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About the Author

Bob Blitzer is a native of Manhattan and received a Bachelor of Arts degree with dual majors in mathematics and psychology (minor: English literature) from the City College of New York. His unusual combination of academic interests led him toward a Master of Arts in mathematics from the University of Miami and a doctorate in behavioral sciences from Nova University. Bob’s love for teaching mathematics was nourished for nearly 30 years at Miami Dade College, where he received numerous teaching awards, including Innovator of the Year from the League for Innovations in the Community College and an endowed chair based on excellence in the classroom. In addition to Thinking Mathematically, Bob has written textbooks covering introductory algebra, intermediate algebra, college algebra, algebra and trigonometry, precalculus, trigonometry, and liberal arts mathematics for high school students, all published by Pearson. When not secluded in his Northern California writer’s cabin, Bob can be found hiking the beaches and trails of Point Reyes National Seashore, and tending to the chores required by his beloved entourage of horses, chickens, and irritable roosters.
Preface

Thinking Mathematically, Seventh Edition provides a general survey of mathematical topics that are useful in our contemporary world. My primary purpose in writing the book was to show students how mathematics can be applied to their lives in interesting, enjoyable, and meaningful ways. The book’s variety of topics and flexibility of sequence make it appropriate for a one- or two-term course in liberal arts mathematics, quantitative reasoning, finite mathematics, as well as for courses specifically designed to meet state-mandated requirements in mathematics.

I wrote the book to help diverse students, with different backgrounds and career plans, to succeed. Thinking Mathematically, Seventh Edition, has four major goals:

1. To help students acquire knowledge of fundamental mathematics.
2. To show students how mathematics can solve authentic problems that apply to their lives.
3. To enable students to understand and reason with quantitative issues and mathematical ideas they are likely to encounter in college, career, and life.
4. To enable students to develop problem-solving skills, while fostering critical thinking, within an interesting setting.

One major obstacle in the way of achieving these goals is the fact that very few students actually read their textbook. This has been a regular source of frustration for me and my colleagues in the classroom. Anecdotal evidence gathered over years highlights two basic reasons why students do not take advantage of their textbook:

“I’ll never use this information.”
“I can’t follow the explanations.”

I’ve written every page of the Seventh Edition with the intent of eliminating these two objections. The ideas and tools I’ve used to do so are described for the student in “A Brief Guide to Getting the Most from This Book,” which appears inside the front cover.

What’s New in the Seventh Edition?

- New and Updated Applications and Real-World Data. I’m on a constant search for real-world data that can be used to illustrate unique mathematical applications. I researched hundreds of books, magazines, newspapers, almanacs, and online sites to prepare the Seventh Edition. This edition contains 110 worked-out examples and exercises based on new data sets and 104 examples and exercises based on updated data. New applications include student-loan debt (Exercise Set 1.2), movie rental options (Exercise Set 1.3), impediments to academic performance (Section 2.1), measuring racial prejudice, by age (Exercise Set 2.1), generational support for legalized adult marijuana use (Exercise Set 2.3), different cultural values among nations (Exercise Set 2.5), episodes from the television series The Twilight Zone (Section 3.6) and the film Midnight Express (Exercise Set 3.7), excuses by college students for not meeting assignment deadlines (Exercise Set 5.3), fraction of jobs requiring various levels of educations by 2020 (Exercise Set 5.3), average earnings by college major (Exercise Set 6.5), the pay gap (Exercise Set 72), inmates in federal prisons for drug offenses and all other crimes (Exercise Set 73), time breakdown for an average 90-minute NFL broadcast (Section 11.6), Scrabble tiles (Exercise Set 11.5), and are inventors born or made? (Section 12.2).

- New Blitzer Bonuses. The Seventh Edition contains a variety of new but optional enrichment essays. There are more new Blitzer Bonuses in this edition than in any previous revision of Thinking Mathematically. These include “Surprising Friends with Induction” (Section 1.1), “Predicting Your Own Life Expectancy” (Section 1.2), “Is College Worthwhile?” (Section 1.2), “Yogi-isms” (Section 3.4), “Quantum Computers” (Section 4.3), “Slope and Applauding Together” (Section 72), “A Brief History of U.S. Income Tax” (Section 8.2) “Three Decades of Mortgages” (Section 8.7), “Up to Our Ears in Debt” (Section 8.8), “The Best Financial Advice for College Graduates” (Section 8.8), “Three Weird Units of Measure” (Section 9.1), “Screen Math” (Section 10.2), “Senate Voting Power” (Section 13.3), “Hamilton Mania” (Section 13.3), “Dirty Presidential Elections” (Section 13.3), “Campaign Posters as Art” (Section 13.4), and “The 2016 Presidential Election” (Section 13.4).

- New Graphing Calculator Screens. All screens have been updated using the T1-84 Plus C.

- Updated Tax Tables. Section 8.2 (Income Tax) contains the most current federal marginal tax tables and FICA tax rates available for the Seventh Edition.

- New MyLabMath. In addition to the new functionalities within an updated MyLab Math, the new items specific to the Thinking Mathematically 7th edition MyLab Math include
  - All new objective level video program with assessment
  - Interactive concept videos with assessment
  - Animations with assessment
  - StatCrunch integration
What Familiar Features Have Been Retained in the Seventh Edition?

- **Chapter-Opening and Section-Opening Scenarios.** Every chapter and every section open with a scenario presenting a unique application of mathematics in students’ lives outside the classroom. These scenarios are revisited in the course of the chapter or section in an example, discussion, or exercise. The often humorous tone of these openers is intended to help fearful and reluctant students overcome their negative perceptions about math. A feature called “Here’s Where You’ll Find These Applications,” is included with each chapter opener.

- **Section Objectives (What Am I Supposed to Learn?).** Learning objectives are clearly stated at the beginning of each section. These objectives help students recognize and focus on the section’s most important ideas. The objectives are restated in the margin at their point of use.

- **Detailed Worked-Out Examples.** Each example is titled, making the purpose of the example clear. Examples are clearly written and provide students with detailed step-by-step solutions. No steps are omitted and each step is thoroughly explained to the right of the mathematics.

- **Explanatory Voice Balloons.** Voice Balloons are used in a variety of ways to demystify mathematics. They translate mathematical language into everyday English, help clarify problem-solving procedures, present alternative ways of understanding concepts, and connect problem solving to concepts students have already learned.

- **Check Point Examples.** Each example is followed by a similar matched problem, called a Check Point, offering students the opportunity to test for conceptual understanding by working a similar exercise. The answers to the Check Points are provided in the answer section in the back of the book. Worked-out video solutions for many Check Points in the MyLab Math courses.

- **Great Question!** This feature presents study tips in the context of students’ questions. Answers to the questions offer suggestions for problem solving, point out common errors to avoid, and provide informal hints and suggestions. As a secondary benefit, this feature should help students not to feel anxious or threatened when asking questions in class.

- **Brief Reviews.** The book’s Brief Review boxes summarize mathematical skills that students should have learned previously, but which many students still need to review. This feature appears whenever a particular skill is first needed and eliminates the need to reteach that skill.

- **Concept and Vocabulary Check.** The Seventh Edition contains 653 short-answer exercises, mainly fill-in-the blank and true/false items, that assess students’ understanding of the definitions and concepts presented in each section. The Concept and Vocabulary Checks appear as separate features preceding the Exercise Sets. These are assignable in the MyLab Math course.

- **Extensive and Varied Exercise Sets.** An abundant collection of exercises is included in an Exercise Set at the end of each section. Exercises are organized within seven category types: Practice Exercises, Practice Plus Exercises, Application Exercises, Explaining the Concepts, Critical Thinking Exercises, Technology Exercises, and Group Exercises.

- **Practice Plus Problems.** This category of exercises contains practice problems that often require students to combine several skills or concepts, providing instructors the option of creating assignments that take Practice Exercises to a more challenging level.

- **Chapter Summaries.** Each chapter contains a review chart that summarizes the definitions and concepts in every section of the chapter. Examples that illustrate these key concepts are also referenced in the chart.

- **End-of-Chapter Materials.** A comprehensive collection of review exercises for each of the chapter’s sections follows the Summary. This is followed by a Chapter Test that enables students to test their understanding of the material covered in the chapter. Worked-out video solutions are available for every Chapter Test Prep problem in the MyLab Math course or on YouTube.

- **Learning Guide.** This study aid is organized by objective and provides support for note-taking, practice, and video review. The Learning Guide is available as PDFs in MyLab Math. It can also be packaged with the textbook and MyLab Math access code.

I hope that my love for learning, as well as my respect for the diversity of students I have taught and learned from over the years, is apparent throughout this new edition. By connecting mathematics to the whole spectrum of learning, it is my intent to show students that their world is profoundly mathematical, and indeed, π is in the sky.

Robert Blitzer
Resources for Success
MyLab Math Online Course for Thinking Mathematically, 7th edition
by Robert Blitzer (access code required)

MyLab Math is available to accompany Pearson’s market leading text offerings. To give students a consistent tone, voice, and teaching method each text’s flavor and approach is tightly integrated throughout the accompanying MyLab Math course, making learning the material as seamless as possible.

NEW! Video Program
All new objective-level videos provide a new level of coverage consistently throughout the text. Videos at the objective level allow students to get support just where they need it. Instructors can assign these as media assignments or using the provided assessment questions for each video.

NEW! Interactive Concept Videos
New Interactive Concept Videos are also available in MyLab Math. After a brief explanation, the video pauses to ask students to try a problem on their own. Incorrect answers are followed by further explanation, taking into consideration what may have led to the student selecting that particular wrong answer. Incorrect answer ‘A’ goes down one path while incorrect answer ‘B’ provides a different explanation based on why the student may have selected that option.

NEW! Animations
New animations let students interact with the math in a visual, tangible way. These animations allow students to explore and manipulate the mathematical concepts, leading to more durable understanding. Corresponding exercises in MyLab Math make these truly assignable.

StatCrunch
Newly integrated StatCrunch allows students to harness technology to perform complex analyses on data.

pearson.com/mylab/math
Resources for Success

Instructor Resources
Annotated Instructor's Edition
ISBN-10: 0-13-468454-0
The AIE includes answers to all exercises presented in the book, most on the page where they appear and the remainder in the back of the book.
The following resources can be downloaded from MyLab Math or the Instructor's Resource Center on pearsonhighered.com.

MyLab Math with Integrated Review
Provides a full suite of supporting resources for the course content plus additional assignments and study aids for students who will benefit from remediation. Assignments for the integrated review content are preassigned in MyLab™ Math, making it easier than ever to create your course.

Instructor's Solutions Manual
This manual contains detailed, worked-out solutions to all the exercises in the text.

PowerPoint Lecture Presentation
These editable slides present key concepts and definitions from the text. Instructors can add art from the text located in the Image Resource Library in MyLab Math or slides that they create on their own. PowerPoint slides are fully accessible.

Image Resource Library
This resource in MyLab Math contains all art from the text, for instructors to use in their own presentations and handouts.

Instructor's Testing Manual
The Testing Manual includes two alternative tests per chapter. These items may be used as actual tests or as references for creating actual tests.

TestGen
TestGen® (www.pearsoned.com/testgen) enables instructors to build, edit, print, and administer tests using a computerized bank of questions developed to cover all the objectives of the text. TestGen is algorithmically based, allowing instructors to create multiple but equivalent versions of the same question or test with the click of a button. Instructors can also modify test bank questions or add new questions. The software and test bank are available for download from Pearson's Instructor Resource Center.

Student Resources

Learning Guide with Integrated Review Worksheets
ISBN 10: 0-13-470508-4
Bonnie Rosenblatt, Reading Area Community College
This workbook is organized by objective and provides support for note-taking, practice, and video review and includes the Integrated Review worksheets from the Integrated Review version of the MyLab Math course. The Learning Guide is also available as PDFs in MyLab Math. It can also be packaged with the textbook and MyLab Math access code.

Student Solutions Manual
ISBN 10: 0-13-468650-0
Daniel Miller, Niagara County Community College
This manual provides detailed, worked-out solutions to odd-numbered exercises, as well as solutions to all Check Points, Concept and Vocabulary Checks, Chapter Reviews, and Chapter Tests.

pearson.com/mylab/math
To the Student

The bar graph shows some of the qualities that students say make a great teacher. It was my goal to incorporate each of these qualities throughout the pages of this book to help you gain control over the part of your life that involves numbers and mathematical ideas.

Explains Things Clearly

I understand that your primary purpose in reading Thinking Mathematically is to acquire a solid understanding of the required topics in your liberal arts math course. In order to achieve this goal, I’ve carefully explained each topic. Important definitions and procedures are set off in boxes, and worked-out examples that present solutions in a step-by-step manner appear in every section. Each example is followed by a similar matched problem, called a Check Point, for you to try so that you can actively participate in the learning process as you read the book. (Answers to all Check Points appear in the back of the book and video solutions are in MyMathLab.)

Funny & Entertaining

Who says that a math textbook can’t be entertaining? From our engaging cover to the photos in the chapter and section openers, prepare to expect the unexpected. I hope some of the book’s enrichment essays, called Blitzer Bonuses, will put a smile on your face from time to time.

Helpful

I designed the book’s features to help you acquire knowledge of fundamental mathematics, as well as to show you how math can solve authentic problems that apply to your life. These helpful features include

- **Explanatory Voice Balloons**: Voice balloons are used in a variety of ways to make math less intimidating. They translate mathematical language into everyday English, help clarify problem-solving procedures, present alternative ways of understanding concepts, and connect new concepts to concepts you have already learned.

- **Great Question!**: The book’s Great Question! boxes are based on questions students ask in class. The answers to these questions give suggestions for problem solving, point out common errors to avoid, and provide informal hints and suggestions.

- **Chapter Summaries**: Each chapter contains a review chart that summarizes the definitions and concepts in every section of the chapter. Examples from the chapter that illustrate these key concepts are also referenced in the chart. Review these summaries and you’ll know the most important material in the chapter!

Passionate about the Subject

I passionately believe that no other discipline comes close to math in offering a more extensive set of tools for application and development of your mind. I wrote the book in Point Reyes National Seashore, 40 miles north of San Francisco. The park consists of 75,000 acres with miles of pristine surf-washed beaches, forested ridges, and bays bordered by white cliffs. It was my hope to convey the beauty and excitement of mathematics using nature’s unspoiled beauty as a source of inspiration and creativity. Enjoy the pages that follow as you empower yourself with the mathematics needed to succeed in college, your career, and in your life.

Regards,

Bob

Robert Blitzer
An enormous benefit of authoring a successful textbook is the broad-based feedback I receive from students, dedicated users, and reviewers. Every change to this edition is the result of their thoughtful comments and suggestions. I would like to express my appreciation to all the reviewers, whose collective insights form the backbone of this revision. In particular, I would like to thank the following people for reviewing Thinking Mathematically for this Seventh Edition.

Alexandra Verkhovtseva, Anoka-Ramsey Community College
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Deana Alexander, Indiana University—Purdue University
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Tonny Sangutel, North Carolina Central University

Each reviewer from every edition has contributed to the success of this book and I would like to also continue to offer my thanks to them.

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Robert Blitzer


and Francesca Monaco, project manager, and Kathleen Manley, production editor, whose collective talents kept every aspect of this complex project moving through its many stages.

I would like to thank my editor at Pearson, Dawn Murrin, and editorial assistant, Stacey Miller, who guided and coordinated the book from manuscript through production. Finally, thanks to marketing manager Kyle DiGiannantonio and marketing assistant Hanna Lafferty for your innovative marketing efforts, and to the entire Pearson sales force, for your confidence and enthusiasm about the book.

Robert Blitzer