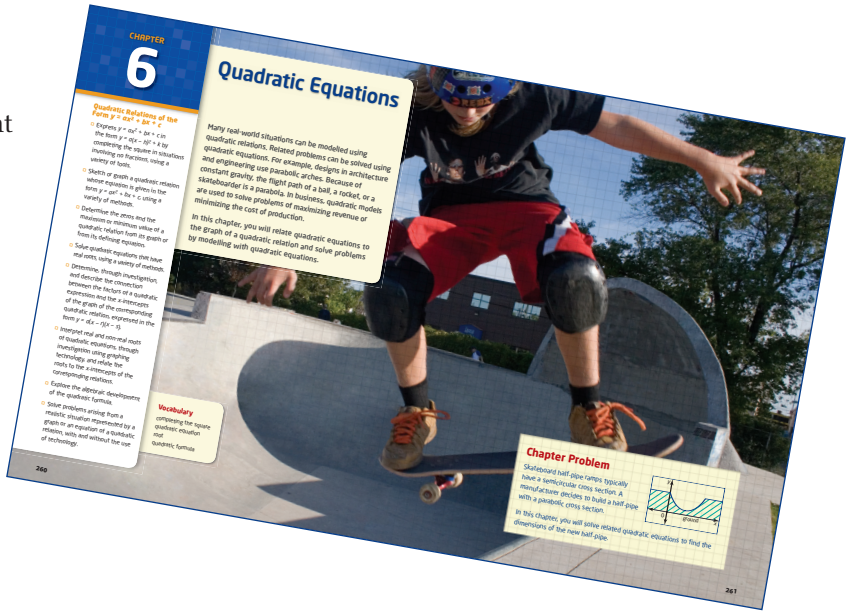
A Tour of Your Textbook

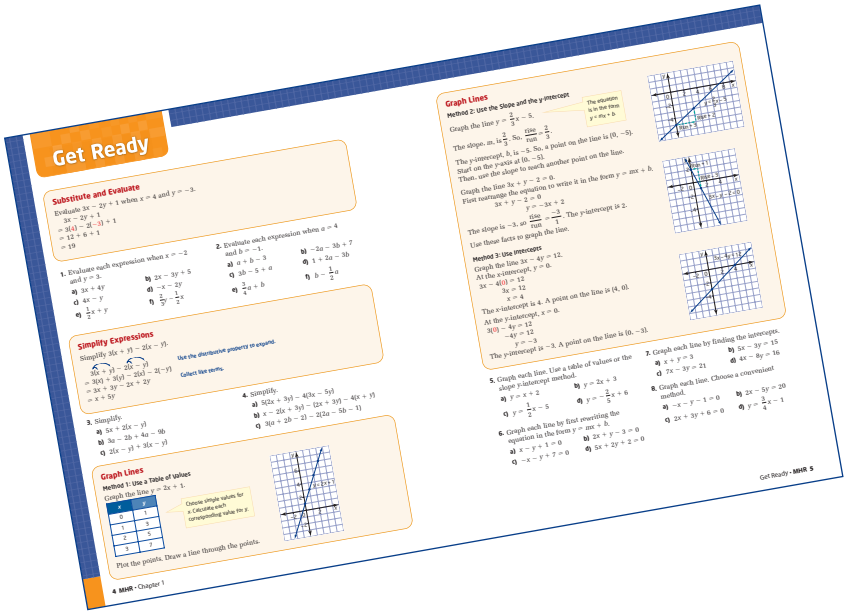
Chapter Opener

- This two-page spread introduces what you will learn in the chapter.
- The specific curriculum expectations that the chapter covers are listed.
- In the vocabulary lists are the mathematical terms that are introduced and defined in the chapter.
- The chapter problem is introduced. Questions related to the chapter problem occur in the Connect and Apply sections of the exercises throughout the chapter and are identified by a **Chapter Problem** descriptor.



Get Ready

Examples and practice questions review key skills from previous mathematics courses that are needed for success with the new concepts of the chapter.



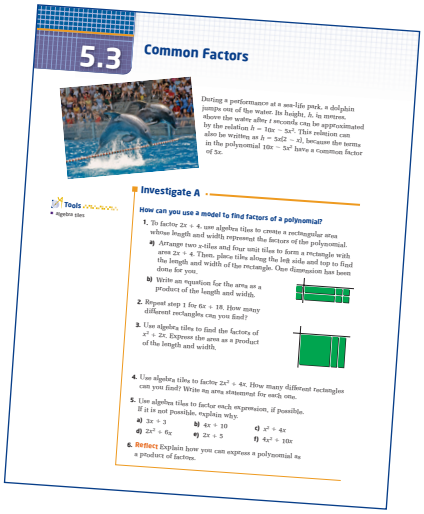
Numbered Sections

Lesson Opener

Many lessons start with a photograph and short description of a real-world setting to which the mathematical concepts relate.

Investigate

These are step-by-step activities, leading you to build your own understanding of the new concepts of the lesson. Many of these activities can best be done by working in pairs or small groups to share ideas.


5.3 Common Factors

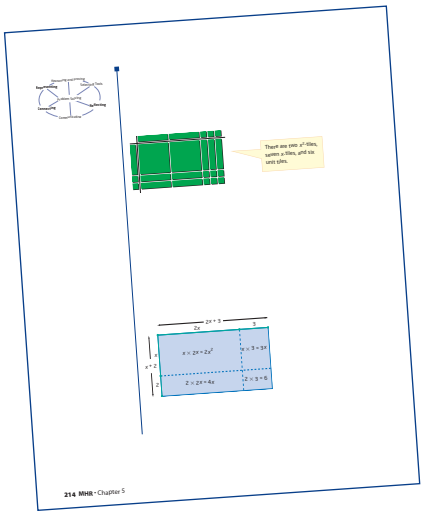
During a performance at a sea-life park, a dolphin jumps out of the water. Its height, h, in metres, above the water after t seconds can be approximated by the relation $h = 10t - 5t^2$. This relation can also be written as $h = 5t(2 - t)$, because the terms in the polynomial $10t - 5t^2$ have a common factor of $5t$.

Tools
- algebra tiles

Investigate A

How can you use a model to find factors of a polynomial?

1. To factor $2x + 4$, use algebra tiles to create a rectangular area whose length and width represent the factors of the polynomial.
   a) Arrange two x-tiles and four unit tiles to form a rectangle with area $2x + 4$. Then, place tiles along the left side and top to find the length and width of the rectangle. One dimension has been done for you.
   b) Write an equation for the area as a product of the length and width.
2. Repeat step 1 for $6x + 18$. How many different rectangles can you find?
3. Use algebra tiles to find the factors of $x^2 + 2x$. Express the area as a product of the length and width.
4. Use algebra tiles to factor $2x^2 + 4x$. How many different rectangles can you find? Write an area statement for each one.
5. Use algebra tiles to factor each expression, if possible. If it is not possible, explain why.
   a) $3x + 3$ b) $4x + 10$ c) $x^2 + 4x$
   d) $2x^2 + 6x$ e) $2x + 5$ f) $4x^2 + 10x$
6. **Reflect** Explain how you can express a polynomial as a product of factors.



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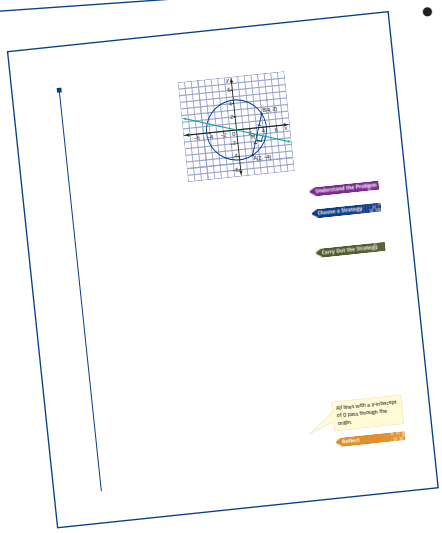
Examples

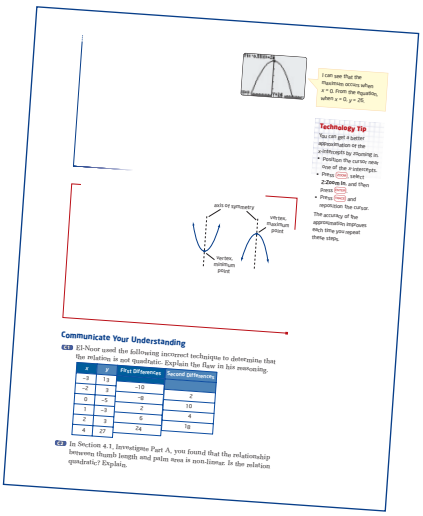
- Examples provide model solutions that show how the new concepts are used.
- The examples and their solutions include several tools to help you understand the work.
  – Notes in a thought bubble help you think through the steps.
  – Sometimes different methods of solving the same problem are shown. One may make more sense to you than the other. Often, alternative methods, using different technology tools, are shown.



- Some examples use the four-step problem solving model to remind you of a very helpful way of tackling problems.

Key Concepts

- This feature summarizes the concepts learned in the lesson.
- You can refer to this summary when you are studying or doing homework.



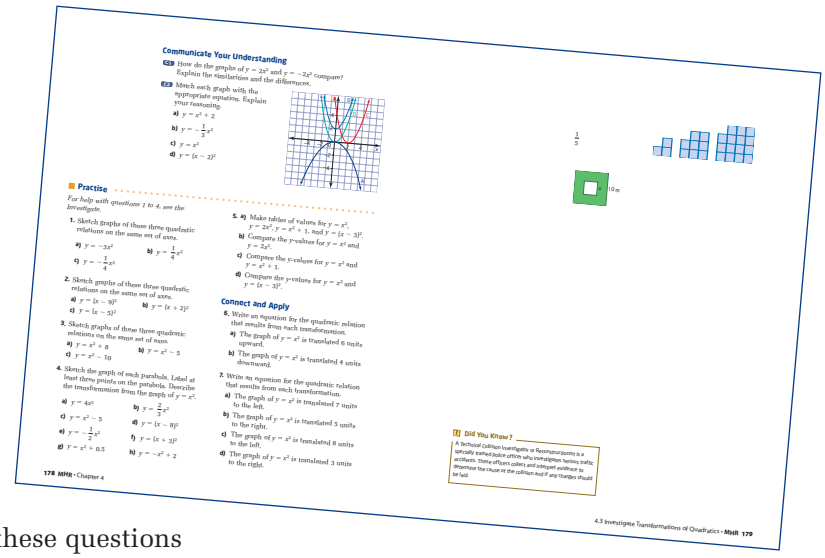
Communicate Your Understanding

These questions allow you to reflect on the concepts of the section. By discussing these questions in a group, you can see whether you understand the main points and are ready to start the exercises.

Exercises

Practise

- These questions provide an opportunity to practise your knowledge and understanding of the new concept.
- To help you, questions are referenced to the examples.



Connect and Apply

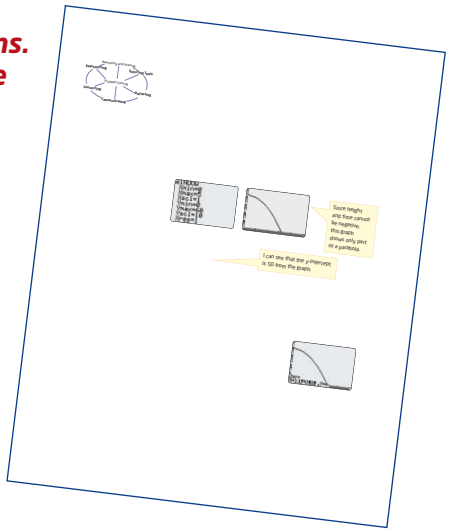
- These questions allow you to use what you have learned to solve problems and make connections among concepts. In answering these questions you will be integrating your skills with many of the math processes.
- There are many opportunities to use technology. If specific tools or materials are needed, these are noted and the question has a **Use Technology** descriptor.

Extend

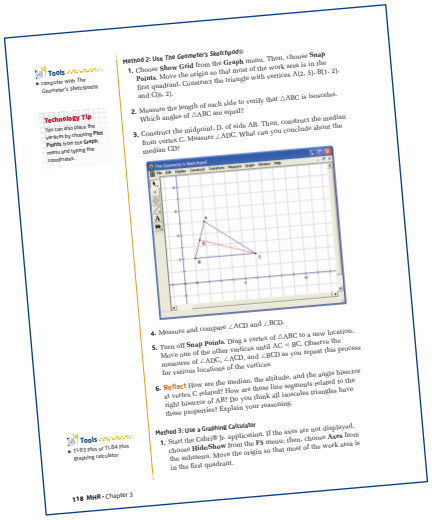
- These are more challenging and thought-provoking questions.
- Most sections conclude with a few **Math Contest** questions.

Technology

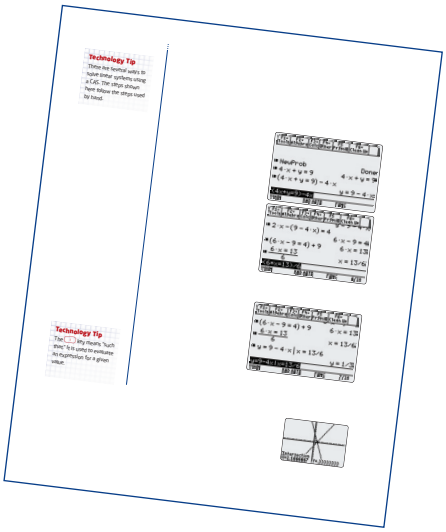
Scientific and graphing calculators are useful for many sections. Keystroke sequences are provided for techniques that may be new to you.



- A TI-83 Plus or TI-84 Plus graphing calculator is useful for some sections, particularly for graphing relations. In the analytic geometry chapters, alternative methods using Cabri® Jr are shown.



- *The Geometer's Sketchpad*® is used in several sections for investigating concepts related to analytic geometry. Alternative steps for doing investigations using pencil and paper are provided for those who do not have access to this computer software.



- Some sections show you how to use a computer algebra system (CAS) to explore algebraic processes or as an alternative tool to solve algebraic problems. This text uses the TI-89 calculator.

Technology Tip

- This margin feature points out helpful hints or alternative strategies for working with graphing calculators or *The Geometer's Sketchpad*®.

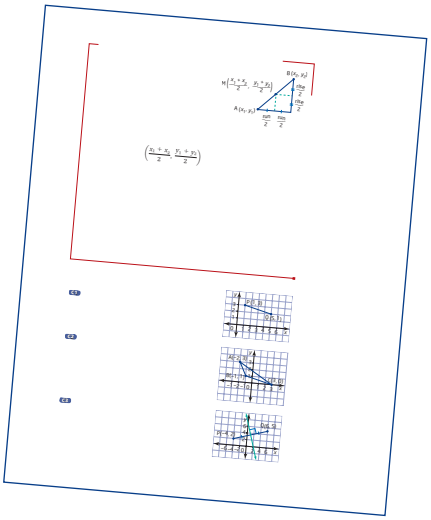
Technology Appendix

- The **Technology Appendix** provides detailed help with all the functions of the graphing calculators and *The Geometer's Sketchpad*® that are used in this course.

Assessment

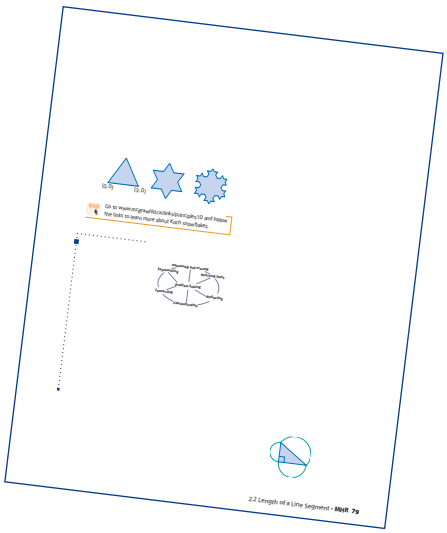
Communicate Your Understanding

- These questions provide an opportunity to assess your understanding of the concepts before proceeding to use your skills in the Practise, Connect and Apply, and Extend questions.
- Through this discussion you can identify any concepts you need to study further.



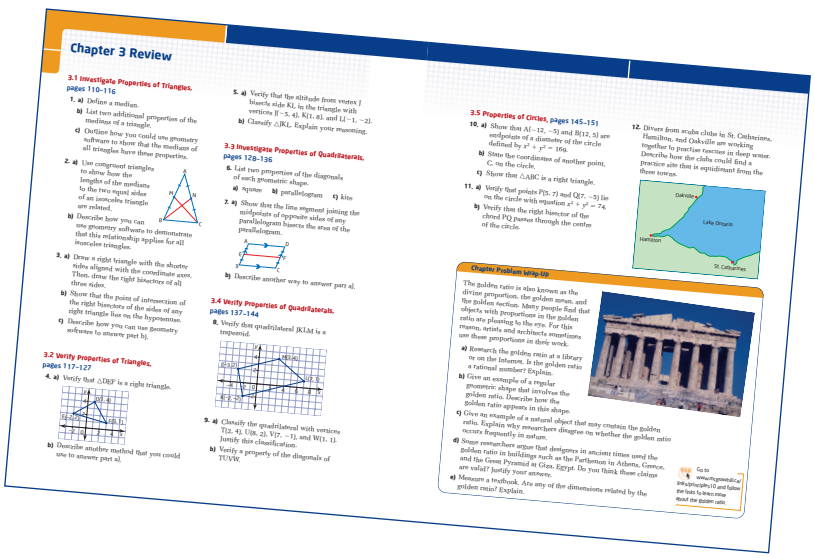
Special Connect and Apply Questions

- Some questions are related to the **Chapter Problem**.
- **Achievement Check:** The last Connect and Apply question of some sections provides an opportunity to demonstrate your knowledge and understanding and your ability to apply, think about, and communicate what you have learned. Achievement Check questions occur every two or three sections and are designed to assess learning of the key concepts in those sections.



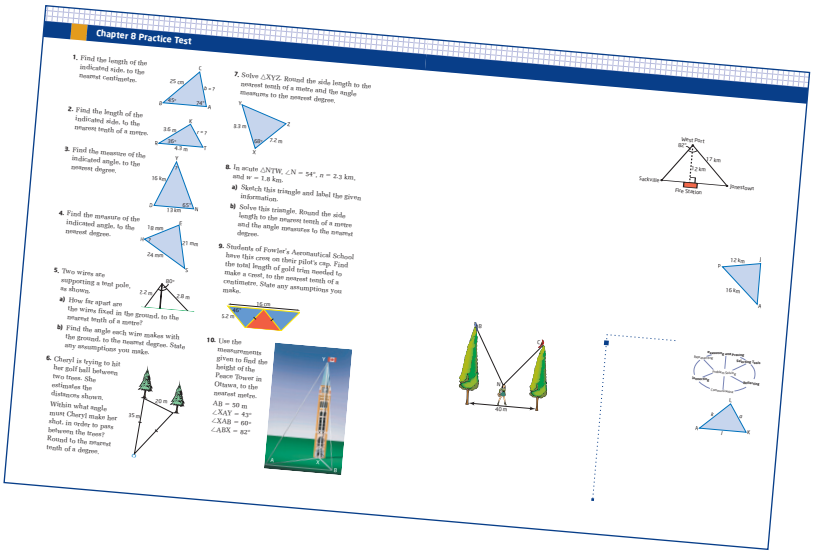
Chapter Problem Wrap-Up

This summary problem occurs at the end of the **Chapter Review**. The **Chapter Problem** may be assigned as a project.



Practice Test

- Each chapter ends with a practice test.

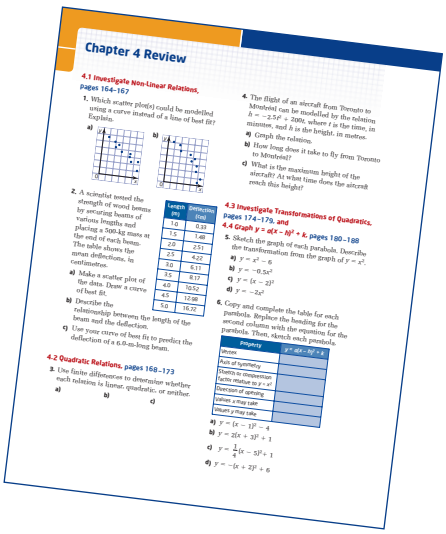


Tasks

- Tasks are presented at the end of Chapters 3, 6 and 8.
- These are more involved problems that require you to use several concepts from the preceding chapters. Each task has multi-part questions and may take about 20 min to complete.
- Some tasks may be assigned as individual or group projects.

Chapter Review

- This feature appears at the end of each chapter.
- By working through these questions, you will identify areas where you may need more review or study before doing the Practice Test.



Cumulative Review

- A cumulative review occurs at the end of Chapters 3, 6, and 8. These questions allow you to review concepts you have learned in the chapters since the last cumulative review. They also help to prepare you for the tasks that follow.

Course Review

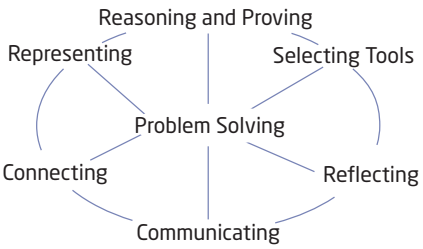
- A Course Review follows the tasks at the end of Chapter 8. This comprehensive selection of questions will help you to determine if you are ready for the final examination.

Other Features

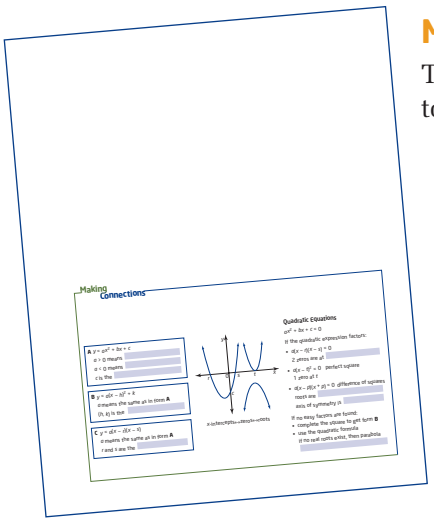
The Mathematical Process

These seven mathematical processes are integral to learning mathematics:

- problem solving
- reasoning and proving
- reflecting
- selecting tools and computational strategies
- connecting
- representing
- communicating



These processes are interconnected and are used throughout the course. Some examples and exercises are flagged with a math processes graphic to show or remind you which of the processes are involved in solving the problem.



Making Connections

This feature points out some of the connections between topics in the course, or to topics learned previously.

Literacy Connections

This margin feature provides tips to help you read and interpret items in math.

Literacy Connections

It is a good idea to read a word problem three times.

Read it the first time to get the general idea.

Read it a second time for understanding. Express the problem in your own words.

Read it a third time to plan how to solve the problem.

Internet Links

This logo is shown beside questions in which it is suggested that you use the Internet to help solve the problem or to research or collect information. Some direct links are provided on our Web site *www.mcgrawhill.ca/links/principles10*.

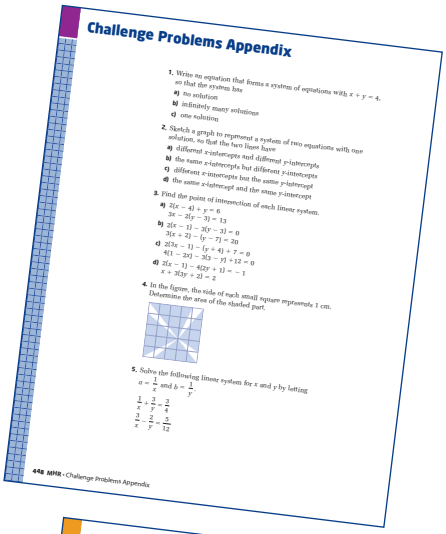
Did You Know?

This feature provides interesting facts related to the topics in the examples or the exercises.

Did You Know?

Household white vinegar is 5% acetic acid. A 5% acetic acid solution means that 5% pure acid is mixed with 95% water. For example, 1 L of white vinegar contains 50 mL of pure acetic acid and 950 mL of water.

Appendices


Challenge Problems Appendix

1. Write an equation that forms a system of equations with $x + y = 4$, so that the system has
a) no solution
b) infinitely many solutions
c) one solution

2. Sketch a graph to represent a system of two equations with one solution, so that the two lines have
a) different x-intercepts and different y-intercepts
b) the same x-intercepts but different y-intercepts
c) different x-intercepts but the same y-intercept
d) the same x-intercept and the same y-intercept

3. Find the point of intersection of each linear system.
a) $3(x - 4) + y = 6$
$2x - 2(y - 3) = 13$
b) $2(x - 1) - 3(y - 3) = 0$
$3(x + 2) - (y - 7) = 20$
c) $2(3x - 1) - (y + 4) + 7 = 0$
$4(1 - 2x) - 3(3 - y) + 12 = 0$
d) $2(x - 1) - 4(2y + 1) = -1$
$x + 3(2y + 2) = 2$

4. In the figure, the side of each small square represents 1 cm. Determine the area of the shaded part.

5. Solve the following linear system for x and y by letting $a = \frac{1}{x}$ and $b = \frac{1}{y}$.
$\frac{1}{x} - \frac{2}{y} = \frac{2}{3}$
$\frac{3}{x} - \frac{2}{y} = \frac{5}{12}$

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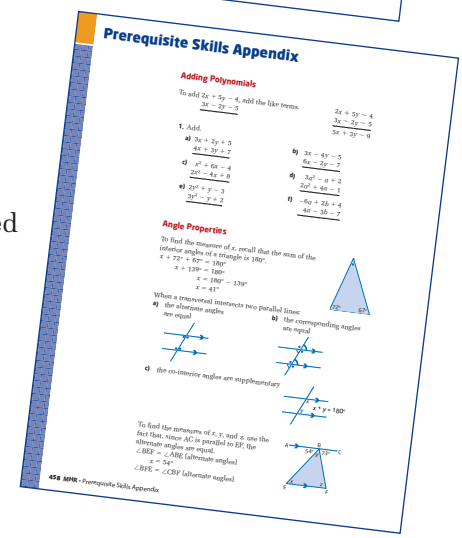
Prerequisite Skills Appendix

Adding Polynomials

To add $2x + 5y - 4$, add the like terms.
$3x - 2y - 5$
$2x + 5y - 4$
$3x - 2y - 5$
$5x + 3y - 9$

1. Add.
a) $3x + 2y + 5$
$4x + 3y + 7$
b) $3x - 4y - 5$
$5x - 2y - 7$
c) $x^2 + 6x - 4$
$2x^2 - 5x - 8$
d) $3y^2 - a + 2$
$2a^2 + 4a - 1$
e) $2y^2 + y - 2$
$3y^2 - y + 2$
f) $-6a + 2b + 4$
$4a - 3b - 7$

Angle Properties

To find the measure of x, recall that the sum of the interior angles of a triangle is 180°.
$x + 72° + 67° = 180°$
$x + 139° = 180°$
$x = 180° - 139°$
$x = 41°$

When a transversal intersects two parallel lines:
a) the alternate angles are equal
b) the corresponding angles are equal
c) the co-interior angles are supplementary

To find the measures of x, y, and z, use the fact that, since AC is parallel to EF, the alternate angles are equal.
$\angle BEF = \angle ABE$ (alternate angles)
$x = 54°$
$\angle BFE = \angle CBF$ (alternate angles)

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Challenge Problems Appendix

A varied selection of more difficult problems is presented on pages 448–457. Some are directly related to the content of this course, while others are more general "puzzler" problems. These problems will provide new challenges and enrichment. They will help if you are planning to take the grade 11 university course to prepare for more difficult problems.

Prerequisite Skills Appendix

If you need help with any of the topics in the Get Ready for each chapter, refer to this appendix on pages 458–475. Examples and practice questions are provided. The topics are arranged in alphabetical order.

Technology Appendix

The **Technology Appendix**, on pages 476–503, provides detailed help for some basic functions of the TI-83 Plus or TI-84 Plus graphing calculator, the computer algebra system on the TI-89 graphing calculator, and *The Geometer's Sketchpad*®. These pages will be particularly helpful if you have not used these tools before.

Other Back Matter

Glossary

A complete illustrated glossary is included. All key terms of the text, as well as other mathematical terms, are listed on pages 570–581. This is a good resource if you want to check the exact meaning of a term.

Answers

Complete illustrated answers are provided for all questions in each Get Ready, numbered section, Chapter Review, and Practice Test. Refer to pages 504–569. Answers for the Achievement Check questions, the Chapter Problem Wrap-Up, the Investigate questions, and Communicate Your Understanding questions are provided in *Principles of Mathematics 10 Teacher's Resource*.

Index

A general index is included on pages 582–585.