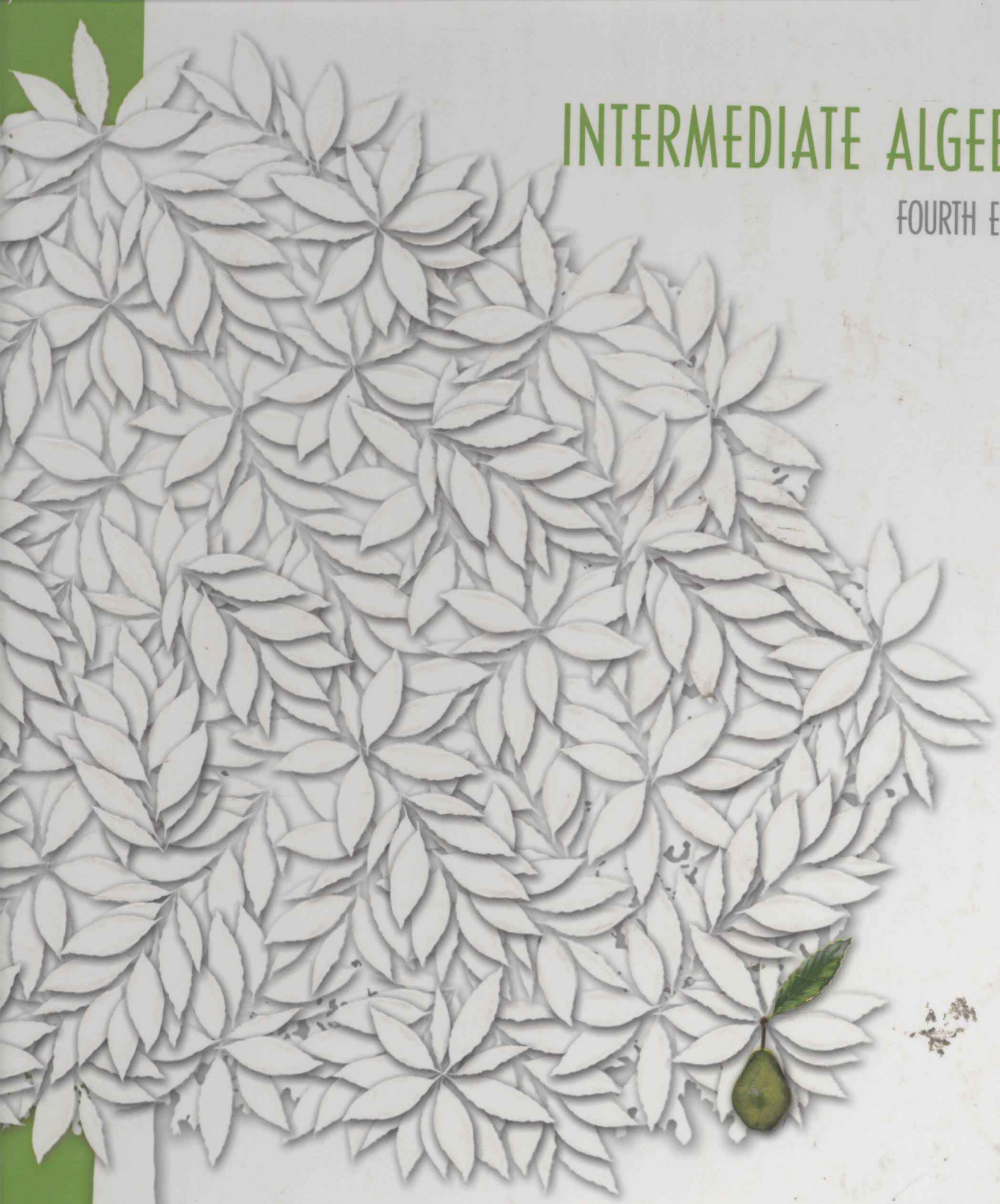
INTERMEDIATE ALGEBRA

FOURTH EDITION



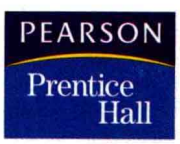
K. Elayn Gay

Includes Chapter Test Prep Video CD

Intermediate Algebra

FOURTH EDITION

K. Elayn Martin-Gay



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DEDICATION

To my mother, Barbara M. Miller, and her husband, Leo Miller, and to the memory of my father, Robert J. Martin

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PREFACE

ABOUT THE BOOK

Intermediate Algebra, Fourth Edition was written to provide a **solid foundation in algebra** for students who might have had no previous experience in algebra. Specific care has been taken to ensure that students have the most **up-to-date and relevant** text preparation for their next mathematics course, as well as to help students to succeed in nonmathematical courses that require a grasp of algebraic fundamentals. I have tried to achieve this by writing a user-friendly text that is keyed to objectives and contains many worked-out examples. The basic concepts of graphing and functions are introduced early, and problem solving techniques, real-life and real-data applications, data interpretation, appropriate use of technology, mental mathematics, number sense, critical thinking, decision-making, and geometric concepts are emphasized and integrated throughout the book.

The new edition includes an increased emphasis on study and test preparation skills. In addition, the fourth edition now includes a new resource, the Chapter Test Prep Video CD. With this CD/Video, students have instant access to video solutions for each of the chapter test questions contained in the text. It is designed to help them study efficiently.

The many factors that contributed to the success of the previous editions have been retained. In preparing this edition, I considered the comments and suggestions of colleagues throughout the country, students, and many users of the prior editions. The AMATYC Crossroads in Mathematics: Standards for Introductory College Mathematics before Calculus and the MAA and NCTM standards (plus Addenda), together with advances in technology, also influenced the writing of this text.

Intermediate Algebra, Fourth Edition is **part of a series of texts** that can include *Basic College Mathematics Second Edition, Prealgebra, Fourth Edition, Beginning Algebra, Fourth Edition*. Also, available are *Intermediate Algebra: A Graphing Approach, Third Edition*, and *Beginning and Intermediate Algebra, Third Edition*, a combined algebra text. Throughout the series, pedagogical features are designed to develop student proficiency in algebra and problem solving, and to prepare students for future courses.

NEW FEATURES AND CHANGES IN THE NEW EDITION

The following new features have been added to the fourth edition.

INCREASED EMPHASIS ON STUDY SKILLS

New! Study Skills Reminders Integrated throughout the text to help students hone their study skills and serve as a point-of-use support resource, reinforcing the skills covered in Section 1.1. Also, beginning in Section 2.1, and continued throughout the text, there are special Study Skills Reminders that help students organize an outline on how to recognize and how to solve various equations and inequalities. See the Study Skills Reminders in Sections 2.1, 2.4, 2.5, 2.6, and 2.7 for examples.

New! Integrated Reviews serve as mid-chapter reviews and help students assimilate new skills and concepts they have learned separately over several sections. The reviews provide students with another opportunity to practice with *mixed* exercises as they master the topics.

ENHANCED SECTION EXERCISE SETS

Mixed Practice exercises. Exercise sets have been organized to include mixed practice exercises where appropriate. They give students the chance to assimilate the concepts and skills covered in separate objectives. Students have the opportunity to practice the kind of decision making they will encounter on tests.

New! Concept Extension exercises have been added to the end of the section exercise sets. They extend the concepts and require students to combine several skills or concepts. They expose students to the way math ideas build upon each other and offer the opportunity for additional challenges.

MORE OPPORTUNITIES FOR STUDENTS TO CHECK THEIR UNDERSTANDING

New! Concept Checks are special exercises found in most sections following key examples. Working these will help students check their grasp of the concept being developed before moving to the next example.

INCREASED EMPHASIS ON IMPROVING TEST PREPARATION

New! Chapter Test Prep Video CD packaged with each text and presented by Elayn Martin-Gay provides students with a resource to take and correct sample tests as they prepare for exams. Step-by-Step solutions are presented for every Chapter Test exercise contained in the text. Easy video navigation allows students to instantly access the solutions to the exact exercises they need help with.

KEY CONTINUING FEATURES

The following key features have been retained from previous editions.

Readability and Connections I have tried to make the writing style as clear as possible while still retaining the mathematical integrity of the content. When a new topic is presented, an effort has been made to **relate the new ideas to those that students may already know**. Constant reinforcement and connections within problem solving strategies, data interpretation, geometry, patterns, graphs, and situations from everyday life can help students gradually master both new and old information.

Problem Solving Process This is formally introduced in Chapter 2 with a **four-step process that is integrated throughout the text**. The four steps are Understand, Translate, Solve, and Interpret. The repeated use of these steps throughout the text in a variety of examples shows their wide applicability. Reinforcing the steps can increase students' confidence in tackling problems.

Applications and Connections Every effort was made to include as many accessible, interesting, and relevant real-life applications as possible throughout the text in both worked-out examples and exercise sets. The applications **strengthen students' understanding of mathematics in the real world** and help to motivate students. They show connections to a wide range of fields including agriculture, allied health, art, astronomy, automotive ownership, aviation, biology, business, chemistry, communication, computer technology, construction, consumer affairs, demographics, earth science, education, entertainment, environmental issues, finance and economics, food service, geography, government, history, hobbies, labor and career issues, life science, medicine, music, nutrition, physics, political science, population, recreation, sports, technology, transportation, travel, weather, and important related mathematical areas such as geometry and statistics. (See the Index of Applications on page xxiv.) Many of the applications are based on **recent and interesting real-life data**. Sources for data include newspapers, magazines, government publications, publicly held companies, special interest groups, research organizations, and reference books. Opportunities for obtaining your own real data are also included.

Helpful Hints Helpful Hints, contain practical advice on applying mathematical concepts. These are found throughout the text and **strategically placed** where students are most likely to need immediate reinforcement. They are highlighted in a box for quick reference and, as appropriate, an indicator line is used to precisely identify the particular part of a problem or concept being discussed. For instance, see page 98.

Visual Reinforcement of Concepts The text contains numerous graphics, models, and illustrations to visually clarify and reinforce concepts. These include **new and updated** bar graphs, circle graphs in two and three dimensions, line graphs, calculator screens, application illustrations, photographs, and geometric figures.

Real World Chapter Openers The chapter openers focus on how math is used in a specific career, and reference a "Spotlight on Decision Making" feature within the chapter for further exploration of the **career and the relevance of algebra**.

Student Resource Icons At the beginning of each exercise set, videotape, tutorial software CD-Rom, Student Solutions Manual, Study Guide, and tutor center icons are displayed. These icons help reinforce that these learning aids are available should students wish to use them to review concepts and skills at their own pace. These items have **direct correlation to the text** and emphasize the text's methods of solution.

Chapter Highlights Found at the end of each chapter, the Chapter Highlights contain key definitions, concepts, *and* examples to **help students understand and retain** what they have learned.

Chapter Project This feature occurs at the end of each chapter, often serving as a chapter wrap-up. For **individual or group completion**, the multi-part Chapter Project, usually hands-on or data based, allows students to problem solve, make interpretations, and to think and write about algebra.

EXERCISE SETS

Each text section ends with an exercise set. The exercises are carefully graded in level of difficulty. In the beginning, **exercises are keyed** to at least one worked example in the text. Once a student has gained confidence, **the latter exercises are not keyed to examples**. Exercises and examples marked with a video icon ( ) have been worked out step-by-step by the author in the videos that accompany this text.

Throughout the text exercises there is an emphasis on data and graphical interpretation via tables, charts, and graphs. The ability to interpret data and read and create a variety of types of graphs is developed gradually so students become comfortable with it. Similarly, throughout the text there is integration of geometric concepts, such as perimeter and area. Exercises and examples marked with a geometry icon (△) have been identified for convenience.

Each exercise set contains one or more of the following features.

Mental Math These problems are found at the beginning of many exercise sets. They are mental warm-ups that **reinforce concepts** found in the accompanying section and increase students' confidence before they tackle an exercise set. By relying on their own mental skills, students increase not only their confidence in themselves, but also their number sense and estimation ability. This edition includes a greater number of Mental Math exercises.

Writing Exercises These exercises are found in almost every exercise set and are marked with the icon (✎). They require students to **assimilate information** and provide a written response to explain concepts or justify their thinking. Guidelines recommended by the American Mathematical Association of Two Year Colleges

(AMATYC) and other professional groups recommend incorporating writing in mathematics courses to reinforce concepts.

Mixed Practice exercises. Exercise sets have been organized to include mixed practice exercises where appropriate. They give students the chance to assimilate the concepts and skills covered in separate objectives. Students have the opportunity to practice the kind of decision making they will encounter on tests.

New! Concept Extension exercises have been added to the end of the section exercise sets. They extend the concepts and require students to combine several skills or concepts. They expose students to the way math ideas build upon each other and offer the opportunity for additional challenges.

Data and Graphical Interpretation Throughout the text there is an emphasis on data interpretation in exercises via tables, bar charts, line graphs, or circle graphs. The ability to interpret data and read and create a variety of graphs is **developed gradually** so students become comfortable with it.

Calculator Explorations and Exercises These optional explorations offer guided instruction, through examples and exercises, on the proper use of **scientific and graphing calculators or computer graphing utilities as tools in the mathematical problem-solving process**. Placed appropriately throughout the text, these explorations reinforce concepts or motivate discovery learning.

Additional exercises building on the skills developed in the Explorations may be found in exercise sets throughout the text, and are marked with the icon  for graphing calculator use.

Review and Preview These exercises occur in each exercise set (except for those in Chapter 1). These problems are **keyed to earlier sections** and review concepts learned earlier in the text that are needed in the next section or in the next chapter. These exercises show the **links between earlier topics and later material**.

Vocabulary Checks Vocabulary checks, provide an opportunity for students to become more familiar with the use of mathematical terms as they strengthen verbal skills. They are found at the end of each chapter.

Chapter Review and Chapter Test The end of each chapter contains a review of topics introduced in the chapter. The review problems are keyed to sections. The Chapter Test is not keyed to sections. The Chapter Test Prep Video CD provides solutions by the author to every Chapter Test exercise in the text.

Cumulative Review Each chapter after the first contains a **cumulative review of all chapters beginning with the first** up through the chapter at hand. The odd problems contained in the cumulative reviews are actually earlier worked examples in the text. The even problems are keyed to sections where students can go to review the material in an exercise.

KEY CONTENT CHANGES IN THE FOURTH EDITION

The following changes to content are included.

- **Exponential and Logarithmic Functions** are now Chapter 9, **Conic Sections** Chapter 10.

Specific discussions have been enhanced in the fourth edition. Some of the changes include:

- In every section where a new type of equation or inequalities is solved, **a special study skill box has been added. Students are encouraged to develop a cumulative outline** in their own words that will help them learn to recog-

nize and solve these equations and inequalities. This is designed to help sutdents throughout intermediate algebra—as well as to be better prepared for college algebra.

- **Increased coverage on factoring trinomials by grouping**. See Section 5.6.
- **Increased discussion about slope as a rate of change**. See Sections 3.4 and 3.5.
- **Improved diagrams for student understanding**. For example, see Sections 9.1 and 9.2.

Exercise Sets. All applications and data have been thoroughly updated. In addition, the following changes have been made:

- All exercise sets are better organized. Most now include a section of exercises called **"Mixed Practice"**. These exercises are designed to help prepare students for any testing of concepts.
- Each exercise set now includes **Concept Extension** exercises. These exercises allow instructors to pick and choose more difficult and/or more conceptual types of exercises for students.
- Overall, the range of the exercise sets has extended so that there are now more choices for exercises at increased level of difficulty. See sections 2.1, 2.6, 3.3, 4.1, 4.4, 5.3, 5.7, 6.4, 6.8, 7.4, 7.6, 9.3.
- Overall, the types of the exercises available for students has increased. This is intended to help them better prepare for standardized testing. For example, see the new multiple choice exercises in sections 2.4, 4.2, 6.1, 7.1, 7.2.
- More real-life data exercises have been included. See sections 2.2, 2.3, 3.1, 4.3.
- Increased Mental Math exercises: These can be worked as a class or alone before the exercise set. These exercises not only increase student's mental computation skills, but prepares a studednt for the upcoming exercise set. See sections 2.7, 3.1, 6.2, 6.8, 7.1, 7.2, 9.1, 9.5, 10.2.

INSTRUCTOR AND STUDENT RESOURCES

The fourth edition is supported by a comprehensive resource for instructors and students.

INSTRUCTOR RESOURCES—PRINT

Annotated Instructor's Edition (ISBN 0-13-146987-8)

- Answers to exercises on the same text page or in Graphing Answer Section
- Graphing Answer Section contains answers to exercises requiring graphical solutions, chapter projects, and Spotlight on Decision Making exercises
- Teaching Tips throughout the text placed at key points in the margin, found in places where students historically need extra help together with ideas on how to help students through these concepts, as well as placed appropriately to provide ideas for expanding upon a certain concept, other ways to present a concept, or ideas for classroom activities
- New Classroom Examples have been added. Each Classroom Example parallels the text example for an added resource during lecture

Instructor's Solutions Manual (ISBN 0-13-144465-4)

- Detailed step-by-step solutions to even-numbered section exercises
- Solutions to every Spotlight on Decision Making exercise
- Solutions to every Calculator Exploration exercise

- Solutions to every Chapter Test and Chapter Review exercise
- Solution methods reflect those emphasized in the textbook

Instructor's Resource Manual with Tests (ISBN 0-13-144466-2)

- Notes to the Instructor that include new suggested assignments for each exercise set
- Eight Chapter Tests per chapter (5 free response, 3 multiple choice)
- Two Cumulative Review Tests (one free response, one multiple choice)
- Eight Final Exams (4 free response, 4 multiple choice)
- Twenty additional exercises per section for added test exercises or worksheets, if needed
- Group Activities (on average of two per chapter; providing short group activities in a convenient ready-to-use handout format)
- Answers to all items

INSTRUCTOR RESOURCES—MEDIA

TestGen with QuizMaster enables instructors to build, edit, print, and administer tests using a computerized bank of questions developed to cover all the objectives of the text. Instructors can modify test bank questions or add new questions by using the built-in question editor, which allows users to create graphs, import graphics, and insert math notation, variable numbers, or text. Tests can be printed or administered online via the Internet or another network. TestGen comes packaged with QuizMaster, which allows students to take tests on a local area network. The software is available on a dual-platform Windows/Macintosh CD-ROM.

"Instructor to Instructor" Videos authored by Elayn Martin-Gay these videos offer topical and teaching technique instruction to new instructors and adjuncts to enhance effective classroom communication, and provide seasoned faculty with additional teaching ideas and approaches. They also provide suggestions for presenting the topics in class, alternative approaches, time saving strategies, classroom activities, and much more.

New MyMathLab® (instructor) is a series of text-specific, easily customizable online courses for Prentice Hall mathematics textbooks. MyMathLab is powered by CourseCompass_—Pearson Education's online teaching and learning environment—and by MathXL®—our online homework, tutorial, and assessment system. MyMathLab gives you the tools you need to deliver all or a portion of your course online, whether your students are in a lab setting or working from home.

MyMathLab provides a rich and flexible set of course materials, featuring free-response exercises that are algorithmically generated for unlimited practice and mastery. Students can also use online tools such as video lectures, animations, and a multimedia textbook to independently improve their understanding and performance. Instructors can use MyMathLab's homework and test managers to select and assign online exercises correlated directly to the textbook, and they can also import TestGen tests into MyMathLab for added flexibility. MyMathLab's online gradebook—designed specifically for mathematics—automatically tracks students' homework and test results and gives the instructor control over how to calculate final grades.

MyMathLab is available to qualified adopters. For more information, visit our website at www.mymathlab.com or contact your Prentice Hall sales representative for a product demonstration.

MathXL® is a powerful online homework, tutorial, and assessment system that accompanies your Prentice Hall mathematics textbook. With MathXL, instructors can

create, edit, and assign online homework and tests using algorithmically generated exercises correlated at the objective level to your textbook. All student work is tracked in MathXL's online gradebook. Students can take chapter tests in MathXL and receive personalized study plans based on their test results. The study plan diagnoses weaknesses and links students directly to tutorial exercises for the objectives they need to study and retest. Students can also access supplemental animations and video clips directly from selected exercises. MathXL is available to qualified adopters. For more information, visit our website at www.mathxl.com, or contact your Prentice Hall sales representative for a product demonstration.

MathXL® Tutorials on CD This interactive tutorial CD-ROM provides algorithmically generated practice exercises that are correlated at the objective level to the exercises in the textbook. Every practice exercise is accompanied by an example and a guided solution designed to involve students in the solution process. Selected exercises may also include a video clip to help students visualize concepts. The software tracks student activity and scores and can generate printed summaries of students' progress.

STUDENT RESOURCES—PRINT

Student Solutions Manual (ISBN 0-13-144464-6)

- Detailed step-by-step solutions to odd-numbered section exercises
- Solutions to every (odd and even) Mental Math exercise
- Solutions to odd-numbered Calculator Exploration exercises
- Solutions to every (odd and even) exercise found in the Chapter Reviews and Chapter Tests
- Solution methods reflect those emphasized in the textbook
- Ask your bookstore about ordering

Study Guide (ISBN 0-13-144469-7)

- Additional step-by-step worked out examples and exercises
- Practice tests and final examination
- Includes Study Skills and Note-taking suggestions
- Includes Hints and warnings section
- Solutions to all exercises, tests, and final examination
- Solution methods reflect those emphasized in the text
- Ask your bookstore about ordering

STUDENT RESOURCES—MEDIA

New! Chapter Test Prep Video CD Provides a step-by-step video solution to each problem in the textbook Chapter Test, presented by Elayn Martin-Gay.

MyMathLab® (student) is a complete online course designed to help students succeed in learning and understanding mathematics. MyMathLab contains an online version of your textbook with links to multimedia resources—such as video clips, practice exercises, and animations—that are correlated to the examples and exercises in the text. MyMathLab also provides students with online homework and tests and generates a personalized study plan based on their test results. The study plan links directly to unlimited tutorial exercises for the areas students need to study and re-test, so they can practice until they have mastered the skills and concepts in the textbook. All of the online homework, tests, and tutorial work students do is tracked in their MyMathLab gradebook.

MathXL® is a powerful online homework, tutorial, and assessment system that accompanies your Prentice Hall mathematics textbook. With MathXL, instructors can create, edit, and assign online homework and tests using algorithmically generated exercises correlated at the objective level to your textbook. All student work is tracked in MathXL's online gradebook. Students can take chapter tests in MathXL and receive personalized study plans based on their test results. The study plan diagnoses weaknesses and links students directly to tutorial exercises for the objectives they need to study and retest. Students can also access supplemental animations and video clips directly from selected exercises. MathXL is available to qualified adopters. For more information, visit our website at www.mathxl.com, or contact your Prentice Hall sales representative for a product demonstration.

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- In-text exercises marked with a video icon appear on the videos
- Digitized videos offer convenient anytime access to video tutorial support when shrinkwrapped with the text

PH Tutor Center (0-13-064604-0)

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- Staffed by developmental math faculty
- Accessed through a registration number that may be bundled with a new text or purchased separately with a used book.
- See www.prenhall.com/tutorcenter for FAQ

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Sadly, executive editor of this project, Karin Wagner, passed away this year. She will be dearly remembered by me and the rest of the staff at Prentice Hall for her integrity, wisdom, commitment, and especially her sense of humor and infectious laugh.

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K. Elayn Martin-Gay

ABOUT THE AUTHOR

K. Elayn Martin-Gay has taught mathematics at the University of New Orleans for 25 years. Her numerous teaching awards include the local University Alumni Association's Award for Excellence in Teaching, and Outstanding Developmental Educator at University of New Orleans, presented by the Louisiana Association of Developmental Educators.

Prior to writing textbooks, K. Elayn Martin-Gay developed an acclaimed series of lecture videos to support developmental mathematics students in their quest for success. These highly successful videos originally served as the foundation material for her texts. Today the tapes specifically support each book in the Martin-Gay series.

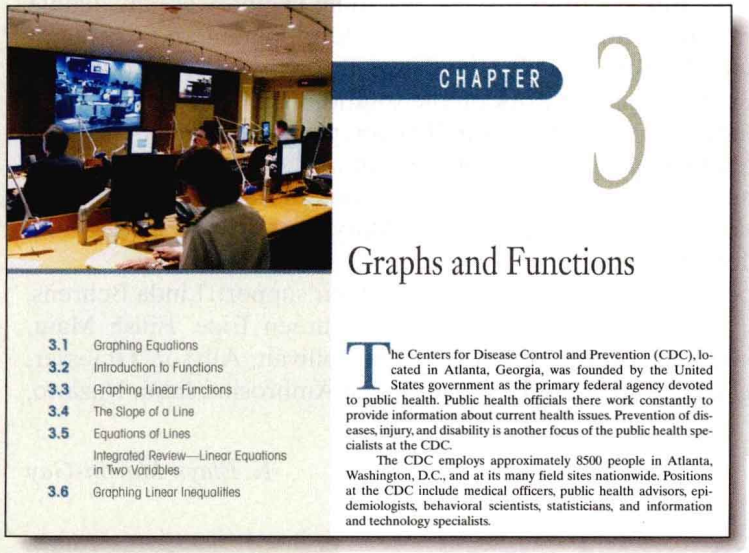
Elayn is the author of over ten published textbooks as well as multimedia interactive mathematics, all specializing in developmental mathematics courses such as basic mathematics, prealgebra, beginning and intermediate algebra. She has provided author participation across the broadest range of materials: textbook, videos, tutorial software, and Interactive Math courseware. All the components are designed to work together. This offers an opportunity of various combinations for an integrated teaching and learning package offering great consistency and comfort for the student.

Highlights of *Intermediate Algebra, Fourth Edition*

Every Student Can Succeed

Intermediate Algebra, Fourth Edition has been written and designed to help you succeed in this course. Special care has been taken to ensure students have the most up-to-date and relevant text features, and as many real-world applications as possible to provide you with a solid foundation in algebra and prepare you for future courses.

Good study skills are essential for success in mathematics. This edition provides an increased emphasis on study and test preparation skills. Take a few minutes to examine the features and resources that have been incorporated into *Intermediate Algebra, Fourth Edition* to help students excel.



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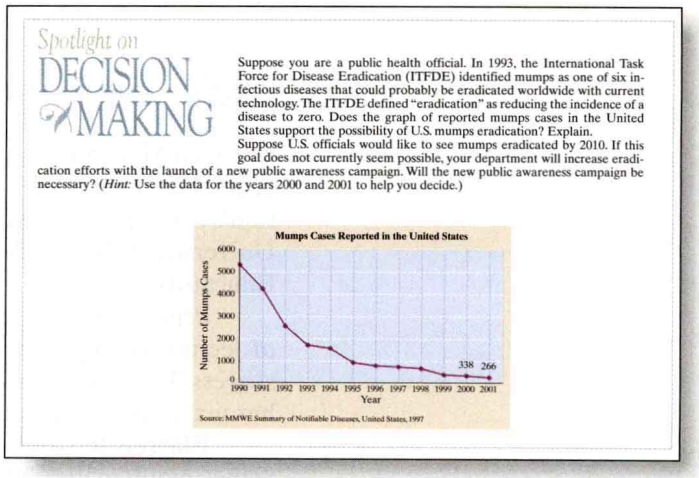
◀ Real-World Chapter Openers

Real-world chapter openers focus on how algebraic concepts relate to the world around you. They also reference a **Spotlight on Decision Making** feature within the chapter for further exploration.



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▲ Spotlight on Decision Making

These unique applications encourage students to develop decision making and problem solving abilities. Primarily workplace or career-related situations are highlighted in each feature.

Become a Confident Problem Solver!

A goal of this text is to help you develop problem-solving abilities.

EXAMPLE 5

FINDING THE ORIGINAL PRICE OF A COMPUTER

Suppose that a computer store just announced an 8% decrease in the price of a particular computer model. If this computer sells for $2162 after the decrease, find the original price of this computer.

Solution

1. UNDERSTAND. Read and reread the problem. Recall that a percent decrease means a percent of the original price. Let's guess that the original price of the computer is $2500. The amount of decrease is then 8% of $2500, or (0.08)($2500) = $200. This means that the new price of the computer is the original price minus the decrease, or $2500 − $200 = $2300. Our guess is incorrect, but we now have an idea of how to model this problem. In our model, we will let x = the original price of the computer.

2. TRANSLATE.

In words:	original price of computer	minus	8% of original price	is	new price
	↓	↓	↓	↓	↓
Translate:	x	−	$0.08x$	=	2162

3. SOLVE the equation.

$$x - 0.08x = 2162$$
$$0.92x = 2162 \quad \text{Combine like terms.}$$
$$x = \frac{2162}{0.92} = 2350 \quad \text{Divide both sides by } 0.92.$$

4. INTERPRET.

Check: If the original price of the computer was $2350, the new price is

$$\$2350 - (0.08)(\$2350) = \$2350 - \$188 = \$2162 \quad \text{The given new price.}$$

State: The original price of the computer was $2350.

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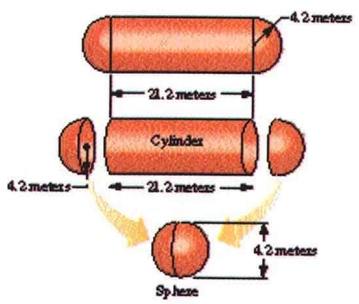
General Strategy for Problem Solving

Save time by having a plan. The organization of this text can help you. Note the outlined problem-solving steps: *Understand, Translate, Solve,* and *Interpret.* Problem solving is introduced early, emphasized, and integrated throughout the chapters. The problem-solving procedure is illustrated step-by-step in the in-text examples.

Geometry

Geometric concepts are integrated throughout the text in examples and exercises and are identified with a triangle icon. The inside front cover contains *Geometric Formulas* for convenient reference, and there are appendices on geometry in the back of the text.

△ 39. A portion of the external tank of the Space Shuttle *Endeavour* is a liquid hydrogen tank. If the ends of the tank are hemispheres, find the volume of the tank. To do so, answer parts a through c.



a. Find the volume of the cylinder shown. Round to 2 decimal places.

b. Find the volume of the sphere shown. Round to 2 decimal places.

c. Add the results of parts a and b. This sum is the approximate volume of the tank.

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Learn Better–Master and Apply Skills and Concepts

K. Elayn Martin-Gay provides thorough explanations of concepts and enlivens the content by integrating successful and innovative instructional tools. These features have been included to enhance your understanding of mathematical concepts.

CONCEPT CHECK

Determine which equations represent functions. Explain your answer.

a. $y = 14$ **b.** $x = -5$ **c.** $x + y = 6$

4 Next, we practice finding the domain and range of a relation from its graph.

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New Concept Checks

Concept Checks are special exercises found in most sections following key examples. Work these to help measure your grasp of the concept being explained before moving to the next example. Answers appear at the bottom of the text page.

New Mixed Practice Exercises

Mixed Practice exercises have been added to the exercise sets to give students the chance to assimilate the concepts and skills that have been covered in separate objectives.

MIXED PRACTICE

Graph each linear equation.

35. $x + 2y = 8$	**36.** $x - 3y = 3$
37. $3x + 5y = 7$	**38.** $3x - 2y = 5$
39. $x + 8y = 8$	**40.** $x - 3y = 9$
41. $5 = 6x - y$	**42.** $4 = x - 3y$
43. $-x + 10y = 11$	**44.** $-x + 9 = -y$
45. $y = \frac{3}{2}$	**46.** $x = \frac{3}{2}$
47. $2x + 3y = 6$	**48.** $4x + y = 5$
49. $x + 3 = 0$	**50.** $y - 6 = 0$
51. $f(x) = \frac{3}{4}x + 2$	**52.** $f(x) = \frac{4}{3}x + 2$
53. $f(x) = x$	**54.** $f(x) = -x$

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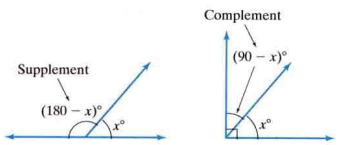
Concept Extensions

71. Newsprint is either discarded or recycled. Americans recycle about 27% of all newsprint, but an amount of newsprint equivalent to 30 million trees is discarded every year. About how many trees' worth of newsprint is *recycled* in the United States each year? (*Source:* The Earth Works Group)

72. Find an angle such that its supplement is equal to twice its complement increased by 50°.



73. The average annual number of cigarettes smoked by an American adult continues to decline. For the years 1991–2000, the equation $y = -64.45x + 2795.5$ approximates this data. Here, x is the number of years after 1990 and y is the average annual number of cigarettes smoked.

a. If this trend continues, find the year in which the average annual number of cigarettes smoked is 0. To do this, let $y = 0$ and solve for x.

b. Predict the average annual number of cigarettes smoked by an American adult in 2005. To do so, let $x = 15$ (Since $2005 - 1990 = 15$) and find y.

c. Use the result of part b to predict the average *daily* number of cigarettes smoked by an American adult in 2005. Round to the nearest whole. Do you think this number represents the average daily number of cigarettes smoked by an adult smoked? Why or why not?

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New Concept Extensions

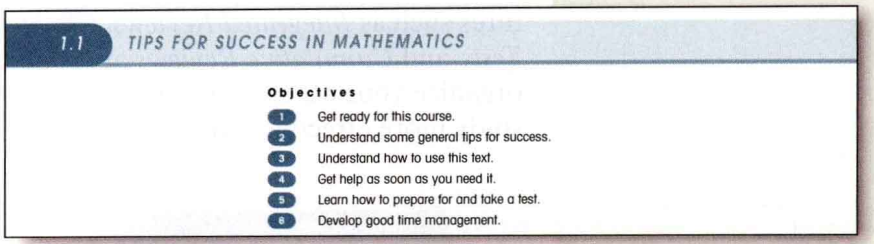
Concept Extension exercises have also been added to the exercise sets. They extend the concepts and require students to combine several skills or concepts. These exercises expose students to the way math ideas build upon each other.

Study Better–Build Confidence and Develop Study Skills

Several features of this text can be helpful in building your confidence and mathematical competence. They will also help improve your study skills.

Tips for Success ▶

Coverage of study skills in Section 1.1 reinforces this important component to success in this course.

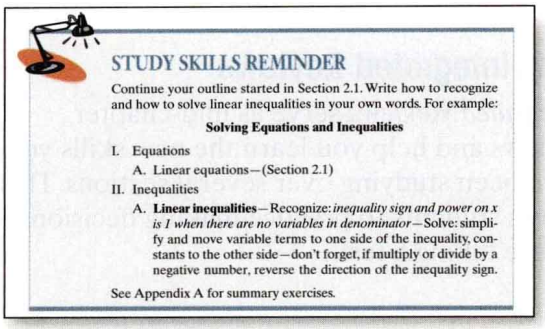


1.1 TIPS FOR SUCCESS IN MATHEMATICS

Objectives

1. Get ready for this course.
2. Understand some general tips for success.
3. Understand how to use this text.
4. Get help as soon as you need it.
5. Learn how to prepare for and take a test.
6. Develop good time management.

PAGE 2



STUDY SKILLS REMINDER

Continue your outline started in Section 2.1. Write how to recognize and how to solve linear inequalities in your own words. For example:

Solving Equations and Inequalities

I. Equations
   A. Linear equations—(Section 2.1)
II. Inequalities
   A. **Linear inequalities**—Recognize: *inequality sign and power on x is 1 when there are no variables in denominator*—Solve: simplify and move variable terms to one side of the inequality, constants to the other side—don't forget, if multiply or divide by a negative number, reverse the direction of the inequality sign.

See Appendix A for summary exercises.

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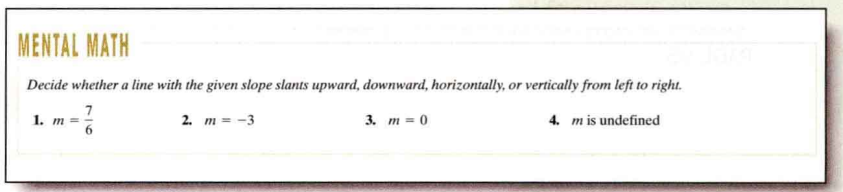
◀ Study Skills Reminders

Study Skills Reminders are integrated throughout the text to reinforce Section 1.1 and encourage the development of strong study skills. Starting in Section 2.1, a special type of reminder is included. It helps students develop a cumulative outline that will help them learn to recognize and solve equations and inequalities. This is designed to help students throughout intermediate algebra–as well as to be better prepared for college algebra.

Mental Math ▶

Mental Math warm-up exercises reinforce concepts found in the accompanying section and can increase your confidence before beginning an execise set.



MENTAL MATH

Decide whether a line with the given slope slants upward, downward, horizontally, or vertically from left to right.

1. $m = \frac{7}{6}$
2. $m = -3$
3. $m = 0$
4. m is undefined

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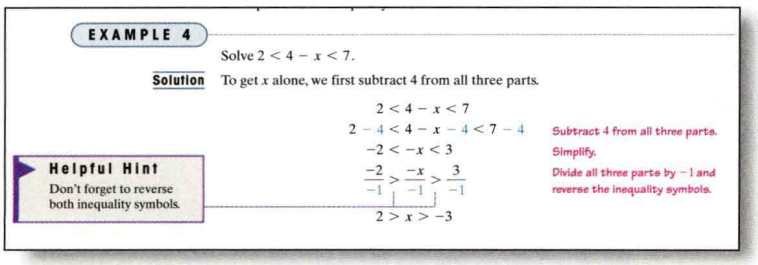

EXAMPLE 4

Solve $2 < 4 - x < 7$.

Solution To get x alone, we first subtract 4 from all three parts.

$$2 < 4 - x < 7$$
$$2 - 4 < 4 - x - 4 < 7 - 4 \quad \text{Subtract 4 from all three parts.}$$
$$-2 < -x < 3 \quad \text{Simplify.}$$
$$\frac{-2}{-1} > \frac{-x}{-1} > \frac{3}{-1} \quad \text{Divide all three parts by } -1 \text{ and reverse the inequality symbols.}$$
$$2 > x > -3$$

Helpful Hint
Don't forget to reverse both inequality symbols.

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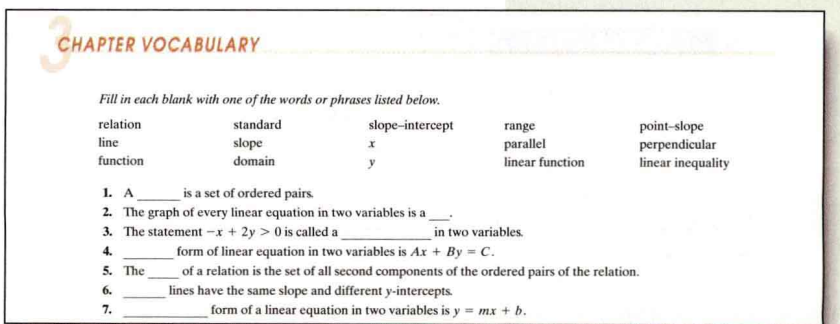
◀ Helpful Hints

Found throughout the text, these features contain practical advice on applying mathematical concepts. They are strategically placed where students are most likely to need immediate reinforcement.

Vocabulary Checks ▶

Vocabulary Checks help students strengthen verbal skills and answer questions about a chapter's content by filling in the blank with the correct word from the vocabulary list.



3 CHAPTER VOCABULARY

Fill in each blank with one of the words or phrases listed below.

relation	standard	slope–intercept	range	point-slope
line	slope	x	parallel	perpendicular
function	domain	y	linear function	linear inequality

1. A _____ is a set of ordered pairs.
2. The graph of every linear equation in two variables is a ___.
3. The statement $-x + 2y > 0$ is called a _____ in two variables.
4. _____ form of linear equation in two variables is $Ax + By = C$.
5. The ____ of a relation is the set of all second components of the ordered pairs of the relation.
6. _____ lines have the same slope and different y-intercepts.
7. _____ form of a linear equation in two variables is $y = mx + b$.

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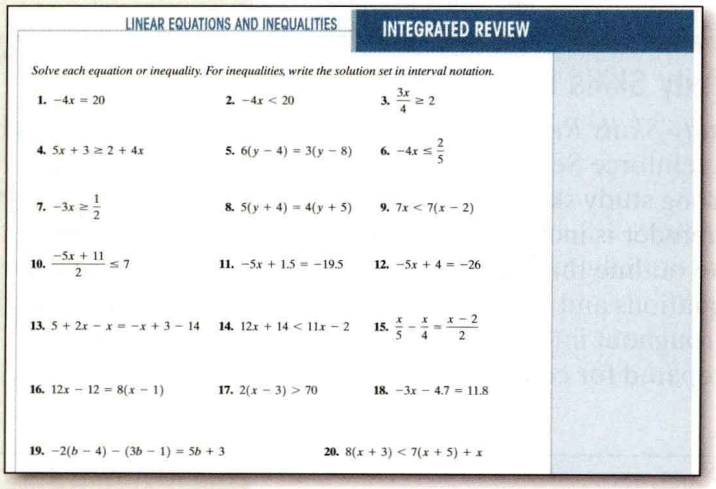
Test Better–Test Yourself and Check Your Understanding

Good exercise sets and an abundance of worked-out examples are essential for building confidence. The exercises in this text are intended to help you build skills and understand concepts as well as motivate and challenge you. In addition, features such as *Integrated Reviews, Chapter Highlights, Chapter Reviews, Chapter Tests,* and *Cumulative Reviews* are found in each chapter to help you study and organize your notes. A new resource—*Chapter Test Prep Video*—will help students study more effectively than ever before.



LINEAR EQUATIONS AND INEQUALITIES | INTEGRATED REVIEW

Solve each equation or inequality. For inequalities, write the solution set in interval notation.

1. $-4x = 20$
2. $-4x < 20$
3. $\frac{3x}{4} \geq 2$
4. $5x + 3 \geq 2 + 4x$
5. $6(y - 4) = 3(y - 8)$
6. $-4x \leq \frac{2}{5}$
7. $-3x \geq \frac{1}{2}$
8. $5(y + 4) = 4(y + 5)$
9. $7x < 7(x - 2)$
10. $\frac{-5x + 11}{2} \leq 7$
11. $-5x + 1.5 = -19.5$
12. $-5x + 4 = -26$
13. $5 + 2x - x = -x + 3 - 14$
14. $12x + 14 < 11x - 2$
15. $\frac{x}{5} - \frac{x}{4} = \frac{x - 2}{2}$
16. $12x - 12 = 8(x - 1)$
17. $2(x - 3) > 70$
18. $-3x - 4.7 = 11.8$
19. $-2(b - 4) - (3b - 1) = 5b + 3$
20. $8(x + 3) < 7(x + 5) + x$

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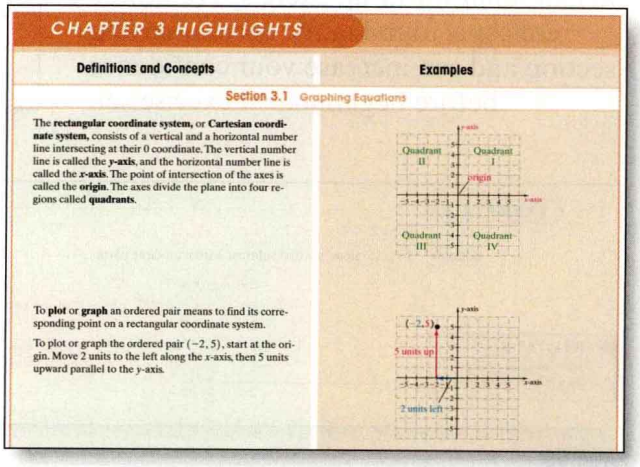
New Integrated Reviews

Integrated Reviews serve as mid-chapter reviews and help you learn the new skills you have been studying over several sections. This allows students to practice making decisions before taking a test.



CHAPTER 3 HIGHLIGHTS

Definitions and Concepts	Examples
Section 3.1 Graphing Equations	
The **rectangular coordinate system,** or **Cartesian coordinate system,** consists of a vertical and a horizontal number line intersecting at their 0 coordinate. The vertical number line is called the **y-axis,** and the horizontal number line is called the **x-axis.** The point of intersection of the axes is called the **origin.** The axes divide the plane into four regions called **quadrants.**	Quadrant II, Quadrant I, origin, Quadrant III, Quadrant IV
To **plot** or **graph** an ordered pair means to find its corresponding point on a rectangular coordinate system. To plot or graph the ordered pair $(-2, 5)$, start at the origin. Move 2 units to the left along the x-axis, then 5 units upward parallel to the y-axis.	$(-2, 5)$, 5 units up, 2 units left

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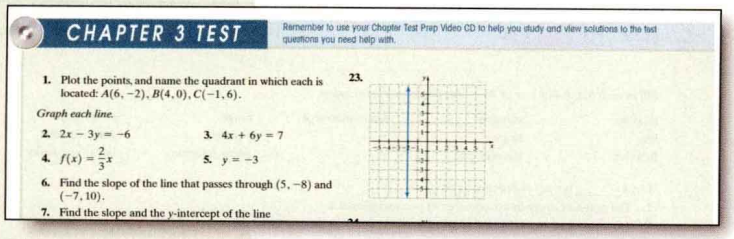
Chapter Highlights

Each chapter ends with *Chapter Highlights.* They contain key definitions, concepts, and examples to help you understand and retain what you have learned in the chapter.



CHAPTER 3 TEST

Remember to use your Chapter Test Prep Video CD to help you study and view solutions to the test questions you need help with.

1. Plot the points, and name the quadrant in which each is located: $A(6, -2), B(4, 0), C(-1, 6)$.

Graph each line.

2. $2x - 3y = -6$
3. $4x + 6y = 7$
4. $f(x) = \frac{2}{3}x$
5. $y = -3$
6. Find the slope of the line that passes through $(5, -8)$ and $(-7, 10)$.
7. Find the slope and the y-intercept of the line

23.

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Chapter Tests

Take the Chapter Test at the end of each chapter to prepare for a class exam. With the new *Chapter Test Prep Video* (packaged with your text), you can instantly view the solution to the exact exercises you're working as part of your studying. See the next page for more details.