

TRM Learning Targets Grid

At the beginning of each section, we present the relevant learning targets. Point these out to your students and refer back to the targets when you cover them in class. There is a PDF version of the grid with an additional column that students can use to keep track of their progress. Find it by clicking on the link in the TE-Book, opening the TRFD, or downloading from the Teacher's Resources on the book's digital platform.

PD Introduction Overview

To watch the video overview of the Introduction (for teachers), click on the link in the TE-Book, look on the TRFD, or download from Teacher's Resources on the book's digital platform.

Teaching Tip

Statistics often requires formulating a question, setting up an experiment, collecting and analyzing data, and drawing a conclusion (science). Furthermore, there is not always one correct way to do the analysis, so we have to be creative in our thinking (art).

+ Ask the StatsMedic**Experience First, Formalize Later**

In this post, we discuss our philosophy for effectively teaching statistics. Generally, we want students to do some deep thinking and reasoning in a context before being exposed to formal definitions and formulas.

INTRODUCTION Statistics: The Science and Art of Data

LEARNING TARGETS *By the end of the section, you should be able to:*

- Identify the individuals and variables in a set of data.
- Classify variables as categorical or quantitative.

We live in a world of *data*. Every day, the media report poll results, outcomes of medical studies, and analyses of data on everything from stock prices to standardized test scores to global warming. The data are trying to tell us a story. To understand what the data are saying, you need to learn more about statistics.

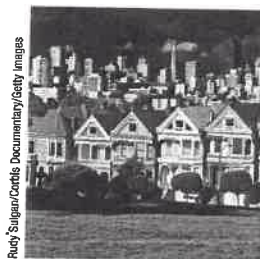
DEFINITION Statistics

Statistics is the science and art of collecting, analyzing, and drawing conclusions from data.

A solid understanding of statistics will help you make good decisions based on data in your daily life.

Organizing Data

Every year, the U.S. Census Bureau collects data from over 3 million households as part of the American Community Survey (ACS). The table displays some data from the ACS in a recent year.



Household	Region	Number of people	Time in dwelling (years)	Response mode	Household income	Internet access?
425	Midwest	5	2-4	Internet	52,000	Yes
936459	West	4	2-4	Mail	40,500	Yes
50055	Northeast	2	10-19	Internet	481,000	Yes
592934	West	4	2-4	Phone	230,800	No
545854	South	9	2-4	Phone	33,800	Yes
809928	South	2	30+	Internet	59,500	Yes
110157	Midwest	1	5-9	Internet	80,000	Yes
999347	South	1	<1	Mail	8,400	No

Most data tables follow this format—each row describes an **individual** and each column holds the values of a **variable**.

TRM Additional First-Day Activities

To begin the school year, we recommend that you start with an engaging activity, such as the "Hiring discrimination" activity on page 6. We also recommend that students read the "Overview: What Is Statistics?" on page xxiii and complete "Mr. Starnes's Infamous AP® Statistics Survey." Use this survey to gather data about your students that you can use all year long. Students are usually more interested in themselves than other people! Finally, to help students take advantage of all that *TPS* has to offer, have them read the Preface for Students on page xiii and complete the "Getting to Know Your Textbook" activity. The survey and activity may be found in the Teacher's Resource Materials located in the TE-Book, on the TRFD, or in the Teacher's Resources on the book's digital platform.

Sometimes the individuals in a data set are called *cases* or *observational units*.

DEFINITION Individual, Variable

An **individual** is an object described in a set of data. Individuals can be people, animals, or things.

A **variable** is an attribute that can take different values for different individuals.

For the American Community Survey data set, the *individuals* are households. The *variables* recorded for each household are region, number of people, time in current dwelling, survey response mode, household income, and whether the dwelling has Internet access. Region, time in dwelling, response mode, and Internet access status are **categorical variables**. Number of people and household income are **quantitative variables**.

Note that household is *not* a variable. The numbers in the household column of the data table are just labels for the individuals in this data set. Be sure to look for a column of labels—names, numbers, or other identifiers—in any data table you encounter.

DEFINITION Categorical variable, Quantitative variable

A **categorical variable** assigns labels that place each individual into a particular group, called a category.

A **quantitative variable** takes number values that are quantities—counts or measurements.

Not every variable that takes number values is **quantitative**. Zip code is one example. Although zip codes are numbers, they are neither counts of anything, nor measurements of anything. They are simply labels for a regional location, making zip code a categorical variable. Some variables—such as gender, race, and occupation—are categorical by nature. Time in dwelling from the ACS data set is also a categorical variable because the values are recorded as intervals of time, such as 2–4 years. If time in dwelling had been recorded to the nearest year for each household, this variable would be quantitative.

To make life simpler, we sometimes refer to *categorical data* or *quantitative data* instead of identifying the variable as categorical or quantitative.

AP® EXAM TIP

If you learn to distinguish categorical from quantitative variables now, it will pay big rewards later. You will be expected to analyze categorical and quantitative variables correctly on the AP® exam.

EXAMPLE**Census At School
Individuals and Variables**

PROBLEM: Census At School is an international project that collects data about primary and secondary school students using surveys. Hundreds of thousands of students from Australia, Canada, Ireland, Japan, New Zealand, South Africa, South Korea, the United Kingdom, and the United States have taken part in the project. Data from the surveys are available online. We used the site's "Random Data Selector" to choose 10 Canadian students who completed the survey in a recent year. The table displays the data.

**ALTERNATE EXAMPLE**

Skill 2.A

Which car is best for Mr. Starnes? Individuals and variables

Mr. Starnes is thinking about buying a new car. He has narrowed his choices down to 10 vehicles. Here is information about each vehicle:

Make	Model	Price (\$)	Drivetrain	# doors	City MPG	Engine type
Ford	Focus	17,650	FWD	Four	26	Inline 4
Ford	Escape	27,745	4WD	Four	22	Inline 4
Ford	Fusion	23,485	FWD	Four	22	Inline 4
Honda	CR-V	26,045	4WD	Four	25	Inline 4
Honda	Civic	19,985	FWD	Two	28	Inline 4
Honda	Pilot	33,295	AWD	Four	18	V-6
Porsche	Cayman	53,650	RWD	Two	20	Flat-6
Toyota	Camry	23,935	FWD	Four	24	Inline 4
Toyota	Prius	25,550	FWD	Four	54	Electric/Inline 4
Toyota	RAV4	27,250	AWD	Four	22	Inline 4

All data taken from www.caranddriver.com.

Teaching Tip

Emphasize that "individuals" don't have to be people. For example, the individuals in a study could be the trees in an orchard or the M&M'S® chocolate candies in a bag.

Teaching Tip

Notice the categorical variable that was identified as "Internet access *status*," rather than simply "Internet access." Describing the variable as "Internet access" would be missing a reference to levels or status and is not sufficient.

Teaching Tip

A **statistical question** is one in which the answer is based on data that vary depending on the individual that is chosen.

Teaching Tip

Any quantitative variable can be made into a categorical variable by creating groups for certain intervals of values.

Teaching Tip

The icon at the top of this example (and many others) indicates that students can watch a video presentation of the example by clicking on the link in the e-Book or viewing the videos on the Student Site at highschool.bfwpub.com/updatedtps6e. If you have a projector and Internet access, we recommend that you show your students how to access the videos.

(continues)

ALTERNATE EXAMPLE (continued)

PROBLEM:

- (a) Identify the individuals in this data set.
 (b) What are the variables? Classify each as categorical or quantitative.

SOLUTION:

- (a) The 10 vehicles that Mr. Starnes has identified for potential purchase.
 (b) Categorical: Make, Model, Drivetrain, Number of doors, Engine type
 Quantitative: Price (\$), City MPG.

Chapter 1 Introduction

Alternate Examples

You can find the Alternate Examples for this section in Microsoft Word format by clicking on the link in the TE-Book, opening the TRFD, or downloading from the Teacher's Resources on the book's digital platform.

Making Connections

In Chapter 6, students will distinguish *random variables* as being **discrete** (with gaps between possible values) or **continuous** (no gaps between possible values).

Province	Gender	Number of languages spoken	Handedness	Height (cm)	Wrist circumference (mm)	Preferred communication
Saskatchewan	Male	1	Right	175.0	180	In person
Ontario	Female	1	Right	162.5	160	In person
Alberta	Male	1	Right	178.0	174	Facebook
Ontario	Male	2	Right	169.0	160	Cell phone
Ontario	Female	2	Right	166.0	65	In person
Nunavut	Male	1	Right	168.5	160	Text messaging
Ontario	Female	1	Right	166.0	165	Cell phone
Ontario	Male	4	Left	157.5	147	Text messaging
Ontario	Female	2	Right	150.5	187	Text messaging
Ontario	Female	1	Right	171.0	180	Text messaging

- (a) Identify the individuals in this data set.
 (b) What are the variables? Classify each as categorical or quantitative.

SOLUTION:

- (a) 10 randomly selected Canadian students who participated in the Census At School survey.
 (b) Categorical: Province, gender, handedness, preferred communication method
 Quantitative: Number of languages spoken, height (cm), wrist circumference (mm)

We'll see in Chapter 4 why choosing at random, as we did in this example, is a good idea.

There is at least one suspicious value in the data table. We doubt that the girl who is 166 cm tall really has a wrist circumference of 65 mm (about 2.6 inches). Always look to be sure the values make sense!

FOR PRACTICE, TRY EXERCISE 1

There are two types of quantitative variables: *discrete* and *continuous*. Most discrete variables result from counting something, like the number of languages spoken in the preceding example. Continuous variables typically result from measuring something, like height or wrist circumference. Be sure to report the units of measurement (like centimeters for height and millimeters for wrist circumference) for a continuous variable.

DEFINITION Discrete variable, Continuous variable

A quantitative variable that takes a fixed set of possible values with gaps between them is a **discrete variable**.

A quantitative variable that can take any value in an interval on the number line is a **continuous variable**.

The proper method of data analysis depends on whether a variable is categorical or quantitative. For that reason, it is important to distinguish these two types of variables. The type of data determines what kinds of graphs and which numerical summaries are appropriate.

ANALYZING DATA A variable generally takes values that vary (hence the name *variable*). Categorical variables sometimes have similar counts in each category and sometimes don't. For instance, we might have expected similar numbers of

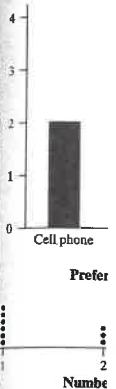


FIGURE 1.1 (a) Bar graph showing the distribution of preferred communication methods for 10 Canadian students.

Preparing for Inference

Categorical and quantitative variables each require different inference procedures. Identifying the type of variable will help students choose the correct inference procedure for a given set of data.

males and females in the Census At School data set. But we aren't surprised to see that most students are right-handed. Quantitative variables may take values that are very close together or values that are quite spread out. We call the pattern of variation of a variable its **distribution**.

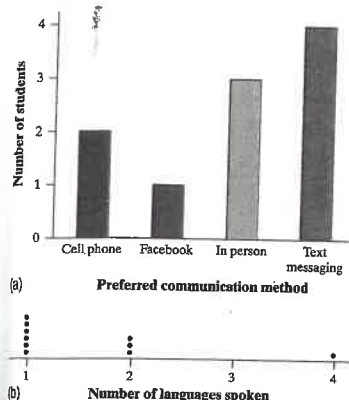


FIGURE 1.1 (a) Bar graph showing the distribution of preferred communication method for the sample of 10 Canadian students. (b) Dotplot showing the distribution of number of languages spoken by these students.

DEFINITION Distribution

The **distribution** of a variable tells us what values the variable takes and how often it takes those values.

Let's return to the data for the sample of 10 Canadian students from the preceding example. Figure 1.1(a) shows the distribution of preferred communication method for these students in a *bar graph*. We can see how many students chose each method from the heights of the bars: cell phone (2), Facebook (1), in person (3), text messaging (4). Figure 1.1(b) shows the distribution of number of languages spoken in a *dotplot*. We can see that 6 students speak one language, 3 students speak two languages, and 1 student speaks four languages.

Section 1.1 begins by looking at how to describe the distribution of a single categorical variable and then examines relationships between categorical variables. Sections 1.2 and 1.3 and all of Chapter 2 focus on describing the distribution of a quantitative variable. Chapter 3 investigates relationships between two quantitative variables. In each case, we begin with graphical displays, then add numerical summaries for a more complete description.

HOW TO ANALYZE DATA

- Begin by examining each variable by itself. Then move on to study relationships among the variables.
- Start with a graph or graphs. Then add numerical summaries.

This process of exploratory data analysis is known as *descriptive statistics*.



CHECK YOUR UNDERSTANDING

Jake is a car buff who wants to find out more about the vehicles that his classmates drive. He gets permission to go to the student parking lot and record some data. Later, he does some Internet research on each model of car he found. Finally, Jake makes a spreadsheet that includes each car's license plate, model, number of cylinders, color, highway gas mileage, weight, and whether it has a navigation system.

1. Identify the individuals in Jake's study.
2. What are the variables? Classify each as categorical or quantitative.
3. Identify each quantitative variable as discrete or continuous.

Teaching Tip

Whenever you use the word *distribution* in this chapter, it is a good idea to remind students that a distribution tells us (1) what values a variable takes and (2) how often it takes those values. This applies to distributions of both categorical and quantitative variables. Also, a "value" doesn't have to be a number. The values of the variable *color* include blue, red, and so on. Ask students "Distribution of what?" to get them to carefully identify the variable.

Teaching Tip

The "Check Your Understanding" gives students an opportunity to pause and apply what they just learned. This feature can be used during class or as an exit slip at the end of a lesson.

✓ Answers to CYU

1. The individuals are the cars in the student parking lot.
2. He recorded the car's license plate number to identify the individuals. The variables recorded for each individual are the model (categorical), number of cylinders (quantitative), color (categorical), highway gas mileage (quantitative), weight (quantitative), and whether or not it has a navigation system (categorical).
3. Number of cylinders (quantitative/discrete), highway gas mileage and weight (quantitative/continuous)

TRM Smelling Parkinson's Activity

An alternative activity that explores the same concepts is found in the "Smelling Parkinson's" handout created by Doug Tyson.

Preparing for Inference

This activity can be used on the first day of class. The context is accessible for all learners, and it gets students to think inferentially.

ACTIVITY OVERVIEW

To help prepare for using this activity, watch the overview video by clicking on the link in the TE-Book, opening the TRFD, or downloading from the Teacher's Resources on the book's digital platform.

Time: 20 minutes

Materials: Bag with 25 beads (15 of one color and 10 of another) or 25 slips of paper (15 labeled "male" and 10 labeled "female") for each group of students

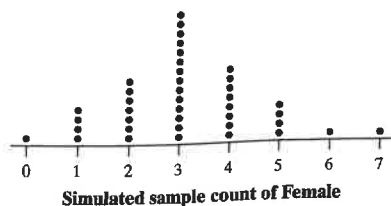
Teaching Advice: Please do this activity! It introduces students to the major themes of the course. Consider making the dotplot on chart paper or a poster and saving it to refer back to when you get to significance tests in Chapter 9. The theoretical probability of 5 or more females is about 0.128.

Extension: Would your advice change if the lottery had chosen 6 female (and 2 male) pilots? What about 7 female pilots? Explain.

Answers:

1–2. Answers will vary for each class.

3. Here is one possible dotplot:



4. Yes, it is believable that the lottery was fair because selecting 5 or more female pilots would not be that surprising ($6/40 = 0.15$). I would advise the male pilot not to file a grievance with the pilots' union.

From Data Analysis to Inference

Sometimes we're interested in drawing conclusions that go beyond the data at hand. That's the idea of *inferential statistics*. In the "Census At School" example, 9 of the 10 randomly selected Canadian students are right-handed. That's 90% of the *sample*. Can we conclude that exactly 90% of the *population* of Canadian students who participated in Census At School are right-handed? No.

If another random sample of 10 students were selected, the percent who are right-handed might not be exactly 90%. Can we at least say that the actual population value is "close" to 90%? That depends on what we mean by "close." The following activity gives you an idea of how statistical inference works.

ACTIVITY

Hiring discrimination—it just won't fly!

An airline has just finished training 25 pilots—15 male and 10 female—to become captains. Unfortunately, only eight captain positions are available right now. Airline managers announce that they will use a lottery to determine which pilots will fill the available positions. The names of all 25 pilots will be written on identical slips of paper. The slips will be placed in a hat, mixed thoroughly, and drawn out one at a time until all 8 captains have been identified.



A day later, managers announce the results of the lottery. Of the 8 captains chosen, 5 are female and 3 are male. Some of the male pilots who weren't selected suspect that the lottery was not carried out fairly. One of these pilots asks your statistics class for advice about whether to file a grievance with the pilots' union.

The key question in this possible discrimination case seems to be: *Is it plausible (believable) that these results happened just by chance?* To find out, you and your classmates will *simulate* the lottery process that airline managers said they used.

1. Your teacher will give you a bag with 25 beads (15 of one color and 10 of another) or 25 slips of paper (15 labeled "M" and 10 labeled "F") to represent the 25 pilots. Mix the beads/slips thoroughly. Without looking, remove 8 beads/slips from the bag. Count the number of female pilots selected. Then return the beads/slips to the bag.
2. Your teacher will draw and label a number line for a class *dotplot*. On the graph, plot the number of females you got in Step 1.
3. Repeat Steps 1 and 2 if needed to get a total of at least 40 simulated lottery results for your class.
4. Discuss the results with your classmates. Does it seem plausible that airline managers conducted a fair lottery? What advice would you give the male pilot who contacted you?

Our ability to do inference is determined by how the data are produced. Chapter 4 discusses the two main methods of data production—sampling and

Preparing for Inference

The hiring discrimination activity foreshadows several of the big ideas of formal inference:

Hypotheses: To start the activity, we assume that the lottery was carried out fairly. In Chapter 9, this claim will be called the **null hypothesis**.

P-value: Count the number of dots in the dotplot that represent 5 females or more. Convert this count to a percent by dividing by the total number of dots. In Chapter 9, this estimated probability will be called the **P-value**.

Conclusion: If the *P*-value is small, the observed outcome is unlikely to happen purely by chance if the null hypothesis is true, and we have convincing evidence that the lottery was unfair. What constitutes a *P*-value that is "small"? This depends on the context, but a generally accepted rule is that less than 5% is considered **statistically significant** (Chapter 4).

experiments—and the types of conclusions that can be drawn from each. As the activity illustrates, the logic of inference rests on asking, “What are the chances?” *Probability*, the study of chance behavior, is the topic of Chapters 5–7. We’ll introduce the most common inference techniques in Chapters 8–12.

Introduction

Summary

- **Statistics** is the science and art of collecting, analyzing, and drawing conclusions from data.
- A data set contains information about a number of **individuals**. Individuals may be people, animals, or things. For each individual, the data give values for one or more **variables**. A variable describes some characteristic of an individual, such as a person’s height, gender, or salary.
- A **categorical variable** assigns a label that places each individual in one of several groups, such as male or female. A **quantitative variable** has numerical values that count or measure some characteristic of each individual, such as number of siblings or height in meters.
- There are two types of quantitative variables: discrete and continuous. A **discrete variable** has a fixed set of possible numeric values with gaps between them. A **continuous variable** can take any value in an interval on the number line. Discrete variables usually result from counting something; continuous variables usually result from measuring something.
- The **distribution** of a variable describes what values the variable takes and how often it takes them.

Introduction

Exercises

The solutions to all exercises numbered in red may be found in the Solutions Appendix, starting on page S-1.

1. **A class survey** Here is a small part of the data set that describes the students in an AP® Statistics class. The data come from anonymous responses to a questionnaire filled out on the first day of class.

Gender	Grade level	GPA	Children in family	Homework last night (min)	Android or iPhone?
F	9	2.3	3	0–14	iPhone
M	11	3.8	6	15–29	Android
M	10	3.1	2	15–29	Android
F	10	4.0	1	45–59	iPhone
F	10	3.4	4	0–14	iPhone
F	10	3.0	3	30–44	Android
M	9	3.9	2	15–29	iPhone
M	12	3.5	2	0–14	iPhone

- (a) Identify the individuals in this data set.
(b) What are the variables? Classify each as categorical or quantitative.

2. **Coaster craze** Many people like to ride roller coasters. Amusement parks try to increase attendance by building exciting new coasters. The following table displays data on several roller coasters that were opened in a recent year.¹

Roller coaster	Type	Height (ft)	Design	Speed (mph)	Duration (sec)
Wildfire	Wood	187.0	Sit down	70.2	120
Skyline	Steel	131.3	Inverted	50.0	90
Goliath	Wood	165.0	Sit down	72.0	105
Helix	Steel	134.5	Sit down	62.1	130
Banshee	Steel	167.0	Inverted	68.0	160
Black Hole	Steel	22.7	Sit down	25.5	75

- (a) Identify the individuals in this data set.
(b) What are the variables? Classify each as categorical or quantitative.
3. **Hit movies** According to the Internet Movie Database, *Avatar* is tops based on box-office receipts worldwide as of January 2017. The following table displays data on several popular movies. Identify the individuals

Teaching Tip

Make sure to point out the two icons next to Exercise 1. The “pg 3” icon reminds students that the example on page 3 is very similar to this exercise. The “play” icon reminds students that there is a video solution available by clicking on the link in the e-Book or viewing the videos on the Student Site at highschool.bfwpub.com/updatedtps6e.

Teaching Tip

Many solutions provided in the *Annotated Teacher’s Edition* have been shortened to fit in the margin.

Full Solutions to Chapter 1 Introduction Exercises

Complete solutions are available as PDFs by clicking on the link in the TE-Book, opening the TRFD, or downloading from the Teacher’s Resources on the book’s digital platform.

Answers to Chapter 1 Introduction Exercises

1.1 (a) The AP® Statistics students who completed a questionnaire on the first day of class. (b) gender (categorical), grade level (categorical), GPA (quantitative), children in family (quantitative), homework last night (min) (categorical), and type of phone (categorical)

1.2 (a) The roller coasters that were opened in a recent year. (b) type (categorical), height (ft) (quantitative), design (categorical), speed (mph) (quantitative), and duration(s) (quantitative)

1.3 The individuals are movies. The variables are year (quantitative), rating (categorical), time (min) (quantitative), genre (categorical), and box office (\$) (quantitative). *Note:* Year might be considered categorical if we want to know how many of these movies were made each year, rather than the average year.

1.4 The individuals are the tallest buildings in the world as of February 2017. The variables are country (categorical), height (m) (quantitative), floors (quantitative), use (categorical), and year completed (quantitative).

1.5 The categorical variables are type of wood, type of water repellent, and paint color. The quantitative variables are paint thickness and weathering time.

1.6 The categorical variables are gender, race, and smoker status. The quantitative variables are age, systolic blood pressure, and level of calcium in the blood.

1.7 The discrete variables are number of siblings and how many books they have read in the past month. The continuous variables are the distance from their home to campus and how long it took them to complete an online survey.

1.8 The discrete variables are the number of times they visited the site and the number of likes received. The continuous variables are the time spent on the site and how long since they created a member profile.

1.9 b

1.10 c

and variables in this data set. Classify each variable as categorical or quantitative.

Movie	Year	Rating	Time (min)	Genre	Box office (\$)
Avatar	2009	PG-13	162	Action	2,783,918,982
Titanic	1997	PG-13	194	Drama	2,207,615,668
Star Wars: The Force Awakens	2015	PG-13	136	Adventure	2,040,375,795
Jurassic World	2015	PG-13	124	Action	1,669,164,161
Marvel's The Avengers	2012	PG-13	142	Action	1,519,479,547
Furious 7	2015	PG-13	137	Action	1,516,246,709
The Avengers: Age of Ultron	2015	PG-13	141	Action	1,404,705,868
Harry Potter and the Deathly Hallows: Part 2	2011	PG-13	130	Fantasy	1,328,111,219
Frozen	2013	PG	108	Animation	1,254,512,386
Iron Man 3	2013	PG-13	129	Action	1,172,805,920

4. **Skyscrapers** Here is some information about the tallest buildings in the world as of February 2017. Identify the individuals and variables in this data set. Classify each variable as categorical or quantitative.

Building	Country	Height (m)	Floors	Use	Year completed
Burj Khalifa	United Arab Emirates	828.0	163	Mixed	2010
Shanghai Tower	China	632.0	121	Mixed	2014
Makkah Royal Clock Tower Hotel	Saudi Arabia	601.0	120	Hotel	2012
Ping An Finance Center	China	599.0	115	Mixed	2016
Lotte World Tower	South Korea	554.5	123	Mixed	2016
One World Trade Center	United States	541.0	104	Office	2013
Taipei 101	Taiwan	509.0	101	Office	2004
Shanghai World Financial Center	China	492.0	101	Mixed	2008
International Commerce Center	China	484.0	118	Mixed	2010
Petronas Tower 1	Malaysia	452.0	88	Office	1998

5. **Protecting wood** What measures can be taken, especially when restoring historic wooden buildings, to help wood surfaces resist weathering? In a study of this question, researchers prepared wooden panels and then exposed them to the weather. Some of the variables recorded were type of wood (yellow poplar, pine, cedar); type of water repellent (solvent-based, water-based); paint thickness (millimeters); paint color (white, gray, light blue); weathering time (months). Classify each variable as categorical or quantitative.

6. **Medical study variables** Data from a medical study contain values of many variables for each subject in the study. Some of the variables recorded were gender (female or male); age (years); race (Asian, Black, White, or other); smoker (yes or no); systolic blood pressure (millimeters of mercury); level of calcium in the blood (micrograms per milliliter). Classify each variable as categorical or quantitative.
7. **College life** A college admissions office collects data from each incoming freshman on several quantitative variables: distance from their home to campus, number of siblings, how many books they have read in the past month, and how long it took them to complete an online survey. Classify each variable as discrete or continuous.
8. **Social media** A social media company records data from each of its users on several quantitative variables: time spent on the site, how many times they visited the site, number of likes received, and how long since they created a member profile. Classify each variable as discrete or continuous.

Multiple Choice: Select the best answer.

Exercises 9 and 10 refer to the following setting. At the Census Bureau website www.census.gov, you can view detailed data collected by the American Community Survey. The following table includes data for 10 people chosen at random from the more than 1 million people in households contacted by the survey. "School" gives the highest level of education completed.

Weight (lb)	Age (years)	Travel to work (min)	School	Gender	Income last year (\$)
187	66	0	Ninth grade	1	24,000
158	66	n/a	High school grad	2	0
176	54	10	Assoc. degree	2	11,900
339	37	10	Assoc. degree	1	6000
91	27	10	Some college	2	30,000
155	18	n/a	High school grad	2	0
213	38	15	Master's degree	2	125,000
194	40	0	High school grad	1	800
221	18	20	High school grad	1	2500
193	11	n/a	Fifth grade	1	0

9. The individuals in this data set are

- (a) households. (b) people. (c) adults.
(d) 120 variables. (e) columns.

10. This data set contains

- (a) 7 variables, 2 of which are categorical.
(b) 7 variables, 1 of which is categorical.
(c) 6 variables, 2 of which are categorical.
(d) 6 variables, 1 of which is categorical.
(e) None of these.