Probability, Data, and Statistics

Investigating Probability

Probability is the study of how likely it is for an **event** to occur. Possible results are called **outcomes**. Probability can be expressed as a number from 0 to 1. You can find this number by comparing the number of ways that are favorable for the event to occur to all of the outcomes that are possible.

$$\text{Probability} = \frac{\text{number of favorable outcomes}}{\text{total number of outcomes possible}}$$

- If there is **no chance** that an event can happen, the probability is 0. For example, the probability of a banana turning into an apple would be 0.
- If an event is **certain** to happen, its probability is 1, or 100%. For example, the probability that you will get wet if you stand in the rain without a raincoat or an umbrella is 1, or 100%.
- The greater the probability that an event will occur, the closer the number representing the probability will be to 1; the less the probability, the closer the number will be to 0.

When you toss a coin, the probability of tossing heads is $\frac{1}{2}$. This is because there are 2 possible outcomes, heads or tails. Only 1 of those outcomes is favorable for heads.

$$\text{Probability (heads)} = \frac{\text{favorable outcomes}}{\text{possible outcomes}} = \frac{1}{2}$$

The probability for heads on a single toss can be expressed in any of the following ways:

fraction	decimal	ratio	percent	words
$\frac{1}{2}$	0.5	1:2	50%	The chances are one in two. There is a *fifty percent* or a *fifty-fifty* chance.

Example

Art, Etan, José, Ryan, and Dwight wrote their names on separate slips of paper and put them in a box. One name will be drawn to win a prize. Each person has an equal chance of winning. What is the probability that Ryan's name will be drawn?

There are 5 different names that can be drawn. Only 1 name is Ryan's.

$$\text{Probability (of Ryan's name being drawn)} = \frac{\text{favorable outcomes}}{\text{possible outcomes}} = \frac{1}{5} = 0.2 = 20\%$$

Ryan has a 1 in 5, or a 0.2, or a 20% chance of having his name drawn.

Example

There are 12 towels in a laundry bag. Three are green, 4 are white, and 5 are yellow. If Tammy reaches into the bag without looking and pulls 1 towel out, what is the probability that she will select a green towel?

$$\text{Probability} = \frac{\text{number of favorable outcomes}}{\text{total number of outcomes}} = \frac{3 \text{ green towels}}{12 \text{ towels}} = \frac{3}{12} = \frac{1}{4} = 0.25 = 25\%$$

The probability that Tammy will select a green towel is $\frac{1}{4}$, or 0.25, or 25%.

Investigating Probability (continued)

PRACTICE

Circle the correct answer.

1. A box contains 3 green and 5 red counters. What is the probability of reaching into the box without looking and picking one red counter?

   A $\frac{1}{3}$ C $\frac{3}{5}$

   B $\frac{3}{8}$ D $\frac{5}{8}$

2. What is the probability that if someone picks a number from 1 through 10, the number will be even?

   F $\frac{1}{5}$ H $\frac{1}{2}$

   G $\frac{2}{3}$ J $\frac{1}{4}$

3. In the class election, Carlo got 12 votes, Bryan got 14 votes, and Roger got 10 votes. If a person in the class is selected at random, what is the probability that he or she voted for Roger?

   A $\frac{1}{3}$ C $\frac{1}{10}$

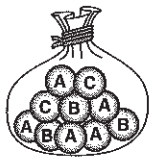
   B $\frac{5}{18}$ D $\frac{5}{13}$

4. What is the probability that a person picked at random is born in a month beginning with the letter "J"?

   F $\frac{1}{12}$ H $\frac{1}{3}$

   G $\frac{1}{4}$ J $\frac{1}{6}$

Use the diagram of lettered discs for Numbers 7 and 8. There are 2 discs labeled C, 3 labeled B, and 5 labeled A.



5. If you reach into the bag without looking and take out a disc, what is the probability it will be a "C"?

   A 25% C 20%
   B 10% D 2%

6. What is the probability you will pick the letter "D"?

   F 100% H 25%
   G 50% J 0%

7. What is the probability that if you drop something, it will fall down, not up?

   A $\frac{1}{2}$ C 0.25

   B 3:4 D 100%

8. What is the probability that a letter picked at random from the first 10 letters of the alphabet will be a vowel?

   F $\frac{3}{10}$ H $\frac{2}{5}$

   G $\frac{4}{7}$ J $\frac{3}{5}$

Gathering Data for a Survey

When a company or an organization wants to know what people think, they conduct a **survey**. Information is usually gathered from a **sample group**, which is a small part of the **population** they want to know about.

- The population consists of people or objects that the survey is about.
  For example, in a survey to find out how many people between the ages of 20 and 30 listen to a certain radio station, the population is all of the people between 20 and 30 who live in the listening area of the station.

- The sample group selected to be surveyed should be members of the population.

- The sample group should represent a **random sample**. This means that every member of the population has an equal chance of being selected. The survey of radio listeners should include people 20 to 30 years old from all walks of life who live throughout the entire listening area rather than selecting from only one group or one neighborhood.

It is important that survey questions not be biased; questions should not influence the answers. Look at these two questions designed to find what kind of food people like:

What kind of pizza do you like?
What is your favorite food?

The first question assumes a person would select pizza as a favorite food, while the second question leaves the choice open to any type of food.

PRACTICE

Circle the correct answer.

1. Jamie wants to expand the cookware section in her gift shop. Which of these sample groups would give her the best data about what items she should add?
   - **A** people who buy greeting cards at her store
   - **B** people who take cooking classes at a local cooking school
   - **C** a random sample of people who have purchased only cookware items in her shop
   - **D** a random sample of customers to her shop

2. Herman is writing a questionnaire for a survey to find out whether people recycle newspapers. Which of these questions would give him the most unbiased results?
   - **F** Are you a person who cares about the environment and recycles newspapers?
   - **G** Where do you take your newspapers to recycle them?
   - **H** What types of items do you take to the recycling center?
   - **J** Do you recycle newspapers?

3. Which question would get the most unbiased results about a person's reaction to a movie?
   - **A** Weren't the costumes great?
   - **B** What was your favorite part of the movie?
   - **C** What did you think of the movie?
   - **D** Did you think this movie was as good as the last one starring the same actor?

Reading a Table

Tables and graphs are useful ways to organize data. They allow us to read information quickly and easily. To understand a table or a graph, always begin by reading the title and the headings. They explain the relationships shown in a table or graph.

Top 10 Network Telecasts of All Time

Rank	Program	Telecast Date	Household Rating*	Number of Household Surveyed
1	M*A*S*H Special	Feb. 28, 1983	60.2%	50,150,000
2	Dallas (Who Shot J.R.?)	Nov. 21, 1980	53.3%	41,470,000
3	Roots, Part VIII	Jan. 30, 1977	51.1%	36,380,000
4	Super Bowl XVI	Jan. 24, 1982	49.1%	40,020,000
5	Super Bowl XVII	Jan. 30, 1983	48.6%	40,480,000

*Percentage of U.S. households surveyed that viewed the show
Source: Courtesy Nielsen Media Research

PRACTICE

Use the table above to answer each question.

1. This column of numbers is taken from the table. What do these numbers show?

60.2%
53.3%
51.1%
49.1%
48.6%

   A the percentage of Americans who say each show is their favorite
   B the percentage of households surveyed that viewed the show
   C the percentage of judges who voted for each show

2. On what date was the "Who Shot J.R.?" episode of Dallas shown? _____

3. How many households viewed the last episode of M*A*S*H when it was shown in February of 1983? _____

4. Which shows had a viewer rating higher than 50%? _____

5. Which show had a viewer rating of 60.2%? _____

6. What is the earliest date listed in this table? _____

7. For which show were the greatest number of households surveyed? _____

Using a Price List

A menu or price list is a common type of table. To use a menu or price list, find what you want to buy. Then look for the price for that item. Do not get confused if you are looking for several prices. Write the price for each item. Then do any figuring.

Parcel Post Rates

Weight	Zones 1 and 2	Zone 3	Zone 4	Zone 5	Zone 6	Zone 7	Zone 8
1 pound	$3.69	$3.75	$3.75	$3.75	$3.75	$3.75	$3.75
2 pounds	3.85	3.85	4.14	4.14	4.49	4.49	4.49
3 pounds	4.65	4.65	5.55	5.65	5.71	5.77	6.32
4 pounds	4.86	5.20	6.29	6.93	7.14	7.20	7.87
5 pounds	5.03	5.71	6.94	7.75	8.58	8.64	9.43
6 pounds	5.63	6.01	7.44	8.50	9.52	9.90	11.49
7 pounds	5.80	6.28	7.91	9.20	10.35	11.39	12.83
8 pounds	5.98	6.53	8.30	9.84	11.11	12.54	15.04
9 pounds	6.11	6.76	8.74	10.45	11.83	13.38	17.04
10 pounds	6.28	7.57	9.10	11.01	12.50	14.17	18.14

Insurance rates: $1.30 to insure packages for up to $50; $2.20 to insure packages for $50.01–$100; $3.20 to insure packages for $100.01–$200; $4.20 to insure packages for $200.01–$300.
Source: U.S. Post Office

PRACTICE

Use the price list above to answer the following questions.

1. How much does it cost to mail a 3-pound package to Zone 3? _____

2. How much more does it cost to send a 4-pound package to Zone 6 than to send it to Zone 2? _____

3. What is the total cost to send a 2-pound package to an address in Zone 1, and an 8-pound package to Zone 3? _____

4. How much would it cost to send a 9-pound package to Zone 4 and insure it for $250? _____

5. To the nearest dollar, how much would it cost to send a 2-pound package to Zone 8, a 4-pound package to Zone 4, and a 5-pound package to Zone 6? _____

6. You have $5 to send an 3-pound package to Zone 1. How much insurance can you afford? _____

7. You are sending a package to Zone 6. How much more would it cost to send a 9-pound package rather than a 5-pound package? _____

Using Tables to Make Comparisions

You can use the numbers in a table to make comparisons.
- You can find the **difference** between two numbers by subtracting.
- You can see how **many times larger** one number is than another by setting up a ratio.
- You can find **what fraction** one number is of another by forming a ratio.

The 10 Largest Native American Nations in the United States

Rank	Nation	Population	Percent
1	Cherokee	308,132	16.4
2	Navajo	219,198	11.7
3	Chippewa	103,826	5.5
4	Sioux	103,255	5.5
5	Choctaw	82,299	4.4
6	Pueblo	52,939	2.8
7	Apache	50,051	2.7
8	Iroquois	49,038	2.6
9	Lumbee	48,444	2.6
10	Creek	43,550	2.6

Source: U.S. Department of Commerce 1990 Census

Example The Chippewa Nation is about how many times larger than the Lumbee?

Round the two numbers and then set up a ratio to compare the two nations. Put the greater number for the Chippewa in the numerator.

$$\frac{\text{Chippewa}}{\text{Lumbee}} \quad \frac{100{,}000}{50{,}000} = \frac{2}{1} = 2 \text{ times}$$

The Chippewa Nation is 2 times larger than the Lumbee.

Example The Creek Nation is approximately what fraction of the size of the Chippewa?

Round the numbers and put them in fraction form. For this comparison, put the greater number for the Chippewa in the denominator.

$$\frac{\text{Creek}}{\text{Chippewa}} \quad \frac{40{,}000}{100{,}000} = \frac{2}{5}$$

The Creek Nation is about $\frac{2}{5}$ the size of the Chippewa.

PRACTICE

Use the table above to fill in the blanks.

1. What is the largest Native American group in the United States? _____

2. Which tribe is larger, the Apache or the Choctaw? _____

3. How many more Lumbee are there than Creek? _____

4. Which group is closest in size to the Chippewa? _____

5. Which group is about $\frac{2}{3}$ the size of the Cherokee? _____

6. How many more Choctaw are there than Pueblo? _____

7. Together, the Apache and the Pueblo are about the same size as which group? _____

8. The Sioux Nation is about what fraction of the size of the Navajo?

   A $\frac{1}{5}$ C $\frac{1}{4}$

   B $\frac{1}{3}$ D $\frac{1}{2}$

Interpreting Information in Tables

Tables are one way to display data that have been collected. The table below shows the results of a survey of about 25,196,000 veterans, taken to find out how satisfied they were with their ability to get information about their benefits.

Veterans' Satisfaction on Accessing Benefits Information

Very satisfied	15.4 %
Somewhat satisfied	30.4 %
Neither satisfied nor dissatisfied	24.9 %
Somewhat dissatisfied	13.6 %
Very dissatisfied	9.2 %
Don't need information	2.0 %
Unknown	4.5 %

Source: Department of Veterans Affairs

PRACTICE

Use the above table to answer these questions.

1. What is the approximate ratio of the percent of veterans who were somewhat satisfied to those who were very satisfied with their ability to get benefits information?

   A 2 to 1 **C** 1 to 4
   B 1 to 2 **D** 4 to 1

2. About how many times as many veterans were either somewhat or very satisfied compared with those who were somewhat or very dissatisfied with their ability to get benefits information?

   F half as many
   G two-thirds as many
   H twice as many
   J three times as many

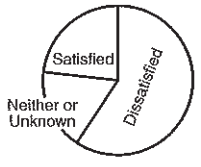
3. Approximately what fraction of the veterans surveyed reported that they were neither satisfied nor dissatisfied?

   A $\frac{1}{3}$ **C** $\frac{1}{4}$
   B $\frac{1}{5}$ **D** $\frac{1}{2}$

4. About how many veterans reported they did not need information on benefits?

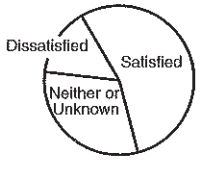
   F $\frac{1}{4}$ million **H** $\frac{1}{2}$ million
   G 1 million **J** 2 million

5. Circle the letter of the graph that most accurately displays the data given in the table above.

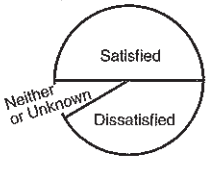


A

C



B



D

Finding Mean, Median, and Mode

Often, when a set of data is collected, the numbers in the data are used to get a single number that represents the data in one way or another.

Example Here are Rob's scores for the last 10 times he bowled.
151, 167, 139, 152, 163, 169, 201, 171, 168, 169
Find the range of Rob's bowling scores.
Find the mean, median, and mode of Rob's scores.

- **Minimum** The minimum is the least number in the set of data.
  Rob's minimum score is 139.
- **Maximum** The maximum is the greatest number in the set of data.
  Rob's maximum score is 201.
- **Range** The difference between the maximum and minimum is the range.
  For Rob's scores, $201 - 139 = 62$. Rob's range is 62.
- **Mean or average** The mean is the result of distributing the data to make each of the numbers the same. To find the mean, add all of the numbers, and then divide the sum by the number of amounts you added.
  Rob's 10 scores add to 1,650. $1{,}650 \div 10 = 165$ Rob's average is 165.
- **Median** The median is the number in the middle of the list after the numbers have been arranged in order from least to greatest. If the number of values that were added is even, there will be two middle numbers; find the average of those two numbers.
  139, 151, 152, 163, 167, 168, 169, 169, 171, 201
  There are two middle scores. Find their average.
  $167 + 168 = 335$ $335 \div 2 = 167\frac{1}{2}$ Rob's median score is $167\frac{1}{2}$.
- **Mode** The mode is the value that appears most often.
  There can be more than one mode. If no number appears more often than any other, the set of data has *no mode*.
  Rob scored 169 twice. The mode of Rob's scores is 169.

PRACTICE

The table below shows the bowling scores of Rob's teammates. Each player bowled 4, 5, or 6 games. Fill in the missing numbers in the shaded section of the table. (If there is no mode for a set of scores, write *none* or *no mode*.)

Bowling Scores

Name	1	2	3	4	5	6	Median	Mode	Mean
Matt Reed	175	180	196	200	179	154	179.5	no mode	181
Ben Hanks	189	156	168	207	180	—			
Jose Ruiz	232	230	263	180	230	—			
Phil Chu	178	167	172	175	175	165			
Linda Glass	167	163	167	163	—	—		no mode	
Tim Horne	144	127	85	144	116	110			
Connie Chu	212	156	164	246	260	246			

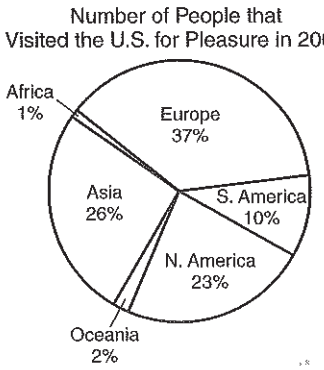
Reading a Circle Graph

Graphs are drawings or diagrams that allow you to read information quickly. You will see various types of graphs in newspapers and magazines, as well as on television.

One type of graph is the **circle graph**. The circle graph, often called a pie graph, divides a circle into wedges that show parts of a whole. Each wedge or section represents a fraction of the total—the larger the section, the greater the fraction of the whole represented.

In a circle graph, it is easy to compare each section with the whole. It is also easy to compare one section with another.

PRACTICE



Use the graph above for Numbers 1–3. Circle the correct answer.

1. The greatest number of people visiting the United States came from

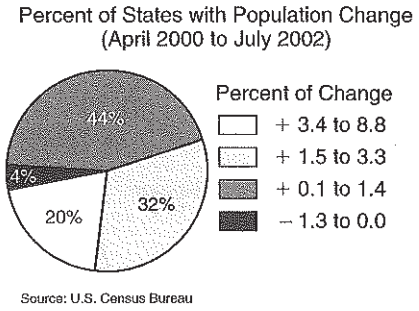
   A Asia **C** Europe
   B North America **D** South America

2. A little more than $\frac{1}{4}$ of the people who visited the United States were from this continent.

   F Asia **H** Europe
   G North America **J** South America

3. The ratio of visitors from Europe to the visitors from South America was closest to

   A 1 to 2 **C** 1 to 3
   B 3 to 1 **D** 4 to 1



The graph above shows the percent of states according to the percent of change in population. Use the graph to answer 4–6.

4. The greatest number of states had a change in population of

   A + 1.5 to 3.3 percent
   B + 0.1 to 1.4 percent
   C + 3.4 to 8.8 percent
   D 0 to −1.3 percent

5. Approximately half of the states had a population change of

   F 3.4 to 8.8 percent
   G 1.5 to 3.3 percent
   H 1.5 to 8.8 percent
   J 0.1 to 3.3 percent

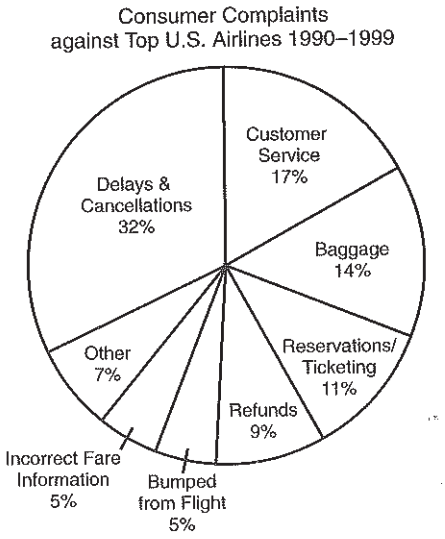
6. A little over three-fourths of the states had a population change of

   A + 0.1 to 3.3 percent
   B + 1.5 to 3.3 percent
   C + 0.1 to 1.4 percent
   D + 3.4 to 8.8 percent

Finding the Numbers Represented in a Circle Graph

Below is a graph of different types of complaints made against top U.S. airlines from 1990-1999. During that 10-year period, a total of 71,245 complaints were registered. Each category has been rounded to the nearest whole percent.

While you can see which category got the greatest percentage of the complaints, this graph does not tell how many complaints there were. To find a number for the complaints for any category, multiply the total number of complaints received by the percent that were received by the category. Since the percents have been rounded, the number of complaints will not be exact.



Note: This graph represents a total of 71, 245 complaints.
Source: U.S. Department of Transportation

Example
Approximately how many complaints were there about flights that were late or canceled? Round your answer to the nearest thousand.

- A total of 71,245 complaints were received.
- 32% of the complaints received were for delayed or canceled flights.
- Find 32% of 71,245.

$$32\% \text{ of } 71{,}245 = 0.32 \times 71{,}245 = 22{,}798.4$$
$$= 22{,}798.4 \approx 23{,}000$$

There were about 23,000 complaints about delayed or canceled flights.

PRACTICE

Use the graph above to answer the following questions. Round each answer to the nearest thousand.

1. Approximately how many customer service complaints were received? _____

2. Approximately how many complaints were received regarding baggage? _____

3. About how many complaints were about incorrect fare information? _____

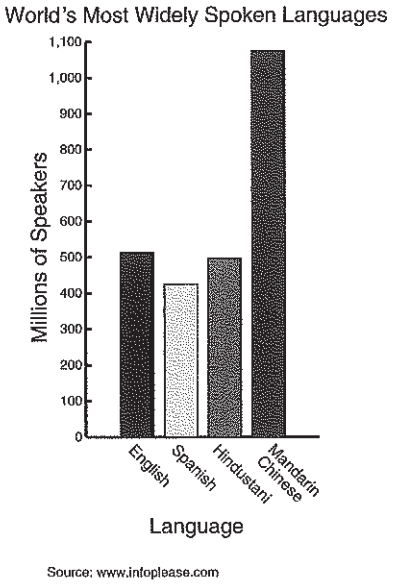
4. About what number of complaints involved problems with reservations or ticketing? _____

5. Which two categories together made up almost half of the complaints received? _____

6. Approximately how many more complaints were received about problems with baggage than about reservation and ticketing problems? _____

Reading a Bar Graph

A bar graph uses thick lines, or bars, to represent categories. Either horizontal or vertical bars can be used. Categories for the bars are listed along one **axis**, and numbers are listed along the other axis.



To read a bar graph, identify the bar representing the category you want. Then determine the number that corresponds with the end of the bar. If a bar ends between two numbers, estimate the number for the end of the bar.

Example

About how many people speak Hindustani?

The bar representing Hindustani lies about $\frac{9}{10}$ of the distance between 400 million and 500 million, or about $\frac{9}{10}$ of 100 million. $\frac{9}{10}$ of 100 million is 90 million.

Add 90 million to 400 million to get 490 million.

About 490 million people speak Hindustani.

PRACTICE

Use the graph above to answer the following questions.

1. About how many people in the world speak English? _____

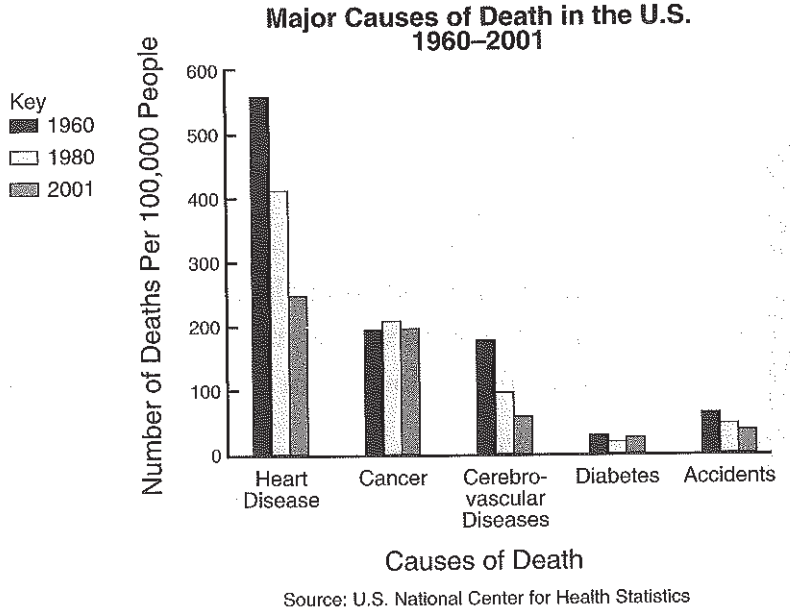
2. Which of these is the best estimate of how many people speak Mandarin Chinese?
   - **A** 1,000
   - **B** 1 billion (1,000,000,000 or 1,000 million)
   - **C** 1.2 billion
   - **D** 1.02 billion

3. About how many times as many people speak Mandarin as speak English? _____

4. Which of the following is *not* shown on this graph?
   - **A** the language that is spoken by the greatest number of people
   - **B** how many more people speak Hindustani than Spanish
   - **C** how many people learn Mandarin as their first language

Understanding Data in Bar Graphs

Bar graphs can be used to show information about more than one set of data at a time. In such graphs, the bars for each set look different. A **key** or **legend** explains what the different bars represent. In the graph below, the key indicates that the different bars represent data for 1960, 1980, and 2001.



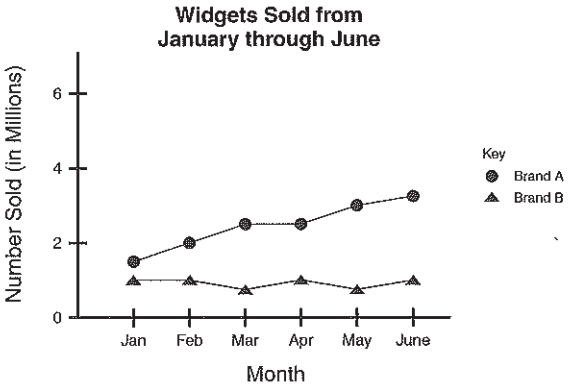
PRACTICE

Use the graph above to answer the following questions.

1. In 2001, about how many Americans out of every 100,000 died of cancer? _____
2. About how many Americans died of heart disease in 1960? _____
3. Which cause of death rose between 1960 and 1980? _____
4. Which two causes of death have had the least change in number over the years shown? _____
5. Which cause of death was about the same in 1960 and 2001? _____
6. About how much lower was the cause of death due to heart disease in 2001 than it was in 1960? _____
7. Based on the graph, an average American town of 200,000 might have expected about how many cancer deaths in 2001? _____
8. Which cause was responsible for around half as many deaths in 2001 as in 1980? _____
9. Which cause of death shows the greatest decrease from 1960 to 2001? _____

Reading a Line Graph

In a **line graph**, line segments connect points or dots that represent data. Line graphs show how something changes over a period of time. When the line displays a pattern of continuing increase, the graph is said to show an **upward trend**. If there is a continuing decrease, the graph shows a **downward trend**. If the data show neither an upward nor a downward trend, the graph is said to show **no trend**.



As with any graph, read the titles to find out what information is represented by the graph. Check the legend to identify the symbols used. The graph shown here compares the number of widgets sold by two companies each month for six months.

PRACTICE

Use the above graph to answer the following questions. Circle the correct answer.

1. The graph shows that
   - **A** more Brand A than Brand B widgets were sold during the time shown
   - **B** more Brand B than Brand A widgets were sold during the time shown
   - **C** Brand A and Brand B sold the same number of widgets

2. The sale of Brand A widgets shows
   - **F** an upward trend
   - **G** a downward trend
   - **H** no trend

3. During which month did one brand have about twice as many sales as the other?
   - **A** January
   - **B** May
   - **C** February
   - **D** June

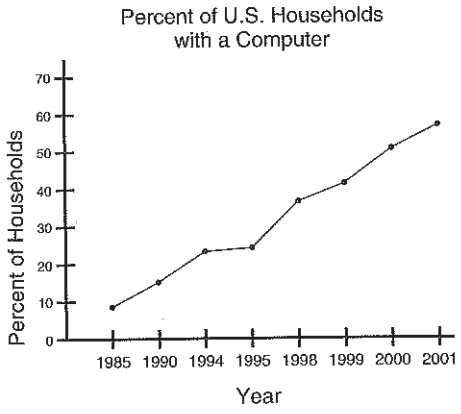
4. In April, approximately how many fewer Brand B widgets were sold than Brand A?
   - **F** $\frac{1}{2}$ million
   - **G** $1\frac{1}{2}$ million
   - **H** 1 million
   - **J** 2 million

5. If sales continue in the same way, approximately how many widget sales can Brand B expect for the month of August?
   - **A** about 4 million
   - **B** about 3 million
   - **C** about 2 million
   - **D** about 1 million

6. If sales continue in the same way, about how many widget sales can Brand A expect for the month of July?
   - **F** $\frac{1}{2}$ million
   - **G** 3 million
   - **H** 1 million
   - **J** 4 million

Probability, Data, and Statistics Skills Checkup

Circle the correct answer for each question.



Source: U.S. Dept. of Commerce

Use the above graph for Numbers 1–4.

1. Which of these is the best estimate of how many more households had a computer in 2000 than in 1985?

   A 5% more C 15% more
   B 40% more D 80% more

2. If in 1995 there were about 100 million households in the United States, about how many households had computers?

   F 24 million H 2.4 million
   G 240 million J There is no way to tell.

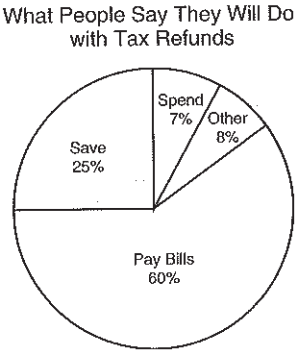
3. Which of the following is the best estimate of the *median* percentage of households that had computers during the years shown?

   A 30% C 50%
   B 63% D 58%

4. Use the trends shown in this graph to predict the percent of households that will have computers in 2004.

   F 42% H 50%
   G 60% J 72%

Use the circle graph for Numbers 5–8.



5. Which question would get the most unbiased response for this survey?

   A What do you plan to do with your tax refund?
   B What do you plan to buy with your tax refund?
   C How much of your tax refund will you use to pay bills?
   D How much of your tax refund do you plan to put into savings?

6. 1,000 people were surveyed. How many said they would spend their refund?

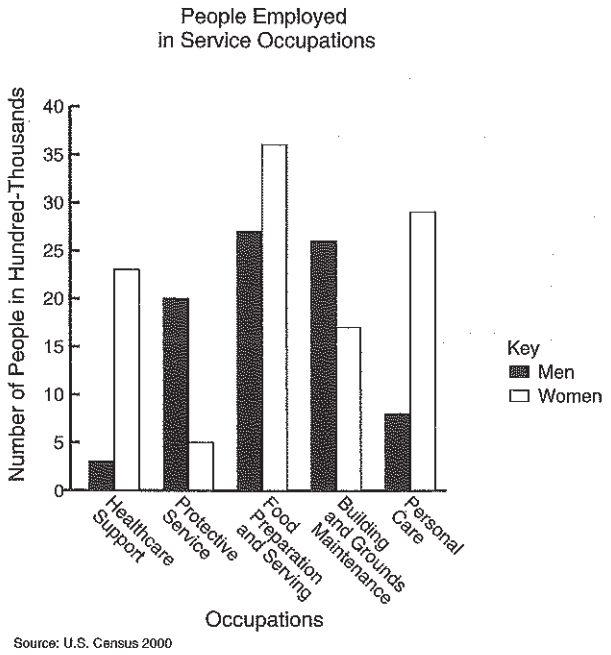
   F 300 H 100
   G 70 J 250

7. Approximately what fraction of the people surveyed would save the money from their tax refund?

   A $\frac{2}{3}$ C $\frac{1}{2}$
   B $\frac{1}{4}$ D $\frac{3}{5}$

8. Based on the percentages shown, if 5,000 people were surveyed, and you selected one of them at random, what is the probability that the person said he or she would pay bills with the refund?

   F $\frac{3}{5}$ H $\frac{2}{3}$
   G $\frac{3}{4}$ J $\frac{5}{6}$



Use the above graph to answer Numbers 9–14.

9. Which category shows about 4 times as many men employed as women?
   - **A** healthcare support
   - **B** protective service
   - **C** food preparation and serving
   - **D** building and grounds maintenance

10. In which category is the number of women employed about $\frac{2}{3}$ the number of men?
   - **F** healthcare support
   - **G** protective service
   - **H** food preparation and serving
   - **J** building and grounds maintenance

11. In which category are the least number of men employed?
   - **A** healthcare support
   - **B** protective service
   - **C** food preparation and serving
   - **D** building and grounds maintenance

12. Approximately how many more women than men are employed in preparing and serving food?
   - **F** 1 million
   - **G** 100 thousand
   - **H** 10 thousand
   - **J** 1 thousand

13. In which category are the greatest number people employed?
   - **A** health support
   - **B** personal care
   - **C** food preparation and serving
   - **D** protective service

14. Which is the best estimate of the total number of people employed in service occupations?
   - **F** 19 hundred
   - **G** 19 thousand
   - **H** 19 hundred thousand
   - **J** 19 million

Page 140

1. 1 hr 22 min
2. 2 hr 25 min
3. 1 hr 40 min
4. 4 hr 45 min
5. 4 hr 15 min
6. 2 hr 50 min
7. 2 hr 9 min
8. 6 hr 30 min

Page 141

1. 60 ft
2. 18 cm
3. 24 in.
4. 22 ft 10 in.
5. 48 m
6. 16 mm
7. 32 km
8. 4 in.
9. 55 ft
10. 28 ft
11. 4 in.
12. 18 cm

Page 142

1. 31.4 in.
2. 37.68 m
3. 75.36 yd
4. 22 ft
5. 44 in.
6. 66 cm

Page 143

1. 84 mi^2
2. 25m^2
3. 90 $in.^2$
4. 180 ft^2
5. 6 m^2
6. 6 yd^2

Page 144

1. 10 $units^2$
2. $4\frac{1}{2}$ $units^2$
3. 6 $units^2$
4. 14 $units^2$
5. 6 $units^2$
6. 35 $units^2$

Page 145

1. 4 ft, 8 ft; 16 ft^2
2. 15 m, 5 m, 37.5 m^2
3. 20 cm, 24 cm; 240 cm^2
4. 25.9 yd^2
5. $1\frac{1}{2}$ ft^2
6. 18.3 m^2
7. 10.9 $in.^2$
8. 16.4 m^2
9. 10.7 cm^2

Page 146

1. 6 m, 36 m; 113.04 m^2
2. 20 ft, 400 ft; 1,256 ft^2
3. 5 yd, 25 yd; 78.5 yd^2
4. 2 km, 4 km: 12.56 km^2
5. 14 in., 196 in; 616 $in.^2$
6. 7 m, 49 m; 154 m^2

Page 147

1. 93 cm^2
2. 150 yd^2
3. 440 ft^2
4. 232 $in.^2$

Page 148

1. 4 cm^3
2. 4 cm^3
3. 4 cm^3
4. 8 cm^3
5. 6 cm^3
6. 27 cm^3
7. 12 cm^3
8. 7 cm^3
9. 12 cm^3

Measurement Skills Checkup

Pages 149–150

1. C
2. G
3. B
4. J
5. C
6. F
7. D
8. F
9. C
10. G
11. D
12. F
13. C
14. H
15. B

Probability, Data, and Statistics

Page 152

1. D
2. H
3. B
4. A
5. C
6. J
7. D
8. F

Page 153

1. D
2. J
3. C

Page 154

1. B
2. Nov. 21, 1980
3. 30,190,300
4. M*A*S*H*, Dallas, and Roots
5. M*A*S*H*
6. Jan. 30, 1977
7. M*A*S*H*

Page 155

1. $4.65
2. $2.28
3. $10.38
4. $12.94
5. $19
6. none
7. $3.25

Page 156

1. Cherokee
2. Choctaw
3. 4,894
4. Sioux
5. Navajo
6. 29,360
7. Sioux
8. D

Page 157

1. A
2. H
3. C
4. H
5. C

Page 158

Ben Hanks	180	no mode	180
Jose Ruiz	230	230	227
Phil Chu	173.5	175	172
Linda Glass	165	no mode	165
Tim Horne	121.5	144	121
Connie Chu	229	246	214

Page 159

1. C
2. F
3. D
4. B
5. H
6. A

Page 160

1. 12,000
2. 10,000
3. 4,000
4. 8,000
5. Delays/Cancellations and Customer Service
6. 2,000

Page 161

1. 500 million
2. D
3. twice as many
4. C

Page 162

1. 200
2. $\frac{550}{100{,}000} \approx \frac{11}{200}$
3. cancer
4. cancer and diabetes
5. cancer and diabetes
6. $\frac{300}{100{,}000} = \frac{3}{1{,}000}$
7. 400
8. heart disease
9. heart disease

Page 163

1. A
2. F
3. C
4. H
5. D
6. J

Probability, Data, and Statistics Skills Checkup

Pages 164–165

1. B
2. F
3. A
4. J
5. A
6. G
7. B
8. F
9. B
10. J
11. A
12. F
13. C
14. J