

## **Chapter 1**

### **Stats Starts Here**

#### ***Solutions to Class Examples:***

##### *Consumer Reports*

Who: energy bars

What: brand name, flavor, price, calories, protein, fat

When: not specified

Where: not specified

How: not specified. Are data collected from the label? Are independent tests performed?

Why: information for potential consumers

Categorical variables: brand name, flavor

Quantitative variables: price (US\$), number of calories (calories), protein (grams), fat(grams)

##### Boston Marathon

Who: Boston Marathon runners

What: gender, country, age, time

When: not specified

Where: Boston

How: not specified. Presumably, the data were collected from registration information.

Why: race result reporting

Categorical variables: gender, country

Quantitative variables: age (years), time (hours, minutes, seconds)

#### ***Supplemental Resources:***

The following page contains a list of the 50 United States of America. We have found it to be helpful if you collect class data on the number of States visited. On the next page is a potential blank survey that you can pass around on the first day of class to collect some data. Some of the survey questions are left deliberately vague, so that you can discuss potential sources of bias, informally of course.

***States—Count the number you have visited***

Alabama	Indiana	Nebraska	Rhode Island
Alaska	Iowa	Nevada	South Carolina
Arizona	Kansas	New Hampshire	South Dakota
Arkansas	Kentucky	New Jersey	Tennessee
California	Louisiana	New Mexico	Texas
Colorado	Maine	New York	Utah
Connecticut	Maryland	North Carolina	Vermont
Delaware	Massachusetts	North Dakota	Virginia
Florida	Michigan	Ohio	Washington
Georgia	Minnesota	Oklahoma	West Virginia
Hawaii	Mississippi	Oregon	Wisconsin
Idaho	Missouri	Pennsylvania	Wyoming
Illinois	Montana		

***States—Count the number you have visited***

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Connecticut	Maryland	North Carolina	Vermont
Delaware	Massachusetts	North Dakota	Virginia
Florida	Michigan	Ohio	Washington
Georgia	Minnesota	Oklahoma	West Virginia
Hawaii	Mississippi	Oregon	Wisconsin
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**Statistics Quiz A—Chapter 1**

Name \_\_\_\_\_

1. One of the reasons that the Monitoring the Future (MTF) project was started was “to study changes in the beliefs, attitudes, and behavior of young people in the United States.” Data are collected from 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders each year. To get a representative nationwide sample, surveys are given to a randomly selected group of students. In Spring 2018, students were asked about alcohol, illegal drug, and cigarette use. Describe the W’s, if the information is given. If the information is not given, state that it is not specified.

- Who:
- What:
- When:
- Where:
- How:
- Why:

2. Consider the following part of a data set:

Age (years)	Sex	Only child?	Height (inches)	Weight (pounds)	Credit Hours	GPA	Major
21	Female	Yes	67.00	140.0	16	3.60	animal science
20	Female	No	62.00	130.0	18	3.86	biology
28	Female	No	64.00	188.0	21	3.25	psychology
21	Male	No	65.00	140.0	15	2.95	psychology
24	Female	No	67.00	130.0	20	3.00	anthropology
22	Male	Yes	68.00	135.0	15	2.94	journalism

List the variables in the data set. Indicate whether each variable is treated as categorical or quantitative in this data set. If the variable is quantitative, state the units.

**Statistics Quiz A—Chapter 1—Key**

1. One of the reasons that the Monitoring the Future (MTF) project was started was “to study changes in the beliefs, attitudes, and behavior of young people in the United States.” Data are collected from 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders each year. To get a representative nationwide sample, surveys are given to a randomly selected group of students. In Spring 2016, students were asked about alcohol, illegal drug, and cigarette use. Describe the W’s, if the information is given. If the information is not given, state that it is not specified.
- Who: 8<sup>th</sup>, 10<sup>th</sup>, and 12<sup>th</sup> graders
  - What: alcohol, illegal drug, and cigarette use
  - When: Spring 2018
  - Where: United States
  - How: survey
  - Why: “to study changes in the beliefs, attitudes, and behavior of young people in the United States”

2. Consider the following part of a data set:

Age (years)	Sex	Only child?	Height (inches)	Weight (pounds)	Credit Hours	GPA	Major
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22	Male	Yes	68.00	135.0	15	2.94	journalism

List the variables in the data set. Indicate whether each variable is treated as categorical or quantitative in this data set. If the variable is quantitative, state the units.

Categorical: sex, only child?, major

Quantitative: age (years), height (inches), weight (pounds), credit hours, GPA

**Statistics Quiz B—Chapter 1**

**Name** \_\_\_\_\_

In November 2003 *Discover* published an article on the colonies of ants. They reported some basic information about many species of ants and the results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida. Information included the scientific name of the ant species, the geographic location, the depth of the nest (in feet), the number of chambers in the nest, and the number of ants in the colony. The article documented how new ant colonies begin, the ant-nest design, and how nests differ in shape, number, size of chambers, and how they are connected, depending on the species. It reported that nest designs include vertical, horizontal, or inclined tunnels for movement and transport of food and ants.

1. Describe the W's, if the information is given:
  - Who:
  - What:
  - When:
  - Where:
  - How:
  - Why:
  
2. List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

**Statistics Quiz B—Chapter 1—Key**

In November 2003 *Discover* published an article on the colonies of ants. They reported some basic information about many species of ants and the results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida. Information included the scientific name of the ant species, the geographic location, the depth of the nest (in feet), the number of chambers in the nest, and the number of ants in the colony. The article documented how new ant colonies begin, the ant-nest design, and how nests differ in shape, number, size of chambers, and how they are connected, depending on the species. It reported that nest designs include vertical, horizontal, or inclined tunnels for movement and transport of food and ants.

1. Describe the W's, if the information is given:

- Who: Colonies of ants. "Many species of ants," but no indication of exactly how many.
- What: scientific name, geographic location, average nest depth, average number of chambers, average colony size, how new ant colonies begin, the ant-nest design, and how nests differ in architecture.
- When: November 2003
- Where: not specified
- How: The results of some discoveries found by myrmecologist Walter Tschinkel of the University of Florida
- Why: Information of interest to readers of the magazine

2. List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

Categorical: species, geographic location, how new ant colonies begin, and nest design.

Quantitative: nest depth (feet), number of chambers (units), and colony size (units).

**Statistics Quiz C—Chapter 1**

**Name** \_\_\_\_\_

In December 2018, Wirecutter published an article entitled “The Best True Wireless Headphones So Far” (<http://thewirecutter.com/reviews/best-true-wireless-headphones/>). They “tested over 60 sets of true wireless in-ear headphones.” Among other things, the article told the brand of each pair of headphones, its price, battery life, audio quality, ease of setup, and other characteristics. The article provides a number of recommendations including best for the money, best for the gym, best for Apple, and best for Android. The author, Lauren Dragan, describes herself as a voice actor with an audio production degree who has spent hundreds of hours testing headphones for Wirecutter.

1. Describe the W’s, if the information is given:
  - Who:
  - What:
  - When:
  - Where:
  - How:
  - Why:
2. List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.



**Statistics Quiz C—Chapter 1—Key**

In December 2018, Wirecutter published an article entitled “The Best True Wireless Headphones So Far” (<http://thewirecutter.com/reviews/best-true-wireless-headphones/>). They “tested over 60 sets of true wireless in-ear headphones.” Among other things, the article told the brand of each pair of headphones, its price, battery life, audio quality, ease of setup, and other characteristics. The article provides a number of recommendations including best for the money, best for the gym, best for Apple, and best for Android. The author, Lauren Dragan, describes herself as a voice actor with an audio production degree who has spent hundreds of hours testing headphones for Wirecutter.

1. Describe the W’s, if the information is given:
  - Who: 11 wireless in-ear headphones.
  - What: brand, price, battery life, audio quality, ease of setup, and other characteristics.
  - When: December 2018
  - Where: not specified, probably the United States
  - How: presumably lab tests of the “over 60” models
  - Why: information for potential consumers
2. List the variables. Indicate whether each variable is categorical or quantitative. If the variable is quantitative, tell the units.

Categorical: brand, audio quality, ease of setup

Quantitative: price (US\$), battery life (probably hours)

**Statistics Quiz D—Chapter 1**

**Name** \_\_\_\_\_

1. In November and December of 2015, the *Pew Research Center* surveyed a sample of American adults aged 18 and older about online shopping. American adults aged 18 and older constitute the \_\_\_\_\_ of the study.
  - A. Who
  - B. What
  - C. When
  - D. Where
  - E. How
  
2. A few of the variables for which data were collected in the *Pew Research Center* study about online shopping include age, gender, income, and number of hours spent shopping online per month. Which of the variables is categorical?
  - A. Age
  - B. Gender
  - C. Income
  - D. Number of hours spent shopping online
  - E. None
  
3. The *Pew Research Center* study about online shopping asked respondents to indicate their education level on the following scale: *Less than High School, High School, Some College, College +*. Which of the following statements is (are) true?
  - A. Education level is a categorical variable.
  - B. Education level is nominal scaled.
  - C. Education level is ordinal scaled.
  - D. Both A and B
  - E. Both A and C
  
4. *Consumer Reports Health* routinely compares drugs in terms of effectiveness and safety. In December 2012 they reviewed a class of drugs called “biologics” used to treat rheumatoid arthritis. Among the information reported was convenience of use (how many pills required each day) and possible side effects (e.g., dizziness, stomach upset). Convenience of use and possible side effects constitute the \_\_\_\_\_ of the study.
  - A. Who
  - B. What
  - C. When
  - D. Where
  - E. How

5. What is the “Who” in a *Consumer Reports Health* study on the effectiveness and safety of drugs used to treat rheumatoid arthritis?
  - A. drugs to treat arthritis currently on the market
  - B. convenience of use and possible side effects
  - C. summer 2008
  - D. the United States
  - E. testing on drugs
  
6. A *Consumer Reports Health* study on the effectiveness and safety of rheumatoid arthritis drugs collected data on possible side effects. This is what kind of variable?
  - A. Quantitative
  - B. Categorical
  - C. Nominal
  - D. Both A and C
  - E. Both B and C
  
7. A *Consumer Reports Health* study on rheumatoid arthritis drugs takes into consideration cost. Cost is
  - A. is a nominal variable.
  - B. is a categorical variable.
  - C. is a quantitative variable.
  - D. is an ordinal variable.
  - E. is an irrelevant variable.
  
8. The Human Resources Department of a large corporation maintains records on its employees. Data are maintained of the following variables: *Age, Employment Category, Education, Whether or not the employee participates in a wellness program, and Paycheck benefit deductions*. Which of these variables are categorical?
  - A. *Age, Employment Category, and Education*
  - B. *Employment Category, Education, and Whether or not the employee participates in a wellness program*
  - C. *Education, Whether or not the employee participates in a wellness program, and Paycheck benefit deductions*
  - D. All of the variables
  - E. None of the variables

9. A *Consumer Reports* study on tipping takes into consideration median amount of tipping for service providers. Tipping is
- A. is a nominal variable.
  - B. is a categorical variable.
  - C. is a quantitative variable.
  - D. is an ordinal variable.
  - E. is an irrelevant variable.
10. The American Community Survey (ACS) is an ongoing survey conducted by the US Census Bureau. They collect various information about the people in a household such as age, sex, race, the number of rooms in the residence, cost electricity for the previous month, and whether or not any household member received benefits from the Food Stamp Program or SNAP (the Supplemental Nutrition Assistance Program). Which of the following would best describe the cases?
- A. Participants
  - B. Identifiers
  - C. Experimental Units
  - D. Respondents
  - E. Variables

***Statistics Quiz D—Chapter 1—Key***

1. A
2. B
3. E
4. B
5. A
6. E
7. C
8. B
9. C
10. D

**Statistics Quiz E—Chapter 1**

**Name** \_\_\_\_\_

1. A university is interested in gauging student satisfaction in its online MBA program. A survey is designed and administered via the Internet to a sample of students currently active in the program. Which of the following would best describe the cases?
  - A. Participants
  - B. Respondents
  - C. Experimental Units
  - D. Subjects
  - E. Variables
  
2. In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate their employment status (unemployed, employed part-time, employed full-time). Which of the following is true?
  - A. This variable is categorical.
  - B. This variable is quantitative.
  - C. This is an identifier variable.
  - D. Both A and C.
  - E. Both B and C.
  
3. In a survey undertaken by a university to gauge student satisfaction in its online MBA program, one question asked students to indicate the number of credits they had transferred into the program. Which of the following is true?
  - A. This variable is categorical.
  - B. This variable is transactional.
  - C. This variable is quantitative.
  - D. This is an identifier variable.
  - E. This variable is nominal.
  
4. Researchers in e-commerce design an experiment to determine what factors are most important to online consumers when completing a transaction via the Internet. Individuals perform tasks on a set of Web sites and record their impressions about various attributes. Which of the following would best describe the cases?
  - A. Participants
  - B. Respondents
  - C. Experimental Units
  - D. Identifiers
  - E. Variables

5. A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was whether or not the hotel included a spa. This is best described as a
- A. quantitative variable.
  - B. identifier variable.
  - C. ordinal variable.
  - D. categorical variable.
  - E. nominal variable.
6. A popular travel magazine regularly reviews hotels worldwide. In a recent issue, it focused on hotels in Hawaii. Among the variables for which it provided data was the price range for rooms with an ocean view. Which of the following statements is true?
- A. This variable is quantitative and has no units.
  - B. This variable is quantitative and the units are \$.
  - C. This variable is quantitative and the units are number of rooms.
  - D. This variable is qualitative and ordinal.
  - E. This variable is qualitative and nominal.
7. A mid-priced chain of hotels, *Hometown Suites*, strives to make its guests “feel at home” by providing amenities such as microwaves in every room. Comment cards are used to get feedback on the importance of such amenities by asking guests to rate them using the scale: \_\_\_ Essential \_\_\_ Important \_\_\_ Not Important. These data are
- A. qualitative.
  - B. nominal.
  - C. ordinal.
  - D. both A and B.
  - E. both A and C.
8. *Businesses* are interested in the work experience of recent graduates from a local business school. Whether or not the graduates have work experience constitutes the \_\_\_\_\_ of the study.
- A. Who
  - B. What
  - C. When
  - D. Where
  - E. How

9. What is the “What” in a *Consumer Reports Tipping* study on the level of tipping during the current holiday season compared to the last holiday season?
- A. whether or not tipped
  - B. amount of tip compared to last year
  - C. the type of tip
  - D. the United States
10. A 2018 study published in the pediatrics journal, *Lancet Child and Adolescent Health*, on physical activity, sleep, and the amount of recreational screen time of 4524 children aged 8-11 found that more screen time was associated with worse working memory, processing speed, attention levels, language skills, and executive function. Screen time is what kind of variable?
- A. Quantitative
  - B. Ordinal
  - C. Nominal
  - D. Both A and C
  - E. Both B and C



***Statistics Quiz E—Chapter 1—Key***

1. B
2. A
3. C
4. A
5. D
6. B
7. E
8. B
9. B
10. A