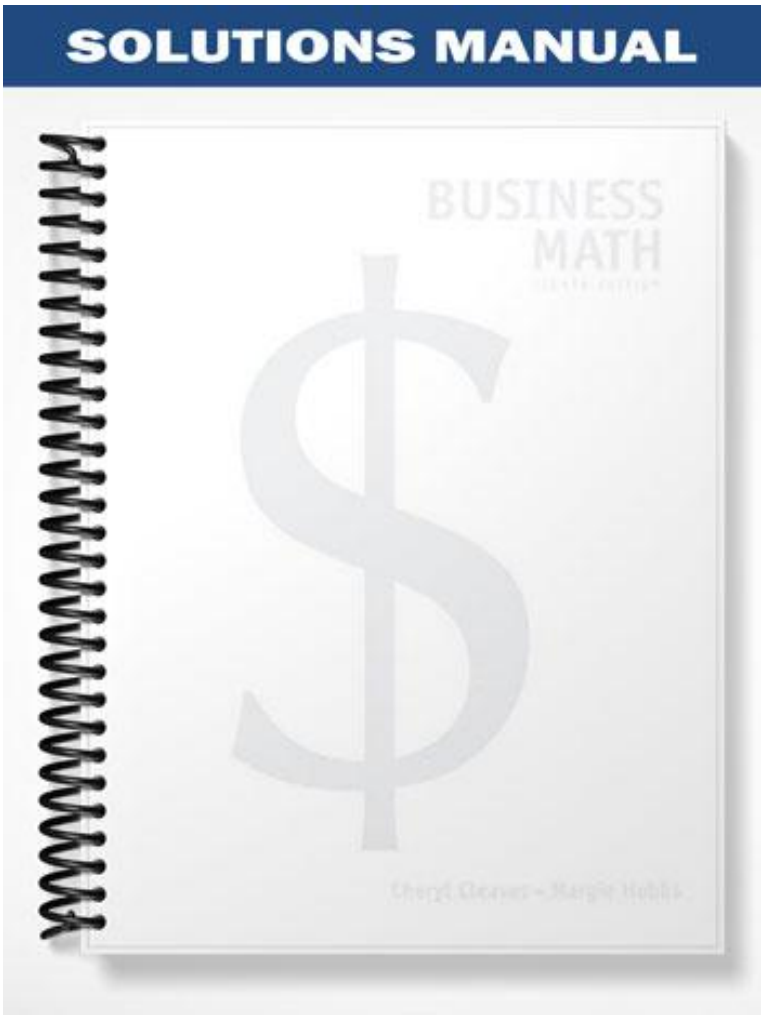
SOLUTIONS MANUAL
BUSINESS
MATH

Instructor's Resource Manual
to accompany

BUSINESS MATH

Eighth Edition

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PREFACE

We have prepared this manual as a resource for instructors who will use this text. Having each taught a number of years, we are well aware of the workloads that most instructors must manage and the limited amount of time available for developing classroom activities and implementing new materials into their programs. In addition, many programs have a large percentage of adjunct faculty who bring many rich experiences to the classroom from a variety of careers; however, the time constraints under which they function preclude development of supplementary curricular materials.

Our aim is to assist you in your role as the facilitator of learning. We recognize that instructors need a variety of materials to enable them to adapt their personal teaching style to accommodate a variety of learning styles. The two of us hope these materials will strengthen your program and we welcome your comments and suggestions as these materials are continually refined and new materials are developed.

Textbook

Business Math, Eighth Edition, is designed for use in classrooms, business and industrial training programs, or learning laboratories. It is easily adapted to a variety of instructional delivery systems.

We use a practical, learn-by-doing approach to business mathematics with both informal language and formal mathematical terminology. The active learning emphasis is also promoted through Case Studies, and the reproducible activities in this Instructor's Resource Manual. The Critical Thinking questions are included to enhance the development of higher-order thinking skills and to promote "writing to learn." All chapters except chapter 2 have an Excel template. Additionally, each chapter contains at least one open-ended or multi-stepped problem designated as a Challenge Problem.

Instructor's Resource Manual

Teaching Tips organized by chapters and class presentation outlines are provided to accommodate a variety of learning environments and student learning styles. Suggestions for using the Reproducible Activities are given in the Teaching Tips section of this Instructor's Resource Manual. These Reproducible Activities can be used as classroom activities, collaborative activities, or individual or group projects.

Test Item File, Computerized Test-Generator, and Reproducible Achievement Tests

A test item file is available to users of the text. This file is provided in hardcopy form and as a self-contained computerized data base which allows instructors to generate work sheets, practice sheets, and diagnostic or post tests from available test items. A manual which lists the entire test-item file coded by chapter sections and by level of difficulty accompanies the diskette. Prentice-Hall Test Manager software and support allow for the addition of your own favorite problems to your datafile and for the selected problems to be exported to many popular wordprocessing formats, such as Microsoft Word, so that the output can be customized any way you like. The reproducible tests are generated from items in the test item file.

Student's Solutions Manual

The ***Student's Solutions Manual*** shows detailed solutions to odd-numbered problems of the

section and end-of-chapter exercises and Practice Tests. This manual can be used as an optional or required resource for students.

Acknowledgments

We appreciate the suggestions that we have received from students and instructors who have used the previous editions of the text.

We welcome comments on this edition and suggestions for future editions. You may email us at ccleaves@bellsouth.net or margiehobbs@bellsouth.net. You will find additional information through the Prentice-Hall website at *http://www.prenhall.com/cleaves.*

INTRODUCTION

You are no doubt aware of the national focus on improving the quality of instruction at the college level, especially in mathematics. Employers of our students and instructors in more advanced mathematics or business courses continue to emphasize that students, in general, have difficulty applying their knowledge to different situations and they rely more on memorizing than on reasoning in trying to solve problems.

Many studies indicate that students can develop thinking skills by proper guidance and that students develop these skills more rapidly and to a higher degree when they regularly work with other students. The initial time that it takes at the beginning of a term to allow, encourage, or insist that students form study groups seems to be well worth the effort.

Included in this manual are samples of assignments and activities that are designed to guide students into a deeper understanding of selected topics. Adopters of *Business Math, Eighth Edition* are welcome to make copies of these assignments for classroom use or modify or adapt them to students' own particular needs.

Calculator Usage

We recommend that all students be required to use a calculator. Students should become proficient in the use of a calculator and be encouraged to use estimation skills to determine the reasonableness of an answer. We understand that opinions vary widely on the extent of calculator usage in a mathematics program and the use of calculators in assessment may vary with individual instructors; however, calculator proficiency is an important part of preparing students for success in business and mathematics courses and in the work environment. The text includes general tips for using the calculator. These tips are introduced in Chapter 1 to explain the use of various keys and continue as new calculator keys or strategies for using the calculator are needed. Key stroke sequences are also included throughout the text to increase the student's proficiency with multiple-stepped calculations. Some of the reproducible activities in this manual require the use of a calculator and in some instances a scientific, business, or graphing calculator.

Assessing Student Progress

In addition to the traditional assessment of student progress through periodic tests, we suggest that students become more aware of their responsibility for learning by assessing their own progress. Some examples of student self-assessment forms are provided in this manual with the transparency masters and other teaching aids. These forms include a Student Information Sheet, a weekly and biweekly progress report, a mid-term self-evaluation, peer evaluation of group projects, and an error analysis form.

Teaching Delivery Styles

To accommodate individual students' needs and learning styles, we suggest that collaborative learning techniques, writing-to-learn tasks, and experimentation be used to supplement classroom discussion. Students should be urged to form study groups to accomplish out-of-class assignments and learning tasks and to develop team-building skills that will carry over to the workplace.

Business Math Addresses Curriculum and Pedagogy Standards

Business Math, Eighth Edition addresses curriculum and pedagogy standards set by the American Mathematical Association of Two-Year Colleges (AMATYC), the National Council of Teachers of Mathematics (NCTM) and the National Business Education Association (NBEA). The goals as presented by NCTM and others are for students *to learn to value mathematics, to learn to reason mathematically, to communicate mathematically, to become confident of mathematical abilities, and to become mathematical problem solvers*.

The text helps students *to learn to value business mathematics* by providing real-life situations in both examples and exercises. *Mathematical reasoning* is promoted through explanatory comments in the text narrative, in examples, and in the questions at the end of each chapter. We use Critical Thinking informal language, business language, and mathematically precise terminology in the text to allow the student to read and understand concepts as presented in the text. Many of the critical thinking questions at the end of each chapter are constructed to allow the student to formulate business and mathematical ideas and express them both orally and in writing. We also present several projects in this manual that *promote mathematical communication* among students and teachers.

To further promote communication, the new terms introduced in each chapter are defined in the margin of the text and also in the glossary index. The index of the text is more extensive than most texts. The intent is for students to come to value the text as a reference even after they have completed their formal study of it.

The Stop and Check Exercises with all the solutions in the text are designed to help students *become confident of their abilities* before attempting the exercises where only the odd answers are provided. The body of the text contains many examples with explanatory comments provided at each step for the student to study. The Summary also provides students with a means of gaining confidence in their ability to assess their own understanding of the concepts presented in the chapter.

Beyond Crossroads

The AMATYC document identifies the following as abilities to be developed by students in college mathematics programs: *number sense, symbol sense, statistical sense, and problem solving sense.* ***Business Math, Eighth Edition*** develops *number sense* through an increased emphasis on estimation. Whenever calculators are used, students are encouraged to check the answer to ensure it is reasonable. Even though many mathematics professionals still disagree about the use of calculators, the authors' position is that students will come to view the calculator as a tool that is invaluable in the workplace and as such will learn to use the calculator in the classroom setting for appropriate circumstances and not necessarily to make calculations which can be done mentally.

We encourage a dual approach for problems with reasonable calculations to develop the students' confidence in both their computational skills and their ability to use the calculator. For complex calculations, we encourage the use of the calculator so that the student can focus on the problem-solving aspect of the situation.

Symbol sense is addressed by presenting many rules, formulas, and properties in both symbols and words. The Critical Thinking questions are used to develop students' ability to write words in mathematical symbols and vice versa. The students should begin to appreciate the value of using mathematical symbolism to write a complex mathematical relationship in a concise form.

The text incorporates an entire chapter on data analysis and the visual representation of data. When *problem solving* is first introduced, a *Five-Step Problem-Solving Strategy* is developed for investigating and analyzing the situation presented in the problem to determine what tools to use to solve the problem.

In summary, ***Business Math, Eighth Edition*** is rich with business experiences that promote the students' ability to make connections from one concept to another and from mathematical concepts to the workplace.

TEACHING TIPS AND CLASS PRESENTATION OUTLINES

Business Math, Eighth Edition, and its accompanying instructional resources have been designed to enable students to experience mathematics. Every instructor brings a different personality and teaching style to the mathematics classroom. No one can be an effective instructor by mimicking someone else's style when that style does not match the instructor's personality. We encourage you to experiment with a wide variety of activities and projects that are included in the text and this manual. We have found that the activities that are most beneficial will vary with the personality of a class. A variety of approaches will help an instructor provide rich business experiences for students with a wide range of learning styles.

Impromptu Classroom Collaborative Activities

College students often are reluctant to form study groups with their classmates. Instructors can be helpful by encouraging collaboration by giving students opportunities during class time to get to know some fellow classmates. Mini-sets of exercises can be used during class time. The exercises can be selected from the even-numbered assignment exercises or practice test at the end of the chapter since these answers are not in the text. A plan for incorporating collaborative learning could be:

1. Select one to three problems for students to work individually in class. Allow a reasonable amount of time for students to complete the problems.
2. Have each student compare results with a study partner and each pair should reach a consensus on the correct answers.
3. Have each pair of students compare results with another pair of students. The four students should reach a consensus on the correct answers.
4. Record and display the answers of each group of four. If there is more than one answer given for any problem, engage the class in a discussion to reach a class consensus on the correct answers.

Team Projects

Some of the activities suggested in the text and in this manual are short activities that can be completed in one class period or less or in an overnight assignment. However, others will require a longer commitment of time. A plan that has been successful in our classes for building teamwork skills and for helping students realize the usefulness of business mathematics is the team project. Students can form their own working groups or they can be assigned to a group of three or four students. Each team selects one or more case studies from the chapters that are covered in the course. Even if two teams select the same project, the teams generally develop an entirely different approach to the project.

A reproducible handout on forming teams and giving instructions for a team project is included in the Reproducible Activities section of this manual.

1 REVIEW OF WHOLE NUMBERS

Most students benefit from a review of basic skills. Even though they have mastered many of the skills previously, it is helpful to refresh these skills. This review, however, needs to be innovative and action-packed. Supplement with meaningful activities and applications so that students' interest can be maintained. The time spent on this review will pay big dividends in the business topics that follow.

Decision-Key Approach. The Five-Step Problem-Solving Strategy is introduced in this chapter and is used throughout the text. Students have found this framework useful in developing their problem-solving skills.

Estimating Emphasized. Developing one's number sense and being able to anticipate characteristics of a reasonable answer are very important skills. Estimating and developing a number sense continue to be an important feature.

Calculator Strategies. Calculator startegies are included in tip boxes to introduce the calculator as a tool. Students are encouraged to develop investigative skills by experimenting with the calculator. Several suggested calculator activities are given in the AIE notes.

Collaborative Classroom Activities. Several collaborative classroom activies are suggested in the AIE Notes. These activities allow students to get to know each other and pave the way for more in-depth teamwork activities later.

Activities. Several Expanding the text Suggestions in AIE; Suggested Team Project: Establishing a Home Business

Outline		**Specific Points**
1-1	Place Value and Our Number System A. Define place-value system. B. Explain how to read a whole number. C. Identify reasons for rounding numbers. D. Explain how to round a whole number.	• The place value system contains 10 digits, and consists of groups of such units, tens, hundreds, thousands, millions, and billions. Commas are used to separate numbers into groups. • Read a whole number from left to right by reading the numerals in each group and saying the group name. Do not use the word *and* in reading whole numbers. • Rounding is used when making estimates to check calculations.
1-2	Operations with Whole Numbers A. Add a column of numbers. B. Estimate a sum. C. Subtract two whole numbers. D. Estimate a difference.	• The addends (numbers being added) give a result, called a sum, when they are totaled. Be sure to carry when a sum of one column is more than 10. • The minuend is the original amount and should be placed over the subtrahend or the amount being taken away. • Borrowing may be necessary when a smaller digit is in the minuend.

Multiplying and dividing whole numbers
A. Multiply two whole numbers.
B. Estimate a product.
C. Describe shortcuts in multiplying numbers containing zeros.
D. Divide two whole numbers.
E. Estimate a quotient.

- An important part of multiplication is the proper placement under the multiplier.
- Use shortcuts for multiplying numbers containing zeros.
- The divisor is the number that goes on the outside of the traditional division symbol. The dividend goes under the symbol. Lining up numbers in division is extremely important.
- If the dividend is not a multiple of the divisor, there will be a remainder.
- Be very careful with zeros in the quotient.

2 REVIEW OF FRACTIONS

These review topics should be interspersed with meaningful activities and applications. Since fractions are an integral part of many business math topics, this review is very important for most students.

Organization. Many users prefer that the basic skills be grouped together before the introduction of business topics. Business applications, case studies, and News that Count articles have been incorporated into the early chapters so that studying the basic skills will be more meaningful.

Activities: Expanding the Text Suggestions in AIE

Outline

2-1 Overview of a fraction
A. Define the parts of a fraction.
B. Define proper fraction.
C. Define improper fraction.
D. Define mixed number.

Converting fractions
A. Convert an improper fraction to a whole or mixed number.
B. Convert a mixed number to an improper fraction.
C. Reduce a fraction to lowest terms.
1. Explain rules for determining divisibility.
2. Find the greatest common divisor.
D. Express a fraction in higher terms.

Specific Points

- The numerator is smaller than the denominator in a proper fraction.
- The numerator is equal to or larger than the denominator in an improper fraction.
- Mixed numbers contain a whole number and a fraction.
- Change an improper fraction to a mixed number by dividing the numerator by the denominator and then writing the remainder over the denominator.
- Change a mixed number to an improper fraction by multiplying the denominator by the whole number and adding the numerator; write the answer over the original denominator.
- The rules for divisibility can help in reducing fractions.
- The GCD reduces a fraction to lowest terms.
- The numerator and denominator are multiplied by the same amount when changing a fraction to higher terms.

2-2 Adding and subtracting fractions
- A. Add fractions and mixed numbers
  1. with the same denominator.
  2. with different denominators.
  3. Define prime numbers.
- B. Subtract fractions and mixed numbers
  1. with the same denominators.
  2. with different denominators.
  3. with borrowing in mixed numbers.

- To add fractions with different denominators, find the least common denominator first. Then, change each fraction to be added to an equivalent fraction with the common denominator.
- To subtract fractions with different denominators, find the LCD and change to equivalent fractions having common denominators. Borrowing is often necessary in subtracting mixed numbers.

2-3 Multiplying and dividing fractions
- A. Multiply
  1. proper fractions
  2. mixed numbers
- B. Divide fractions
  1. Define reciprocal.
  2. Divide proper fractions.
  3. Divide mixed numbers.

- To multiply fractions, multiply the numerators, multiply the denominators. Reduce before or after multiplying.
- Mixed numbers should be changed to improper fractions before multiplying.
- The reciprocal of the divisor is used in dividing fractions.
- All whole or mixed numbers must be expressed as improper fractions before dividing.
- Division of fractions is performed by multiplying the dividend by the reciprocal of the divisor.

3 DECIMALS

Decimals allow you to incorporate many interesting applications involving money. Estimation continues to be an important skill for strengthening one's number sense.

Excel Templates. The first Excel template is given for one of the exercises in the Practice Test. This template shows how spreadsheets can be a useful technology tool in business math.

Activities. Several Expanding the Text and Collaborative Classroom Activities are included in AIE notes; Excel template; Suggested team project: Comparative Shopping

Outline

3-1 Reading, rounding, adding, and subtracting decimals
- A. Define
  1. a pure decimal.
  2. a mixed decimal.
  3. a complex decimal.
- B. Read
  1. pure decimals.
  2. mixed and complex decimals.
- C. Round decimals.

Specific Points

- Read a pure number as a whole number with the place value at the end.
- The word *and* is used for the decimal in a mixed decimal.
- Similar procedures are used for rounding decimals and whole numbers.
- To add decimal numbers, line up the decimals first. A number without a decimal is understood to have a decimal point to the right of the last digit.

3-2	Operations with Decimals A. Add decimals. B. Subtract decimals. C. Multiply decimals. D. Divide 1. decimal by a whole number. 2. decimal by a decimal. 3. whole number by a decimal. 4. decimal by a power of 10.	• Subtract decimals by lining up the decimals first. Add zeros after the decimal until both the subtrahend and minuend have the same number of decimal places. • The product has the same number of decimal places as the total places in the multiplier and multiplicand. • To multiply a decimal number by a power of 10, move the decimal to the right as many places as there are zeros in the power of 10. • To divide a decimal number by a whole number, write the decimal in the quotient above the decimal in the dividend and divide. • To divide a decimal or whole number by a decimal, move the decimal point in the divisor to the right so that it becomes a whole number. Then, move the decimal point in the dividend the same number of places. • To divide a decimal number by a power of 10, move the decimal to the left as many places as there are zeros in the power of 10.
3-3	Convert decimals and fractions A. Convert fractions to decimals. 1. a proper fraction to a decimal 2. a mixed number to a decimal B. Convert decimals to fractions. 1. a pure decimal to a fraction 2. a mixed decimal to a fraction	• Change a fraction to a decimal by dividing the numerator by the denominator. • Change a mixed number to a decimal by (a) changing to an improper fraction and then dividing by the denominator or (b) converting the fraction to a decimal and then adding to the whole number. • Change a decimal or mixed decimal to a fraction by writing the place value of the rightmost digit as the denominator.

4 BANKING

Bank records is the first business topic introduced following the development of the basic skills. It is a skill that is of general interest to all student regardless of their career choice.

Reconciliation Procedure. The reconciliation procedure is refined and greatly enhanced with the inclusion of a form for guiding students through the process. This improvement was a direct result of user comments.

Revisions Based on Changes in Banking Technology. The narrative portions have been revised based on the extensive advances that banking has undergone recently as a result of technology changes.

Activities: Ten Expanding the Text Suggestions in AIE; Excel template; Reproducible Activities: Transposing Digits; Suggested Team Project: Bank Debit Cards.

Outline		Specific Points
4-1	Checking account transactions A. Complete a deposit slip. B. Describe the bank check and its features. C. Describe a check stub. D. Complete an account register. E. Explain the types of check endorsements.	• A deposit slip is a form that tells the bank which account should receive the cash and checks being deposited. • A check is a piece of paper ordering the bank to pay someone an amount of money from the account given on the check. • A check stub is a form that provides spaces to record information about checks written and deposits made. • An account register is set of forms used to record all transactions made in an account. • A check endorsement is required as a safeguard against misuse of a check.
4-2	Bank statements A. Explain the features of a bank statement. B. Explain fees that may be charged: 1. service charge 2. nonsufficient funds charge or returned check fee 3. FDIC insurance premium C. Discuss the steps in reconciling a bank statement.	• A bank statement is a monthly record that shows all transactions made in an account during a month. • The account holder uses the bank statement to compare the records of the bank with his or her own records. • Bank reconciliation is the process of comparing the transactions recorded in the account register with those listed on the bank statement.

5 EQUATIONS

Equations and formulas are the basis of most business math topics and it is helpful for students to have an early introduction to these skills. When a systematic approach is used, students can overcome some of their apprehensions associated with word problems.

Outcome for Equations That Are Proportions: To show the usefulness of proportions in problem solving, proportions are examined as a type of equation.

Increased Emphasis on Estimation and Checking. The emphasis has increased for examining the reasonableness of a solution by estimating through critical thinking rather than just a pencil and paper calculations with rounded amounts.

Activities: Expanding the Text Suggestions in AIE; Excel template; Suggested Team Projects: Using Formulas and Using Spreadsheets.

Outline		Specific Points
5-1	Equations A. Explain an equation. B. Solve an equation with one operation. C. Solve an equation with two operations. D. Solve an equation containing parentheses. E. Solve equations with multiple unknowns.	• An equation must contain an equal sign, showing that the left side has the same value as the right side. • Unknowns are represented by letters, called variables. To solve an equation is to find the value of the unknown, the variable. • To solve an equation with one operation, do the opposite of the operation to both sides.

	F. Solve equations that are proportions.	• When an equation contains more than one operation, do the opposite of addition and subtraction first; do the opposite of multiplication and division last. • If an equation contains parentheses, multiply by the number in front of the parentheses to remove them. • Combine all unknowns and all numbers before following steps to solve the equation. • If an equation is a proportion, first cross multiply, then divide.
5-2	Solving problems with equations A. Write relationships as equations. B. Discuss key words in a problem.	• Key words in a problem tell which operations are used and how to write the equation. • The relationships step in the decision key approach can be written as an equation. • The symbols used should express the key words in the problem. • Check the answer! Be sure it is appropriate for the situation described in the words of the problem.
5-3	Formulas A. Evaluate a formula. B. Find a variation of a formula.	• Substitute numbers for letters in formula. • Use the order of operations to evaluate the formula.

6 PERCENTS

Percents are used in many business math topics. The understanding of percent concepts is very important.

Activities: Expanding the Text Suggestions in AIE; Excel Template; Suggested Team Project: Distributing Pay Raises

Outline		**Specific Points**
6-1	Percent Equivalents A. Explain the meaning of percents. B. Convert a decimal to a percent. C. Convert a fraction to a percent.	• Percent means per hundred; percents are used for comparisons. • A decimal is converted to a percent by moving the decimal two places to the right. • Change a fraction to a decimal by dividing the numerator by the denominator. Then change the decimal to a percent.
	Converting percents to decimals and fractions A. Change a percent to a decimal. B. Change a mixed percent to a decimal. C. Change a percent to a fraction.	• Percents are converted to a decimal or a fraction before many calculations are performed. • A percent is converted to a decimal by moving the decimal point two places to the left. • If the percent contains a fraction, convert the fraction to a decimal and then move the decimal point two places to the left. • To convert a percent to a fraction, divide by 100 percent and reduce or simplify.

6-2 Percentage problems
- A. Identify the rate, base, and portion (percentage).
- B. Use the percentage formula to find the unknown value when two values are known.

- There are three basic types of percent problems in business, all of which can be solved by using the percentage formula: The base is the total or entire quantity in a problem; the portion (percentage) is a part of the total and the rate is the percent. If the base is multiplied by a rate (%), the percentage is found.
- By rearranging the percentage formula, the base or rate can be found: the base can be found by dividing the percentage by the rate; the rate can be found by dividing the percentage by the base.
- Analyze the words in a percentage problem to determine which values are given and which are to be found.
- The rate is expressed as a percent in the problem.
- The number that expresses the total or original amount is the base and often follows the word *of*.
- The number that expresses a part of the total or original amount is the percentage.

6-3 Increases and Decreases
- A. Find the amount of increase or decrease.
- B. Find the new amount.
- C. Find the rate or base.

- In a percent increase or decrease problem, the portion is the amount of increase or decrease and the original amount is the base.

7 BUSINESS STATISTICS

Organizing and analyzing data continue to be important skills in the business world. The early introduction of these topics allows for a wider variety of applications and activities throughout the text.

Activities: Classroom Collaborative Activity Suggestion in AIE; Expanding the Text Suggestion in AIE; Reproducible Activities: Circle, Bar, and Line Graphs; Critiquing Graphs; Suggested Team Project: Marketing Research.

Outline

7-1 Measures of Central Tendency
- A. Find the mean.
  Find the median.
  Find the mode.
  Interpret these statistics in a given situation.
  Make and interpret a frequency distribution
  Find the mean of grouped data.

Specific Points

- Statistics are values that describe information and show how the pieces of information relate to one another.
- The mean is the sum of the values divided by the number of values.
- The median is the middle value in a group of values that are arranged in numerical order.
- The mode is the value that occurs the most frequently.
- The mean, median, and mode give measures of central tendency or locate the center of the data.
- Frequency distributions are used to categorize data