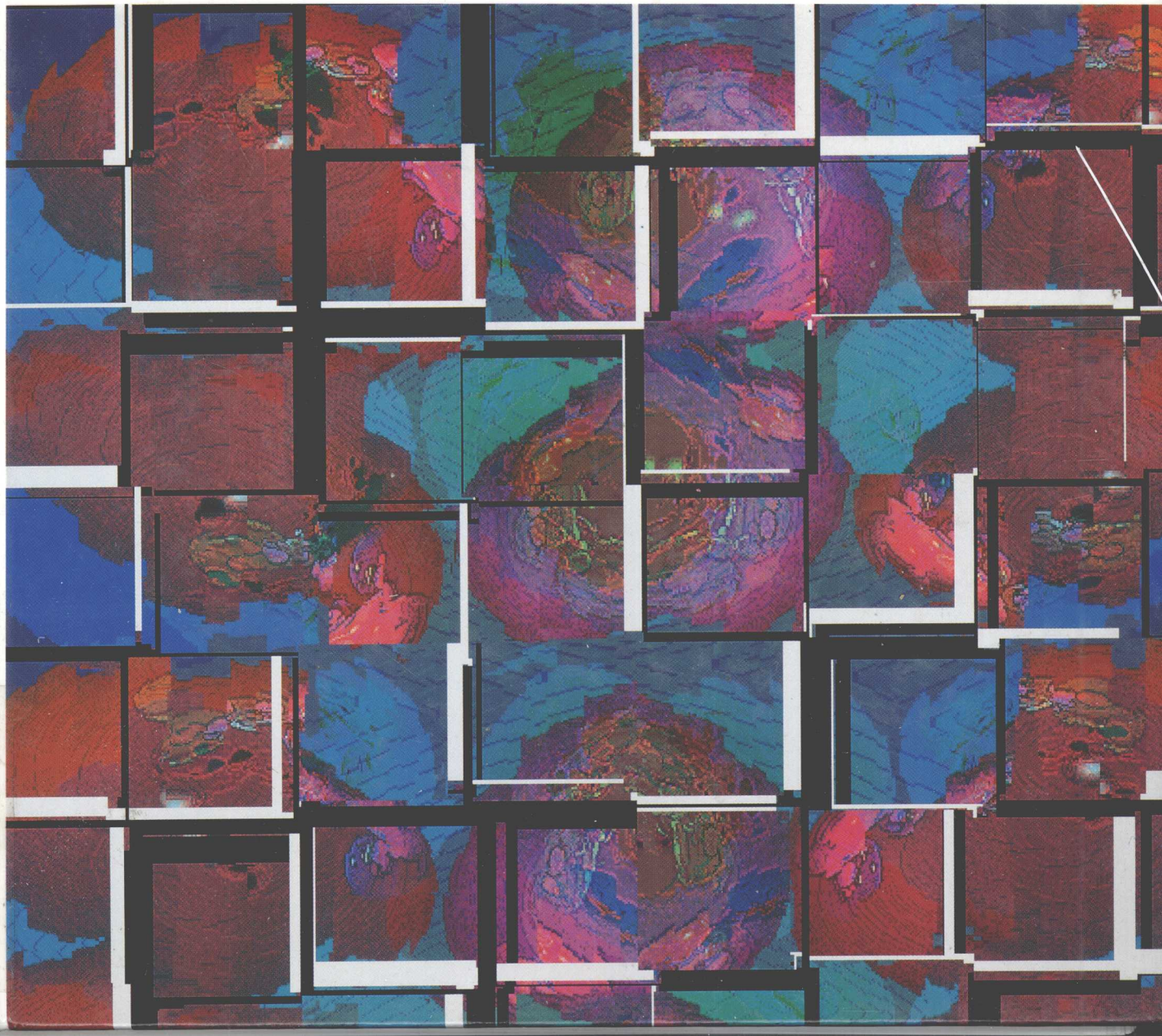
Basic Mathematics
for College Students

SEVENTH EDITION

D. FRANKLIN WRIGHT



BASIC MATHEMATICS FOR COLLEGE STUDENTS

SEVENTH EDITION

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Cerritos College

Custom-Published Version

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PREFACE

Purpose and Style

The purpose of *Basic Mathematics for College Students*, Seventh Edition, is to provide students with a learning tool that will help them

1. develop basic arithmetic skills,
2. develop reasoning and problem-solving skills, and
3. achieve satisfaction in learning so that they will be encouraged to continue their education in mathematics.

The writing style gives carefully worded, thorough explanations that are direct, easy to understand, and mathematically accurate. The use of color, subheadings, and shaded boxes helps students understand and reference important topics.

The emphasis is on *why* basic operations and procedures work as they do, as well as on *how* to perform these operations and procedures. Point-by-point explanations are incorporated within the examples for better understanding, and directions are given in an easy-to-follow format. Classroom Practice problems (with answers) appear in almost every section to reinforce students' understanding of the concepts in that section and to provide the instructor with immediate classroom feedback.

The NCTM curriculum standards have been taken into consideration in the development of the topics throughout the text.

New Special Features

In each chapter:

- *Mathematics at Work!* presents a brief discussion related to an upcoming concept from the chapter ahead and an example of mathematics used in daily life situations.
- *What to Expect in this Chapter* opens each chapter and offers an overview of the topics that will be covered.
- *Learning Objectives* are now listed at the beginning of each section.

In the Exercise sets:

- *Writing and Thinking about Mathematics* exercises encourage students to express their ideas, interpretations, and understanding in writing.
- *Check Your Number Sense* exercises are designed to help students develop confidence in their judgment, estimation, and metal calculation skills.
- *Collaborative Learning Exercises* are designed to be done in interactive groups.
- *The Recycle Bin* is a skills refresher that provides maintenance exercises on important topics from previous chapters.

Customizing Options

Any of four chapters, **Measurement, Geometry, Solving Equations,** and **Additional Topics from Algebra,** can be included as part of the text. The option of combining any or all of the chapters with the beginning nine chapters allows instructors to better meet the diverse requirements of their courses without using a book that contains material that may not be assigned. Contact your local D. C. Heath Representative for more information about these custom-publishing options.

Pedagogical Features

In each section, the presentation and development are based on the following format for learning and teaching:

1. Each section begins with a list of learning objectives for that section.
2. Subsection topics are introduced by color subheadings for easy reference.
3. Thorough and mathematically accurate discussions feature several detailed examples completely worked out with step-by-step explanations.
4. Classroom Practice problems serve as a warm-up for exercise sets and provide students and teachers with immediate classroom feedback.
5. Graded exercises offer variety in their style and level of difficulty including drill, multiple choice, matching, applications, written responses, estimating, and group discussion exercises.
6. Real-life applications are presented in most sections, with several sections devoted solely to applications.
7. Color is used to provide visual support to the text's pedagogy.

Each chapter contains

1. Chapter-opening Mathematics at Work!
2. What to Expect in this Chapter
3. A Summary of Key Terms and Ideas, Rules and Properties, and Procedures
4. A set of Review Questions
5. A Cumulative Review of topics discussed in that chapter and previous chapters (beginning with Chapter 2)

Important Topics and Ideas

- Emphasis has been placed on the development of reading and writing skills as they relate to mathematics.

- Effort has been made to make the exercises motivating and interesting. Applications are varied and practical and contain many facts of interest.
- The use of calculators is encouraged starting with Chapter 5. A new section on scientific notation has been added to help students understand this type of display on their calculators.
- Estimating is an integral part of many discussions throughout the text.
- Geometric concepts such as finding perimeter and area and recognizing geometric figures are integrated throughout the text.

Content

There is sufficient material for a three- or four-semester-hour course. The topics in Chapters 1–7 form the core material for a three-hour course. The topics in Chapters 8 and 9 provide additional flexibility in the course depending on students' background and the goals of the course.

Chapter 1, Whole Numbers, reviews the fundamental operations of addition, subtraction, multiplication, and division with whole numbers. Estimation is used to develop better understanding of whole number concepts, and word problems help to reinforce the need for these ideas and skills in common situations such as finding averages and making purchases.

Chapter 2, Prime Numbers, introduces exponents, shows how to use the rules for order of operations, and defines prime numbers. The concepts of divisibility and factors are emphasized and related to finding prime factorizations, which are, in turn, used to develop skills needed for finding the least common multiple (LCM) of a set of numbers. All of these ideas form the foundation of the development of fractions in Chapter 3.

Chapter 3, Fractions, discusses the operations of multiplication, division, addition, and subtraction with fractions. A special effort is made to demonstrate the validity of the use of improper fractions, and exponents and the rules for order of operations are applied to fractions. Knowledge of prime numbers (and prime factorizations) underlies all of the discussions about fractions.

Chapter 4, Mixed Numbers, shows how mixed numbers are related to whole numbers and fractions. Topics include relating improper fractions and mixed numbers, the basic operations, complex fractions, and the rules for order of operations.

Chapter 5, Decimal Numbers, covers the basic operations with decimal numbers, estimating, and the use of calculators (including scientific notation). To emphasize number concepts, the last section presents operating with decimal numbers, fractions, and mixed numbers in a single expression.

Chapter 6, Ratios and Proportions, develops an understanding of ratios and introduces the idea of a variable. Techniques for solving equations are developed through finding the unknown term in a proportion.

Chapter 7, Percent (Calculators Recommended), approaches percent as hundredths and uses this idea to discuss percent of profit and to find equivalent numbers in the form of percents, decimals, and fractions. The applications with percent are

developed around proportions, the formula $R \times B = A$, and the skills of solving equations. A special section on estimating with percent is included to reinforce basic understanding.

Chapter 8, Consumer Applications, addresses the topics of simple interest, compound interest, balancing a checking account, buying and owning a car, reading graphs, and statistics (mean, median, mode, and range). The use of calculators is encouraged and even necessary, such as in the case of using the formula for compound interest: $A = P(1 + r/n)^{nt}$. Calculating with this formula serves to emphasize the importance of following the rules for order of operations.

Chapter 9, Introduction to Algebra: Signed Numbers, provides a head start for those students planning to continue in their mathematics studies, either in a prealgebra course or a beginning course in algebra. Signed numbers are introduced with the aid of number lines and are graphed on number lines. Topics included are absolute value, operations with signed numbers, order of operations, translating phrases, solving equations, and problem solving.

Customized Chapters

The following chapters are designed to complement the basic text material (Chapters 1–9) to fit any additional curriculum features at your school or any particular syllabus topics desired by instructors. Any of these chapters may be requested by the instructor from the publisher to be included as part of the text, in the order shown here.

Measurement: This chapter discusses the metric system of measurement, the U.S. customary system of measurement, and how to change units of measure within each system and between the systems. The last section discusses the difference between abstract numbers and denominate numbers and operations with denominate numbers.

Geometry: This chapter provides more thorough coverage of geometry beyond what is integrated in the previous chapters. Included are length, perimeter, area, volume, and formulas related to specific figures. Also included is a discussion of types of angles and types of triangles (along with similar triangles). The chapter concludes with a discussion of square roots and the Pythagorean Theorem (with emphasis on how to use a calculator to find roots).

Solving Equations: This chapter forms the basis for continued studies in algebra. Included are simplifying and evaluating expressions (combining like terms), solving equations (with several steps), solving word problems (including consecutive integers), and working with formulas (evaluating formulas and solving for other variables).

Additional Topics from Algebra: This chapter introduces some topics that will be discussed in more detail in a beginning algebra course. Included are solving inequalities, graphing in two dimensions (ordered pairs and straight lines), and operating with polynomials.

Some Possible Course Offerings

Short Course (Chapters 1–7)	Longer Course (Chapter 1–9)	Optional Course (Chapters 2–9 with selected topics from Customized Chapters.)
Whole Numbers	Whole Numbers	Prime Numbers
Prime Numbers	Prime Numbers	Fractions
Fractions	Fractions	Mixed Numbers
Mixed Numbers	Mixed Numbers	Decimal Numbers
Decimal Numbers	Decimal Numbers	Ratios and Proportions
Ratios and Proportions	Ratios and Proportions	Percent (Calculators Recommended)
Percent (Calculators Recommended)	Percent (Calculators Recommended)	Consumer Applications
	Consumer Applications	Introduction to Algebra: Signed Numbers
	Introduction to Algebra: Signed Numbers	Selected topics from Measurement, Geometry, Solving Equations, and Additional Topics from Algebra

Practice and Review

There are more than 5500 practice exercises, lesson exercises, and review items overall. Lesson exercises are carefully chosen and graded, proceeding from easy exercises to more difficult ones. Many sections contain a feature entitled The Recycle Bin which generally has six to ten review exercises from previous chapters. Each chapter includes a Chapter Review, a Chapter Test, and a Cumulative Review (beginning with Chapter 2). The tests are similar in length and content to the tests provided in the *Instructor's Resource Manual*.

Many sections have exercises entitled Writing and Thinking about Mathematics, Check Your Number Sense, and Collaborative Learning Exercises. These exercises are an important part of the text and provide a chance for each student to improve communication skills, develop an understanding of general concepts, and communicate his or her ideas to the instructor. Written responses can be a great help to the instructor in identifying just what students do and do not understand. Many of these questions are designed for the student to investigate ideas other than those presented in the text, with responses that are to be based on each student's own experiences and perceptions. In most cases there is no right answer.

Answers to most exercises, all Chapter Review questions, all Chapter Test questions, and all Cumulative Review questions are provided in the back of the book. Answers to Classroom Practice exercises are given just below the problems themselves.

Supplements

Basic Mathematics for College Students, Seventh Edition, is accompanied by an expanded supplement support package, with each item designed and created to provide maximum benefit to the students and instructors who use them.

Instructor's Resource Manual: This manual includes several prepared forms of chapter quizzes and tests, prepared forms of cumulative tests, and answers for all quizzes and tests. It also includes an answer key to all even text exercises.

Computerized Testing. The *Quisitor* computerized test item file is available in both IBM-PC and Macintosh versions. Instructors may edit or add questions and compose customized tests in multiple choice, free response, or mixed formats. Questions can be selected randomly or according to other specific criteria chosen by the instructor.

Student Study and Solutions Manual: This supplement has been prepared to provide students with additional practice and review questions. Answers to all items are included in the manual, along with solutions to selected items that illustrate the working of all key problem types. Solutions are also included for selected exercises from the text, and for all Chapter Review, Chapter Test, and Cumulative Review exercises.

Videotapes: A series of videotapes, covering all major topics, provides concept review and additional examples to reinforce the text presentation.

Tutorial Software: A new student tutorial program is available in both IBM-PC and Macintosh platforms. The package parallels the text development and offers hundreds of problems for additional drill and practice. The tutorial portion provides interactive feedback as students proceed through concept review and examples.

Acknowledgments

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D. Franklin Wright

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