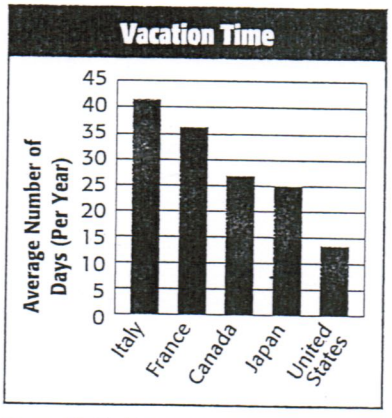
11-7

# 13 Displaying Data in Graphs

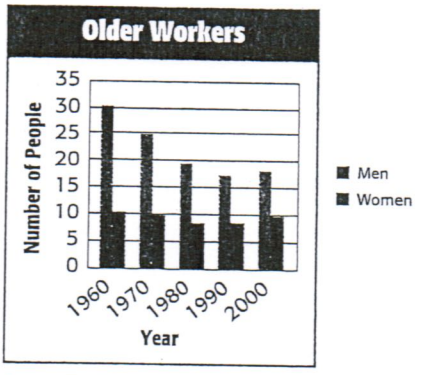
Statistics involves collecting, analyzing, and presenting information, called **data**. Graphs display data to help readers make sense of the information.

- **Bar graphs** are used to compare the frequency of data. The bar graph below compares the average number of vacation days given by countries to their workers.



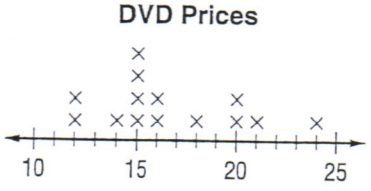

Source: *The World Almanac*

- **Double bar graphs** compare two sets of data. The double bar graph below shows the percent of men and women 65 and older who held jobs in various years.

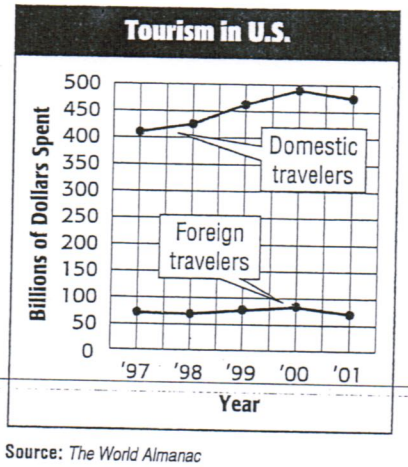



Source: *The World Almanac*

- **Line plots** are diagrams that show the frequency of data on a number line. The line plot below shows the prices of DVDs.




- **Double line graphs**, like double bar graphs, show two sets of data. The double line graph below compares the amount of money spent by both domestic and foreign U.S. travelers.




Source: *The World Almanac*

- **Stem-and-leaf plots** are used to condense a set of data where the greatest place value of the data is used for the **stems** and the next greatest place value forms the **leaves**. Each data value can be seen in this type of graph.

The stem-and-leaf plot below contains this list of mathematics test scores:

95 76 64 88 93 68 99 96 74 75 92 80 76 85 91 70 62 81

The least number has 6 in the tens place.

The greatest number has 9 in the tens place.

The stems are 6, 7, 8, and 9.

The leaves are ordered from least to greatest.

| Stem | Leaf |
|---|---|
| 6 | 2 4 8 |
| 7 | 0 4 5 6 6 |
| 8 | 0 1 5 8 |
| 9 | 1 2 3 5 6 9 |

$6|2 = 62$

## EXAMPLE Choose a Display

**1** Shonny is writing a research paper about the Olympics for her social studies class. She wants to include a graph that shows the number of participants from each country in the 2006 Winter Olympics. Should she use a line plot, bar graph, or stem-and-leaf plot?

Since the data would compare the number of participants from each country, she should choose a bar graph.

### Exercises

**For Exercises 1–4, determine whether a bar graph, double bar graph, line plot, double line graph, or stem-and-leaf plot is the best way to display each of the following sets of data. Explain your reasoning.**

1. the number of cell phones per household in a neighborhood
2. the income of an average household in six different countries
3. the prices for a loaf of bread in twenty different supermarkets
4. the number of boys and the number of girls participating in six different school sports

**For Exercises 5–9, refer to the bar graph, double bar graph, line plot, double line graph, and stem-and-leaf plot on page 749.**

5. Write several sentences to describe the data shown in the graph titled "Vacation Time." Include a comparison of the days worked for Canada and the U.S.
6. Write several sentences to describe the data shown in the graph titled "Older Workers." What other type or types of graphs could you use to display this data? Explain your reasoning.
7. Write several sentences to describe the data shown in the graph titled "Tourism in U.S." What other type or types of graphs could you use to display this data? Explain your reasoning.
8. Write several sentences to describe the data shown in the graph titled "DVD Prices." What other type or types of graphs could you use to display this data? Explain your reasoning.
9. Write several sentences to describe the data shown in the stem-and-leaf plot of mathematics test scores. What is an advantage of showing the scores in this type of graph?

**For Exercises 10–12, use the stem-and-leaf plot that shows the number of stories in the tallest buildings in Dallas, Texas.**

10. How many buildings does the stem-and-leaf plot represent?
11. How many stories are there for the shortest building in the stem-and-leaf plot? the tallest building?
12. What is the median number of stories for these buildings? the mean number?

| Stem | Leaf |
|---|---|
| 2 | 7 9 9 |
| 3 | 0 1 1 1 3 3 4 4 6 6 7 |
| 4 | 0 2 2 5 9 |
| 5 | 0 0 0 0 2 5 6 8 |
| 6 | 0 |
| 7 | 2 |

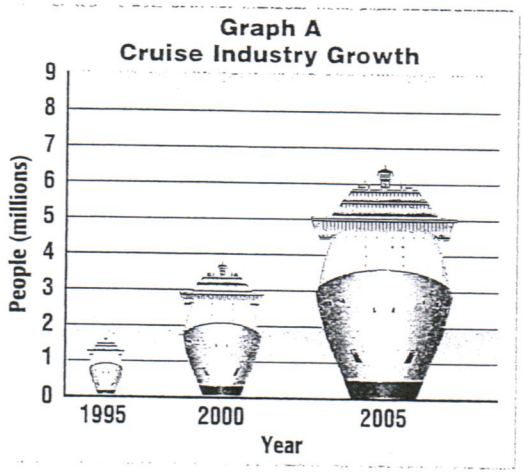
2|7 = 27

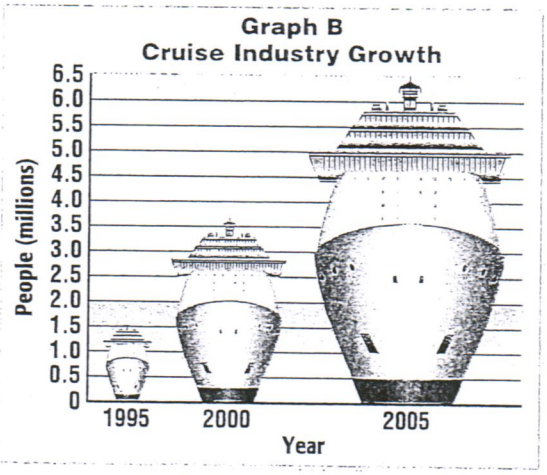
# 15 Misleading Statistics

Two graphs that represent the same data may look quite different. If different vertical scales are used, each graph will give a different visual impression.

## EXAMPLES Misleading Graphs

**TRAVEL** The graphs show the growth of the cruise industry.




**1** **Why do the graphs look different?**

The vertical scales differ.

**2** **Which graph appears to show a greater increase in the growth of the cruise industry? Explain.**

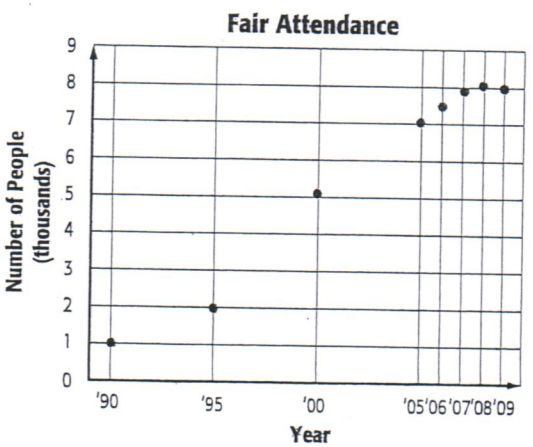
Graph B; the size of the ship makes the increase appear more dramatic because both the height and width of the ship are increasing.

When reading a statistical graph, you must interpret the information carefully and determine whether the inference made from the data is valid.

## EXAMPLE Accuracy of Predictions and Conclusions

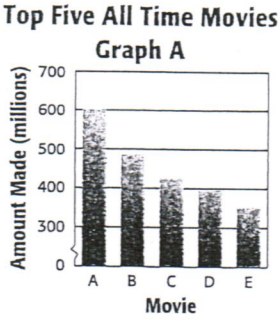
**3** **FAIRS** According to the graph, the number of people did not increase as fast from 2005–2009 as it did from 1990–2005. Determine whether this statement is accurate. Justify your reasoning.

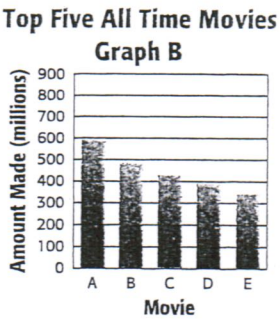
No, the statement is not accurate. The horizontal scale is inconsistent; from 1990 to 2005, the interval is 5 years, but the interval is 1 year from 2005 to 2009.



## Exercises

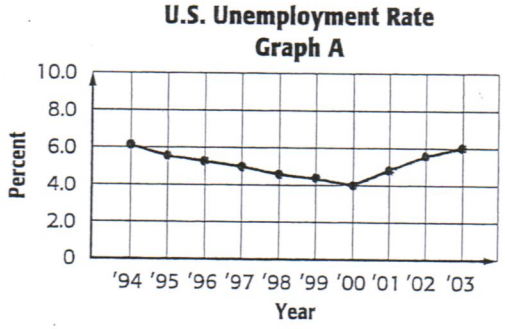
**MOVIES** For Exercises 1 and 2, refer to the graphs below.

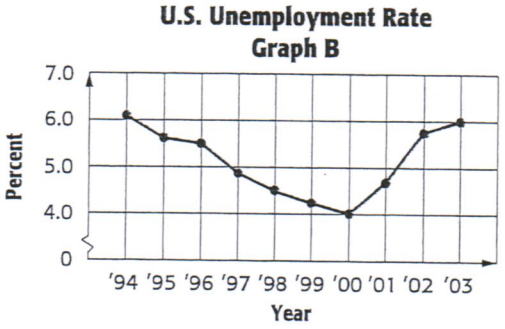



1. Which graph gives the impression that the top all-time movie made far more money than any other top all-time movie?
2. Which graph shows that movie C made nearly as much money as the other top movies?

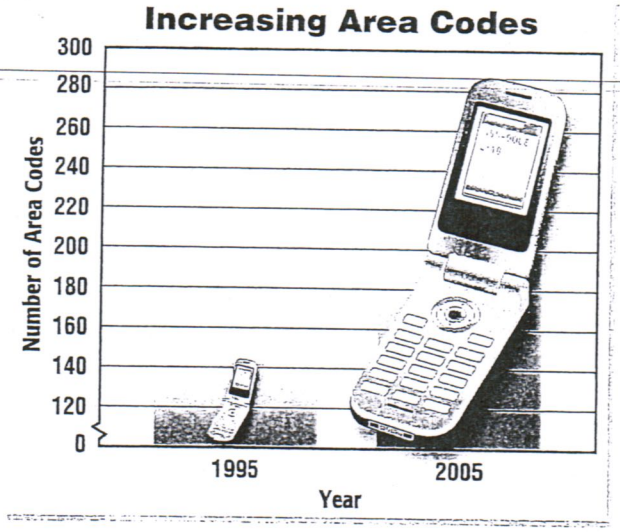
**JOBS** For Exercises 3 and 4, refer to the graphs below.




3. What causes the graphs to differ in their appearance?
4. Which graph appears to show that unemployment rates have increased rapidly since 2000? Explain your reasoning.

5. **COMMUNICATION** The graph shows the number of area codes in the U.S. in two years. According to the graph, it appears that the number of area codes increased by about four times between 1995 and 2005. Determine whether this statement is accurate. Justify your reasoning.




6. How can graphs be misleading? Give an example of a graph that is misleading and explain how to redraw the graph so it is not misleading.