17, use the line graph showing the minimum wage for 1991–1999.



▶ Source: U.S. Bureau of Labor Statistics

15. For how many years did the minimum wage remain the same as it was in 1991?

16. Estimate the minimum wage during 1992.

17. In which year did the minimum wage first increase to over $5?

Student Help

HOMEWORK HELP

INTERNET Extra help with problem solving in Ex. 18 is available at www.mcdougallittell.com

18. **History Link** The table shows the population (in thousands) of California following the Gold Rush of 1849. Make a line graph of the data.

Year	1850	1860	1870	1880	1890
Population	93	380	560	865	1213

19. **CRITICAL THINKING** The table shows the average fuel efficiency for passenger cars for different years. Organize the data into a graph. Explain why you chose the type of graph you used.

Year	1980	1985	1990	1995	2000
Fuel efficiency (miles per gallon)	24.3	27.6	28.0	28.6	29.2

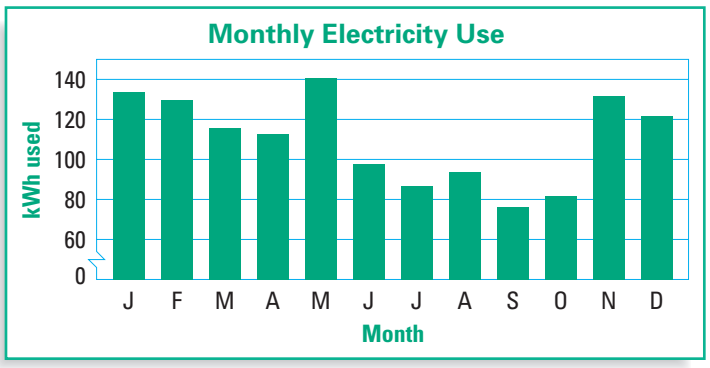
INTERNET **DATA UPDATE** of National Highway Traffic Safety Administration at www.mcdougallittell.com; 2000 data are estimated by authors.

Standardized Test Practice

20. MULTIPLE CHOICE Which way of organizing data is useful for showing changes in data over time?

(A) Table (B) Line graph (C) Circle graph (D) None of these

MULTIPLE CHOICE In Exercises 21 and 22, use the bar graph showing one household's monthly electricity usage in kilowatt-hours (kWh).



21. Which month shows the greatest decrease in use from the prior month?

(F) May (G) October

(H) June (J) November

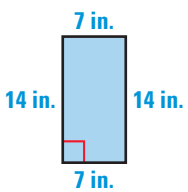
22. About how many total kilowatt-hours were used for the months of January through April?

(A) 480 (B) 400 (C) 550 (D) 600

Mixed Review

Geometry Link **Find the perimeter and area of the geometric figure.** *(Lesson 1.1)*

23.



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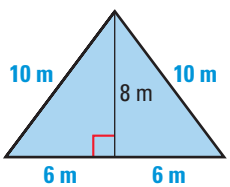

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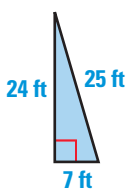

CHECKING SOLUTIONS Check to see if $x = 5$ is or is not a solution of the equation or the inequality. *(Lesson 1.4)*

26. $17 - x < 12$ **27.** $x + 3x \geq 18$ **28.** $5x \div 2 = 12.5$

29. $2.5 > 1.2x - 3$ **30.** $x^2 = 25$ **31.** $(3x)^2 \leq 255$

32. $3x + 2x = 25$ **33.** $19 - 2x > 10$ **34.** $16 \leq 3x + 1$

Maintaining Skills

COMPARING DECIMALS Compare using <, > or =. *(Skills Review p. 770)*

35. 71.717 ? 77.117 **36.** 2.6 ? 2.65 **37.** 0.01 ? 0.0001

38. 1.666 ? 1.67 **39.** 15.7 ? 15.700 **40.** 0.4321 ? 0.434

41. 0.48 ? 0.479 **42.** 3.11 ? 3.09 **43.** 9.54 ? 9.540