

***Statistics - A Tool for Social Research and Data
Analysis 12th edition Healey Test Bank***

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Chapter 01 - Introduction

1. In social research, the purpose of statistics is to
- Prove that the research theory is correct
 - Validate the research project design
 - Manipulate and analyze data
 - Ensure acceptance by the scientific community

ANSWER: c

2. Who introduced the concept "Wheel of Science"?
- Gordon Allport
 - Walter Wallace
 - William Walter
 - Gordon Allman

ANSWER: b

3. According to the Wheel of Science, which statement correctly describes the role of a hypothesis?
- A hypothesis is formed from theory and is used to produce generalizations
 - A hypothesis comes from initial observations and is used to create broad generalizations
 - A hypothesis is developed from statistical results and used mainly to guide further observations
 - A hypothesis originates from theory and is then tested through observation

ANSWER: d

4. In the language of science, a variable that is thought to be causal is called
- An independent variable
 - A hypothetical variable
 - A primary variable
 - A dependent variable

ANSWER: a

5. If people who habitually drive over the speed limit have more fatal accidents, then speed is
- An independent variable
 - The dependent variable
 - An effect or result variable
 - A continuous variable

ANSWER: a

6. A hypothesis states, in part, that "income increases as education increases". In this statement, income is
- The dependent variable
 - The independent variable
 - The hypothetical variable
 - The secondary variable

ANSWER: a

7. In terms of the "Wheel of Science", statistics are central to the research process
- Only between the theory phase and the hypothesis phase

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- b. Only between the hypothesis phase and the observation phase
- c. Only between the observation phase and the empirical generalization phase
- d. Only between the empirical generalization phase and the theory phase

ANSWER: c

8. If a company uses follower counts and impressions to rate social media influencers, this is an example of:
- a. Statistical analysis
 - b. Emotional analysis
 - c. Random guessing
 - d. Qualitative research

ANSWER: a

9. "Ninety percent of dorm residents approved a proposed ban on smoking". This statement is an example of the use of
- a. Inferential statistics
 - b. Univariate descriptive statistics
 - c. Multivariate descriptive statistics
 - d. Inductive statistics

ANSWER: b

10. The data reduction process of descriptive statistics
- a. Allows a few meaningful numbers to summarize a large amount of data
 - b. Eliminates incorrect data through large-scale modifications
 - c. Simply lists all available information in numerical order
 - d. Helps in modifying the given variables numerically

ANSWER: a

11. Measures of association are a type of descriptive statistics that allow us to
- a. Formulate a new hypothesis and make empirical generalizations
 - b. Select random samples from the given population
 - c. Determine the strength and direction of relationships among variables
 - d. Modify the existing theories and formulate new hypotheses

ANSWER: c

12. A researcher wants to know if there is a relationship between region of birth and political party affiliation. They should calculate
- a. A univariate descriptive statistic, like the mean, to summarize a single variable's central tendency
 - b. A qualitative measure of influence that explains how regional traits affect political preferences
 - c. A measure of association for both of variables to assess the strength of their relationship
 - d. A statistic that describes each variable separately without examining how they are related

ANSWER: c

13. What common reaction do many beginners experience when thinking about statistics?
- a. Excitement about formulas
 - b. Confidence in numerical skills

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- c. Fear of making mistakes
- d. Curiosity about research

ANSWER: c

14. A city council wants to understand whether residents' political party affiliation is connected to their support for raising the local sales tax. You are given the community survey data and asked to analyze the relationship between these two categorical variables. Which type of statistical procedure should you apply?

- a. A method that summarizes each variable separately without examining their relationship
- b. A procedure that evaluates how two categorical variables are related to each other
- c. A technique that uses the sample data to estimate parameters for the entire population
- d. An approach that predicts one outcome variable using multiple independent variables

ANSWER: b

15. Inferential statistics are usually based on

- a. Populations
- b. Samples
- c. Individuals
- d. Groups

ANSWER: b

16. Inferential statistics are necessary in social research because

- a. They help researchers address uncertainty that arises when studying part of a larger group
- b. They allow researchers to draw conclusions about populations based on selected samples
- c. They enable researchers to estimate population patterns using limited observed data
- d. They permit researchers to evaluate broader trends without examining every individual

ANSWER: b

17. A sociology student is asked to evaluate a research article that compares school performance using graduation rates and college placements. To make sense of the analysis, the student applies the goal of this statistics course by:

- a. Memorizing formulas to solve the researcher's equations
- b. Treating statistics as unrelated to professional literature
- c. Ignoring the numerical results and focusing on the conclusion only
- d. Using basic statistical literacy to understand data interpretation

ANSWER: d

18. Which of the following is used as a subset of the population?

- a. Indexes
- b. Samples
- c. Individuals
- d. Groups

ANSWER: b

19. A transportation researcher is designing a study and needs at least one variable that can only take whole-number values. Which of the following survey questions would best meet that requirement?

- a. How old are you according to your official identification?

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- b. How long does your average daily commute take?
- c. How much do you usually spend on fuel each month?
- d. How many motor vehicles are currently registered under your name?

ANSWER: d

20. Which of the following questions would generate a continuous variable?
- a. How old are you as recorded on your official documents?
 - b. How many books do you own currently?
 - c. How many times have you ever changed a flat tire?
 - d. How many degrees do you have currently?

ANSWER: a

21. A media researcher wants to include at least one variable in the study that can take on fractional or decimal values. Which of the following survey items would best meet that requirement?
- a. How many children currently live in your household?
 - b. How much total time did you spend watching television yesterday?
 - c. How many full meals did you consume in the past 24 hours?
 - d. How often have you changed your place of residence over your lifetime?

ANSWER: b

22. If a variable is discrete, it cannot be
- a. Continuous
 - b. Ordered
 - c. Grouped
 - d. Indexed

ANSWER: a

23. A nominal-level variable like marital status or gender is always
- a. Discrete
 - b. Continuous
 - c. Ordinal
 - d. Dependent

ANSWER: a

24. A researcher needs a variable that is measured using ordered categories, where responses reflect ranking rather than simple naming. Which of the following would best meet this requirement?
- a. Level of education
 - b. Zip code
 - c. Occupation
 - d. Make of auto

ANSWER: a

25. A sociologist collects data from a sample of 500 students to infer conclusions about all college students nationwide. Which statistical approach is being implemented?

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- a. Descriptive statistics
- b. Inferential statistics
- c. Multivariate statistics
- d. Non-parametric testing

ANSWER: b

26. In addition to saying that one case is different from another, the ordinal level of measurement allows us to
- a. Put cases in general categories
 - b. Measure the distance between the high and low points
 - c. Say that one case is more or less than another
 - d. Calculate meaningful averages of variables

ANSWER: c

27. The variable socioeconomic status ranges from the upper class to the lower class and is an example of the
- a. Nominal level of measurement
 - b. Ordinal level of measurement
 - c. Interval-ratio level of measurement
 - d. Ratio level of measurement

ANSWER: b

28. When working with interval-ratio variables, how is the distance between any two adjacent scores best characterized?
- a. It varies depending on the distribution of cases within each category
 - b. It depends on the researcher's classification scheme for grouping values
 - c. It remains constant because the scale units are defined in equal increments
 - d. It becomes meaningful only after ordering the scores from lowest to highest

ANSWER: c

29. A health researcher needs a variable that can be used to calculate meaningful averages and differences in order to compare participants' developmental patterns. Which of the following would best meet this requirement?
- a. Social security number
 - b. Zip code
 - c. Age
 - d. Hair color

ANSWER: c

30. Which of the following represents a level of measurement based solely on naming or labeling categories?
- a. Nominal
 - b. Continuous
 - c. Discrete
 - d. Observable

ANSWER: a

31. On an exam, the numbers used to label each question represent one type of measurement, while the total number of correct answers represents another. How should these be classified?

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- a. Nominal for the labels, interval-ratio for the scores
- b. Interval-ratio for the labels, nominal for the scores
- c. Continuous for the labels, discrete for the scores
- d. Ordinal for the labels, nominal for the scores

ANSWER: a

32. The ordinal level of measurement is usually
- a. Nominal variable
 - b. Continuous variable
 - c. Discrete variable
 - d. Observable variable

ANSWER: c

33. A researcher wants to summarize test scores by calculating the average. To justify using the mean, the variable must be measured at which level?
- a. Interval-ratio
 - b. Ordinal
 - c. Nominal
 - d. Discrete

ANSWER: a

34. When a student argues that "religious preference" cannot be averaged to represent neighborhood status because they are non-numerical identifiers, the student is correctly applying which concept?
- a. Level of measurement and its analytical limitations
 - b. Sampling bias and representativeness
 - c. Variable manipulation and regression
 - d. Hypothesis falsification and revision

ANSWER: a

35. A researcher has numbered all 50 states from 1 to 50 and has calculated a mean of 17.43 for the variable "state of birth." How should this result be interpreted?
- a. Since the variable is nominal, the mean makes no sense
 - b. Since the variable is ordinal, we should treat the value of the mean with great caution
 - c. The variable is interval-ratio, and the mean is an appropriate and useful statistic in this case
 - d. Since this variable is discrete, the mean should not be computed

ANSWER: a

36. A researcher wants to find the relation between the number of hours studied (X) and marks scored in the examination (Y). Which aspect of research does this study demonstrate?
- a. Applying data reduction
 - b. Identifying cause and effect relation
 - c. Formulating empirical generalizations
 - d. Undertaking correlation analysis

ANSWER: b

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37. If a researcher misclassifies a category of variable 'x' as both 'y' and 'z', which criterion of measurement level does this violate?

- a. Mutually exclusive
- b. Mutually exhaustive
- c. Similarity
- d. Interval equality

ANSWER: a

38. A study shows that as income increases, individuals' consumption also increases. Which aspect of research is this implying?

- a. Evaluating theoretical propositions
- b. Direction and strength of association
- c. Analyzing sample statistics
- d. Interpreting analytical output

ANSWER: b

39. When a researcher summarizes 10,000 income data into percentages or averages, which statistical goal is being implemented?

- a. Inferential statistics
- b. Selecting sample
- c. Data reduction
- d. Hypothesis testing

ANSWER: c

40. A student concludes that "zip code" should not be used to measure social class as it lacks numerical meaning. Which concept is being demonstrated?

- a. Sampling bias prevention
- b. Correlation validity
- c. Empirical generalization
- d. Level of measurement relevance

ANSWER: d

41. If variable 'x' depicts number of doctors in a hospital, then this variable is characterized as _____.

- a. Continuous
- b. Discrete
- c. Independent
- d. Dependent

ANSWER: b

42. A study finds that higher education is related to high-paying jobs. Which aspect of statistical analysis is used for this study?

- a. Identifying sample characteristics
- b. Measuring the association between variables
- c. Establishing a cause-and-effect relationship
- d. Summarizing large amounts of information

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ANSWER: b

43. If a variable has equal intervals and a true zero point, then it is measured at what level?

- a. Ordinal
- b. Discrete
- c. Interval-ratio
- d. Nominal

ANSWER: c

44. Which of the following best describes the collection of data from every student in the university?

- a. Sample
- b. Hypothesis
- c. Variable
- d. Population

ANSWER: d

45. A research team reports that individuals with higher education tend to have higher incomes. Another analyst argues that this finding cannot establish that education produces higher income. What is the analyst evaluating?

- a. Whether the variables were measured at the correct level
- b. Whether the sample was large enough to ensure representativeness
- c. Whether the observed association is being mistaken for a causal explanation
- d. Whether the summary statistics fully captured the data distribution

ANSWER: c

46. Which step would a researcher undertake to study the trading pattern of a region in a cost-friendly manner?

- a. Selecting a relevant sample
- b. Conducting surveys
- c. Interpreting data
- d. Formulating theory

ANSWER: a

47. A government analyst reviews a report in which export figures from the past decade are displayed using line graphs and bar charts. The analyst notes that the report does not examine relationships between variables or attempt to draw conclusions about future exports. Based on this observation, which class of statistical technique is being used?

- a. Univariate descriptive statistics
- b. Bivariate descriptive statistics
- c. Multivariate descriptive statistics
- d. Inferential statistics

ANSWER: a

48. A researcher reports that individuals with healthier eating habits tend to experience fewer medical problems. The report does not claim causation but highlights a statistical relationship between the two variables. Based on this reasoning, what type of analysis is being used?

- a. Evaluating hypotheses to generate further testing
- b. Choosing cases for inclusion in the study sample

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- c. Examining the association between two variables
- d. Developing a broader theoretical explanation

ANSWER: c

49. Summarize the research process as conceptualized in the "Wheel of Science". Identify and explain each of the stages of the research process. At what stage do statistics become central? How? What is the role of statistics in the process?

ANSWER: Will vary

50. Some research situations are summarized below. For each situation, identify all variables and characterize them in terms of level of measurement and whether they are discrete or continuous. If applicable, identify which variables are dependent and which are independent. Explain your reasoning. What statistical application is being used?

- a. A group of one hundred students is asked for their high school and college GPAs. The GPAs are then compared to see if there is any relationship between them.
- b. A candidate for student body president telephones a randomly selected sample of students and asks about their opinion of the system used for course evaluation. Each student is asked if they strongly support, moderately support, or do not support the system. The candidate then uses this information to characterize the opinions of the entire student body.
- c. From what regions of the nation does the college football program recruit players? A researcher ascertained the hometowns of every member of the team for the past ten years.
- d. Which sport on campus has the players with the highest GPAs? The academic records of randomly selected samples of athletes from all sports are compared to answer this question.
- e. Is academic achievement associated with any "background" variables? Information on a sample of students is collected. The information includes GPA, age, sex, major, years of schooling completed by both parents, and marital status of the student.

ANSWER: Will vary

Instructor Manual

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PURPOSE AND PERSPECTIVE OF THE CHAPTER

The purpose of this chapter is to introduce students to the role of statistics in the research process. The discussion is guided by the “Wheel of Science” as conceptualized by Walter Wallace. The text always presents statistics in the context of the research enterprise. That is, statistics are presented as useful tools for answering sociological questions and testing social science theories, never as ends in themselves.

The chapter also distinguishes between descriptive and inferential statistics and univariate, bivariate, and multivariate statistics. The distinction between discrete and continuous variables and the concept of level of measurement is presented in this chapter and the latter is stressed throughout the text as an organizational device and as a major criterion for selecting statistics appropriately. Exercises are provided at the end of the chapter for reviewing the characteristics of the three levels of measurement used in this text.

CHAPTER OBJECTIVES

The following objectives are addressed in this chapter:

- 1-1 Explain the role of statistics in social research and data analysis.
- 1-2 Identify the key stages and terms in social scientific research.
- 1-3 Distinguish between descriptive and inferential statistics.
- 1-4 Provide examples of discrete and continuous variables.
- 1-5 Describe three levels of measurement and cite examples of each.

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WHAT'S NEW IN THIS CHAPTER

The following elements are improvements in this chapter from the previous edition:

- Added guidance on how to adopt a growth mindset to learning about statistics in a section called *Do Statistics Make You Nervous?*
- Included a new illustration on causal diagrams in Figure 1.1.
- Offered new **Statistics in Everyday Life** box on the 2024 U.S. presidential election.
- Created a new **Statistics in Everyday Life** box on same-sex marriage based on a 2024 Gallup Poll.
- Included a new illustration of discrete and continuous variables in Figure 1.2.

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CHAPTER OUTLINE

I. Why Study Statistics?

Statistics help social scientists organize and analyze numerical data to answer questions and test theories about people and society. They transform raw information into meaningful insights, enabling informed and evidence-based decisions.

II. Do Statistics Make You Nervous?

Many students feel anxious about learning statistics, but this section reassures them that such fears are normal and manageable. It encourages adopting a growth mindset, believing that effort and practice lead to improvement and reminds learners that making mistakes is part of mastering statistical reasoning.

III. The Role of Statistics in Scientific Inquiry

a. A Journey Through the Scientific Process

i. Theory

Allport's theory of prejudice, also known as the contact hypothesis, proposes that prejudice decreases when groups of equal status work cooperatively toward shared goals, as this promotes personal understanding rather than stereotyping; however, competition for resources tends to increase prejudice.

ii. Variables and Causation

Allport's theory explains a causal relationship where equal-status contact (independent variable) reduces prejudice (dependent variable), showing that greater cooperative interaction leads to lower bias.

- iii. Hypotheses
To test a theory, researchers convert abstract ideas into a specific hypothesis by clearly defining variables and measurement methods, and then gather data through systematic observation to compare theory with facts.
- iv. Making Observations and Using Data
Testing Allport's theory involves measuring changes in prejudice after cooperative or competitive contact, where statistics become essential for organizing and analyzing data, though their value depends on a well-designed and conceptually sound research process. To be precise, statistics are crucial and secondly, the role of statistics is limited since it becomes relevant only at the end of the observation stage.
- v. Empirical Generalizations
Empirical generalizations involve identifying patterns in data; for instance, noticing that equal-status contact reduces prejudice more for some groups than others and using these observed trends to refine or expand theories.
- vi. A New Theory
When empirical findings lead to theory revision, a new study is conducted to test the updated idea, continuing the Wheel of Science and gradually deepening understanding.
- vii. Summary: The Dialog Between Theory and Research
The dialog between theory and research highlights that scientific understanding evolves gradually—theory inspires research, and research refines theory—with statistics serving as the crucial link that helps analyze data, identify trends, and improve theoretical explanations.

IV. The Goals of This Text

The goal of this text is to help students understand, apply, and interpret statistics as essential tools for analyzing social issues, making informed decisions, and appreciating their role in research and professional practice.

V. Descriptive and Inferential Statistics

a. Descriptive Statistics

Descriptive statistics are methods used to summarize single variables (univariate) or describe relationships between two or more variables (bivariate or multivariate) through data reduction and pattern analysis.

i. Univariate Descriptive Statistics

Univariate descriptive statistics use percentages, averages, and graphs to summarize a single variable, reducing large datasets into a few clear and meaningful numbers, a process called data reduction.

ii. Bivariate and Multivariate Descriptive Statistics

Bivariate and multivariate descriptive statistics use measures of association to quantify the strength and direction of relationships between variables, aiding in understanding patterns and making predictions, though they do not prove causation.

b. Inferential Statistics

Inferential statistics use data from samples to make generalizations about larger populations, enabling researchers to draw accurate conclusions without studying every case.

VI. Discrete and Continuous Variables

a. Discrete Variables

A discrete variable has a unit of measurement that cannot be subdivided, meaning its values are whole numbers, such as the number of people, cars, or children.

b. Continuous Variables

A continuous variable has values that can be subdivided infinitely, such as time or temperature, where measurements can take on any value within a range rather than fixed whole numbers.

VII. Level of Measurement

The level of measurement—nominal, ordinal, or interval-ratio—determines how variables can be mathematically analyzed, ensuring that statistical methods match the nature of the data.

a. The Nominal Level of Measurement

Nominal-level variables are categorical labels without numerical value, used only for classification and comparison of category sizes, and must be mutually exclusive, exhaustive, and similar to ensure clarity and consistency in measurement.

b. The Ordinal Level of Measurement

The ordinal level of measurement ranks categories from high to low, allowing comparison in terms of “more” or “less,” but not exact differences between ranks, as the distances between scores are unequal and non-numeric. To be precise, ordinal scores show only relative ranking, not actual numeric distance between the values.

c. The Interval-Ratio Level of Measurement

The interval-ratio level of measurement involves variables with equal intervals between scores and a true zero point, allowing for all mathematical operations such as addition, subtraction, multiplication, and division—for example, variables like age, income, or number of siblings. There are two crucial differences between ordinal-level and interval-ratio-level variables; i.e., interval-ratio-level variables have equal intervals from score to score and have true zero points in comparison to ordinal-level.

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SOLUTIONS AND ANSWERS FOR EVEN-NUMBERED PROBLEMS: CHAPTER 1

1.4

a	Nation of birth	Nominal	Discrete
b	Age	I-R	Continuous
c	Years of school	I-R	Continuous
d	Occupation	Nominal	Discrete
e	Class	Ordinal	Discrete
f	GPA	I-R	Continuous
g	Major	Nominal	Discrete
h	Legalized drugs?	Ordinal	Discrete
i	Astrological sign	Nominal	Discrete
j	Number of siblings	I-R	Continuous

1.6

a	Infant mortality rates	Dependent	I-R	Continuous
	% of adults allowed to vote	Independent	I-R	Continuous
b	Before/after	Independent	Nominal	Discrete
	Traffic volume	Dependent	I-R	Discrete
	Number of accidents	Dependent	I-R	Discrete
	Number of fatalities	Dependent	I-R	Discrete
c	Before/after	Independent	Nominal	Discrete
	Survey	Dependent	I-R	Discrete
d	Frequency of harassment	Dependent	Ordinal	Discrete
	Age	Independent	I-R	Continuous
	Major	Independent	Nominal	Discrete
e	Type of pickup	Independent	Nominal	Discrete
	Number of complaints	Dependent	I-R	Discrete
	Time	Dependent	I-R	Continuous
	Cost	Dependent	I-R	Continuous
f	Race/ethnicity	Independent	Nominal	Discrete
	Tolerance	Dependent	Ordinal	Discrete
g	Budget cuts	Independent	Nominal	Discrete
	Size of unhoused population	Dependent	I-R	Discrete
h	Sex	Independent	Nominal	Discrete
	Philosophy	Independent	Nominal	Discrete
	Major	Independent	Nominal	Discrete
	Support/oppose closing	Dependent	Ordinal	Discrete
	Number of visits	Dependent	I-R	Discrete
	Does porn cause rape?	Dependent	Ordinal	Discrete

1.8

abany	Ordinal	Discrete
abpoor	Ordinal	Discrete
age	I-R	Continuous ¹
attend	Ordinal	Discrete
trust	Ordinal	Discrete
cappun	Ordinal	Discrete
childs	I-R (but note high score is “8 or more”)	Discrete
class	Ordinal	Discrete
degree	Ordinal	Discrete
educ	I-R	Discrete
fear	Ordinal	Discrete
fefam	Ordinal	Discrete
fepoly	Ordinal	Discrete
grass	Ordinal	Discrete
gunlaw	Ordinal	Discrete
happy	Ordinal	Discrete
helpblk	Ordinal	Discrete
homosex	Ordinal	Discrete
hrs1	I-R	Continuous ¹
Income16	Ordinal	Discrete

1. Variables that measure time *could be* measured at any level of precision.

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