

# BASIC MATHEMATICAL SKILLS

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## WITH GEOMETRY

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James Streeter, Donald Hutchison, and Louis Hoelzle







# Basic Mathematical Skills with Geometry

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Basic Mathematical Skills with Geometry

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**A teacher affects eternity; he can never tell where his influence stops.**

Henry Brooks Adams 1838–1918

This series is dedicated to the memory of James Arthur Streeter, an artisan with words, a genius with numbers, and a virtuoso with pictures from 1940 until 1989.

There is a German proverb that has been translated, “More is to be got from one teacher than from two books.” This reflects the essence of what I have learned about writing from Jim Streeter. Jim was always a teacher who wrote, and never a writer who taught. Jim was a teacher in the classroom, in his office, during meetings, and behind his word processor. From Jim’s perspective, it seemed that life’s single challenge was to find the components that, when properly assembled, would reveal the concept that he wanted to explain. One night Jim and I went out to celebrate the completion of a manuscript. I taught him a dart game called “301.” He was fascinated. I doubt that he ever played again, but he used the game in the classroom and in his writing. He found it an entertaining medium for teaching subtraction, multiplication, and critical thinking skills (e.g., “If you need 15 points, and you must finish with a double score, how many different ways can you win with two darts?”)

Jim did not believe in platitudes, but he did convince me that “writing makes one a better teacher and teaching makes one a better writer.” Because I knew Jim, I have become a better writer, a better teacher, and a better person.

Donald Hutchison



# Preface

Throughout the 1980s and now into the 1990s, the number of students that enter college in need of remedial mathematical skills has increased significantly. In fact, by 1985, 28 percent of undergraduate students were enrolled in remedial classes. *Basic Mathematical Skills* is a descriptive title that appears on many texts written for these students. While this present title has not been altered, the topics included in the text have undergone many changes.

The appropriate basic skills to be included in such a course has been the subject of many discussions by professional societies such as NCTM, MAA, AMATYC, and CUPM.

In addition, states such as Texas, California, and Florida have initiated a testing program which stresses particular basic skills.

After listening to, and participating in, the debates of the professional societies and reviewing the mandated state tests, we find that specific topics are a common thread in all basic skills courses. These topics are geometry, statistics, use of calculators, and reasoning skills. Thus, this text has been expanded and updated to include these fundamental concepts. It is these additions that highlight this revision of the text.

## Revisions

**Geometry:** The measurement section has been expanded to include two new chapters. The first of these covers Geometry. In addition to the previously included discussions of perimeter, circumference, area, and volume, we now include lines, angles, and triangles.

**Statistics:** The second chapter added to the measurement section deals with statistics. It focuses on measurements of center and on the reading of tables and graphs.

**Calculators:** Appendix A is designed to be used in conjunction with Part 3 (decimals). In addition to discussing conversion of fractions, we cover adding and rounding fractions. We also address the issues of when a calculator is appropriate and what kind of calculator the students should use.

**Reasoning:** Appendix B develops both inductive and deductive reasoning skills.

All the new material incorporates the same style that is used in the developmental series that includes *Basic Mathematical Skills*, *Beginning Algebra*, and *Intermediate Algebra*.

## Organization

This text covers all of the topics traditionally included in a college level course in arithmetic. The text material is divided into seventeen chapters, organized into six parts:

Whole Numbers

Fractions

Decimals

Ratios, Proportions, and Percents

Measurement: Geometry and Statistics

An Introduction to Algebra

In addition there are two appendices—Using a Calculator and Reasoning Skills.

To help students as they work their way through the text, the following diagnostic, review, and evaluation features have been incorporated throughout.

- **CHAPTER PRETESTS**—Each chapter begins with a pretest designed to diagnose student difficulties. Answers and section references are provided on the following page. If desired, students may use this diagnostic test to determine which sections of the chapter need particular emphasis and study.
- **CHECK-YOURSELF EXERCISES**—These exercises accompany most of the text examples and are designed to involve the student actively in the learning process. Answers are provided at the end of each chapter section for immediate feedback.
- **SECTION EXERCISES**—Each chapter is divided into short sections followed by two exercise sets of the same level of difficulty. All answers for the first exercise set appear in the text. (The odd answers appear with the exercises and the even answers are in the answer section of the text.)

A second (supplementary) set of exercises is provided for students who want further review of the topics. Answers are provided in the instructor's manual. Some instructors may prefer to use this second set for homework exercises to be handed in as assignments.

Included within many section exercises are *Skillscan* exercises. *Skillscan* draws problems from previous sections of the text, designed to aid the student in the process of reviewing concepts that will be applied in the following section.

- **CHAPTER SELF-TESTS**—Each chapter concludes with a self-test to give students guidance in preparing for a parallel in-class test. Answers are provided with section references to aid in the process of review. Three parallel test forms are provided in the instructor's manual.
- **PART SUMMARIES**—Each of the six main parts is followed by a careful and concise summary of the important terms, techniques, and rules that have been developed in the preceding chapters. A set of comprehensive exercises on the material follows each of those summaries. Again section references are provided with the answers to encourage the review process.
- **CUMULATIVE TESTS**—Also new to the second edition are *Cumulative Tests* after Chapters 4, 7, 9, 11, 13, and 15. These are designed to give the student further opportunity for building skills in the process of a cumulative review. These should be especially useful aids to students preparing for midterm and final examinations.

## Supplements

Available for this text is an *Instructor's Resource Manual* containing sample tests for each chapter, sample midterm and final examinations, as well as answers to the tests.

Also available is an *Instructor's Solutions Manual and Answer Key* containing answers and solutions to chapter and summary exercises.

The *Teacher's Edition* includes answers to all exercises and tests. These answers are printed in a second color for easier use. Other supplements aimed especially at the instructor include both print and computerized testing. The computerized testing provides over 1800 test questions from throughout the text. Several types of test questions are used, including multiple-choice, open-ended, matching, true-false, and vocabulary. The testing system enables the teacher to find the questions by section, topic, question type, difficulty level, and other criteria. In addition, instructors may add their own criteria and edit their own questions. As noted above, sample tests are provided in the *Instructor's Resource Manual*. The Print Test Bank is a hard-copy listing of the questions found in the computerized version.

Several supplements are available for the student. First is a *Student's Solutions Manual*, which includes answers and, when appropriate, solutions to all odd-numbered exercises. Students may purchase this manual through their local bookstores.

*Videotapes* are also available to adopters for student use in a learning laboratory. For the entire series, twenty-four hours of video lessons have been developed, each broken into smaller sections that follow the three texts. These videos provide students with additional instructional and visual support of the lessons.

Finally, a *Computerized Study Guide* is also available to adopters. This tutorial provides additional coverage and support for all sections of each text in the series. Students can work additional problems of many different types and receive constructive feedback based on their answers. Virtually no computer training is needed for the student to work with this supplement.

We trust that these supplements will support both teachers and students in a variety of instructional settings. At the same time, both the authors and McGraw-Hill welcome any recommendations from students and teachers for the continual development of the package as the teaching environment and technology change.

## Acknowledgments

The evolution of this text, through two editions and a revision, has been helped greatly by the keen eyes and logical minds of our colleagues. We find the comments of those that use the text are most intriguing and, invariably, most useful. We encourage you to continue to talk with us or write us with your comments and suggestions.

With this revision we had additional reviewers for the geometry and statistics chapters. We tried to respond to every one of the many good points that were made. We paid particular attention to concerns about TASP guidelines. Among other things, this led to addition of a section on the Pythagorean Theorem. Reviewers were: Benjamin P. Bockstege, Broward Community College; Michael Brozinsky, Queensborough Community College; Barbara Buhr, Fresno City College; Robert D. Campbell, Manatee Community College (Florida); Deborah Dalton, Sante Fe Community College; Sandra Evans, Cumberland County College; John Garlow, Tarrant County Junior College; Nancy Hyde, Broward Community College; Nancy Johnson, Broward Community College; Frank Kelly, University of New Mexico; Maria Kelly, Fresno City College; Shelly Langman, Bellevue Community College; Virginia Lee, Brookdale Community College; Shirley Markus, University of Louisville; Yvonne Martinez, Southwest Texas Junior College; Wayne Miller, Lee College (Texas); Elise Price, Tarrant County Junior College; Roberta L.



Simmons, Lansing Community College; John Spellman, Southwest Texas State University; and Paul Wozniak, El Camino College.

In this age of high tech mathematics lab, supplements and supplement authors have become as important as the test itself. We are proud that our names appear on the supplement together with these authors: Robert Cohen, Greenfield Community College; P. Martin Conway, Five College/Public School Partnership; Diane Ferris, Clackamas Community College; Melinda Gougeon, Greenfield Community College; and John R. Martin, Tarrant County Junior College. Also, a special thanks to Richard and Beth Morel for coordinating the preparation of the supplements.

The staff at McGraw-Hill has been very helpful and quite accommodating. We regularly advise prospective authors that we can not imagine a better balance of support, criticism, and professionalism than we find here. We are specially grateful to Denise Schanck, Karen Hughes, Laura Gurley, Jack Maisel, and Robert Weinstein.

Finally, we wish to thank Sharon Streeter. Sharon's penetrating questions and supportive comments provided impetus to move forward in difficult times.

Donald Hutchison  
Louis Hoelzle



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