

Basic College Math



A Problem Solving Approach

Joseph Cleary / Walter Gleason

Second Edition

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Basic College Math

A Problem Solving
Approach

We would like to dedicate this book to our families.

To the memory of my mother Frances Cleary

My father Joseph Cleary

My wife Helen

My children Allison

Matthew

Meghan

James

My parents Mary and John Gleason

My wife Nancy

My children Stephen

Brian

Gary

Preface

This second edition has been retitled *Basic College Math: A Problem Solving Approach* from *Arithmetic: A Problem Solving Approach* based on feedback from instructors from all over the country. Like the first, the second edition provides all the basic concepts that are necessary for the further study of mathematics and enables students to solve everyday problems. Topics have been added to enhance the students' understanding and ability to manipulate mathematically.

To assist students in accomplishing their goals, we have written the text in a two-part workbook format that is *readable*. In Part I, *Basic Math Revisited*, mathematics concepts are developed with a clear concise explanation of the subject matter followed by a number of illustrative examples. Part II consists of four chapters dealing with real life applications. These chapters may be studied in any order; they are independent of one another.

To assist instructors in helping students reach their goals, the text can be used in the *traditional* classroom approach or in an individualized mathematics learning laboratory. Each chapter in Part I has a pretest where students' weaknesses can be pinpointed. Each section contains an explicit explanation of the material with a large number of graded and illustrated examples followed by exercises that are correlated to the examples. Answers to all section exercises follow the exercise set. At the end of each chapter, there are two tests: a *Warmup Test* and a *Challenge Test*. Part I concludes with a set of cumulative tests.

Purpose of Pretests

If the students are enrolled in a self-paced or nonlecture class and if the students complete the pretest without any errors they may proceed to the chapter review and complete those problems before continuing on to the next chapter. If the students cannot complete the pretest without error, they will be referred to the appropriate section in the chapter so that they may find the necessary help. *However, before moving on, the students should remember to take the time to thoroughly understand any errors.* Those students who want to be certain that they learn all the material in the chapter may proceed directly to the first section of the text.

Pedagogical Features

Pretests Each chapter of Part I has a pretest with all questions referenced to the appropriate section in the chapter and a set of succinct learning objectives correlated to subject topics.

Illustrative Examples and Exercises

The text contains many examples with illustrative solutions and hundreds of exercises with answers at the end of each section including numerous word problems. Exercises are arranged in order of difficulty with a real effort made to achieve a balance between odd and even numbered exercises. Word problems are identified by a picture key indicating applications from the following fields.

Environmental Studies



Chemistry



Engineering, Technical



Medicine



Business/Economics



Biology



Political Science



Sports



Agriculture



Physical Science



Psychology



Physics



Education



Law



Sociology

**Focus on Problem Solving**

A detailed illustrated and solved application of basic math at the end of each section along with a companion problem for student solution.

Building Your Math Vocabulary

A glossary type of section summarizing all of the important terms, with an illustrative example, at the end of each chapter.

Chapter Review

A set of review exercises, at the end of each chapter, that are based on the key concepts of the chapters. Answers to all exercises are included.

Chapter Tests

At the end of each chapter, there is a *Warmup Test* with answers included (at the back of the text), and a *Challenge Test* for which answers are not included.

Cumulative Tests

A set of three cumulative review tests covering the material of Part I. Answers to these cumulative tests are located in the back of the text.

Problem Sets Appendix

An appendix consisting of three collections (A, B, and C) of 1,800 basic math drill exercises with answers. This feature is included for students who need work in the basic math operations.

Basic Math in a Nutshell

An appendix reviewing all of the key concepts of the text with an illustrative example of each.

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Part One

Basic Math Revisited

1

Whole Numbers

Chapter Outline

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- 1.1** Basic Symbols
- 1.2** Place Value, Writing, and Rounding Off
 - Place Value*
 - Writing Whole Numbers*
 - Rounding Off*
- 1.3** Addition
 - Properties of Addition*
- 1.4** Subtraction
- 1.5** Multiplication
 - Properties of Multiplication*
 - Multiplication Symbols*
- 1.6** Division
 - Single-Digit Division*
 - Multiple-Digit Division*
- 1.7** Tests for Divisibility
- 1.8** Powers of Whole Numbers
 - Exponents*
 - Order of Operations*
- 1.9** Problem Solving
 - Focus on Problem Solving
 - Building Your Math Vocabulary
 - Chapter Review
 - Warmup Test
 - Challenge Test

This chapter deals with adding, subtracting, multiplying, and dividing whole numbers (0, 1, 2, 3, . . .). When you deal with these numbers, both speed and accuracy of computation are important. At this point, we will analyze your present level of proficiency and, if necessary, provide you with an opportunity to sharpen your skills. This goal may be achieved by completing the following test. Before you take the test, remember (1) to strive for both speed and accuracy and (2) to review your solution to each problem.

1.0 Pretest

Do all work on these pages. Do not use a calculator.

<i>Problem</i>	<i>Section Reference</i>	<i>Learning Objective</i>
1. To express the fact that 20 is greater than 15, we write $20 > 15$. How would you express the fact that 18 is less than 22? _____	1.1	Understanding of "greater than" and "less than"
In problems 2 and 3, what does the digit 3 mean in each number?		
2. 63,521 _____	1.2	Understanding the place value of a digit in a number
3. 20,035 _____	1.2	Understanding the place value of a digit in a number
4. Express the number 4,062 in written form. _____	1.2	Writing the name of a number
5. Express the number forty thousand, two hundred twenty in numerical form. _____	1.2	Writing a number in numerical form
6. Round off 3,765 to the nearest hundred. _____	1.2	Rounding off whole numbers

In problems 7-20, perform the indicated operation if possible. If the operation is not possible, state "no solution."

7.	$\begin{array}{r} 6 \\ 2 \\ 9 \\ 8 \\ 6 \\ 5 \\ + 2 \\ \hline \end{array}$	8.	$\begin{array}{r} 53,634 \\ + 17,009 \\ \hline \end{array}$	1.3	Adding whole numbers
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